Underpricing on Initial Public Offerings: Further Evidence from the JSE

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Abstract

This paper provides evidence of the existence of IPO underpricing on the JSE between 2000 and 2008. Average underpricing over the period was found to be 17.1 percent (median: 9.4 percent). In line with the general global decline in first day returns following the end of the internet bubble period, average underpricing on the JSE has decreased relative to previous studies. Hot and cold periods were found to exist and initial returns in the hot period (26.5 percent) were significantly higher than in the cold period (5 percent). Weak evidence was found to suggest that smaller IPOs experience higher underpricing. No relationship was found between underpricing and the absolute offer price or the proportion of shares offered.

Chapter I: Introduction

Conducting an initial public offering (IPO), also known as 'going public', involves listing on a stock exchange and simultaneously offering shares to the general public[1]. Firms go public for a number of reasons, including raising of capital, facilitating merger and acquisition activity, creating an opportunity for insiders to cash out and building a public profile for the company.

Generally companies going public offer the shares to subscribers at a price below the economic value of the shares resulting in the closing price on the first day of trading being higher than the offer price. The phenomenon is known as underpricing and often results in substantial price increases on the first day of trading. The average first day return (percentage increase from the offer price to closing price at the end of the first day of trading[2]) for IPOs in the United States between 1960 and 2006 was 18 percent (Loughran, Ritter and Rydqvist, 2007). Bear in mind that this is not an annual return, but refers to the price increase in a single day. It represents a transfer of value from issuing shareholders to subscribing investors and between 1990 and 2008 a total of $122.41bn was foregone by shareholders in this way, or "left on the table". Loughran and Ritter (2002) define *money left on the table* as the difference between the issue price and the closing price on the first day of trading multiplied by the number of shares offered; or the amount by which the proceeds would have been higher had the shares been offered at the first day closing price.

The so-called 'underpricing puzzle' (the extent of underpricing and the willingness of shareholders to give up such enormous value) has attracted substantial research attention and a significant body of research exists. Strong evidence of underpricing has been found in numerous markets worldwide (United States – Ibbotson, 1975; Ritter, 1984; United Kingdom – Levis, 1993; Latin America – Aggarwal, Leal and Hernandez, 1993; Finland – Keloharju, 1993) including the Johannesburg Securities

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[1] Firms can list on an exchange without offering shares and this is known as an Introduction. Introductions are outside the scope of this study. Listing methods are discussed in detail in chapter II.
[2] The terms *first day return, initial return, underpricing* and *initial premium* are used interchangeably.

Exchange (Barlow and Sparks, 1986; Bradfield and Hampton, 1988; Page and Reyneke, 1997). Possible reasons for underpricing include enticing investors into the market when information asymmetry exists, creating confidence in investors for future equity offerings, decreasing the marketing effort required for the IPO and reducing potential legal liability.

The internet bubble period of the late 1990's saw an unprecedented increase in underpricing with average first day returns in the United States (a country historically exhibiting among the lowest levels of underpricing internationally) rising to 71 percent in 1999 (Loughran, Ritter and Rydqvist, 2009). On the Johannesburg Stock Exchange (JSE) the average initial premium for 1998 was a staggering 109 percent (M'kombe and Ward, 2002). Following the excesses of the late 1990's, the first half of the subsequent decade saw a complete turnaround and some of the lowest levels of underpricing to date. This change has sparked renewed interest among researchers. Between 1999 and 2000 investors in the United States left $66.64bn *on the table*; an average of $33bn per annum. From 2001 to 2009, the total amount left on the table was $27.60bn; an average of $3.06bn per annum (Loughran, Ritter and Rydqvist, 2009). Both the aggregate proceeds and the number of IPOs were greater in the latter period, however, the average first day return for 1999 and 2000 was 64.4 percent compared to 11.9 percent in the subsequent nine years (Loughran, Ritter and Rydqvist, 2009).

To date, no study of initial premia on the main board of the JSE in the post internet bubble period has been published. This paper examines the JSE for the period 2000 to 2008 for evidence of the recent international trends in IPO underpricing levels.

This research is of particular importance given the time periods of previous studies on the JSE. All previously published studies on the JSE included the years 1985-1987 in which underpricing in South Africa was exceptionally high. Bhana (1989) studying only that period found mean underpricing to be 65.6 percent; Lawson and Ward (1998) also found that period to be substantially higher than the other years examined. Furthermore, the listing volumes in this period were particularly high, serving to increase the weighting of those years in the total sample averages in all existing JSE studies. As a result, there is a need for evidence on the JSE which can be freely compared to international evidence.

The objective of the paper is to test for the existence of underpricing on the JSE for the period January 2000 to December 2008 and to measure the extent of initial premia over the period under examination. Furthermore, this paper undertakes to perform additional analysis on certain IPO characteristics and their relation to the extent of underpricing and results will be reviewed in light of the findings of international and previous local studies.

The main objectives of this research were formulated into the following research questions:

- Does underpricing exist on the JSE in the period under examination, and if so, what is the extent of the underpricing?
- Has underpricing on the JSE changed over time?
- Do certain IPO characteristics affect the degree of underpricing?

The second chapter of this paper reviews the IPO process in South Africa, focusing on why firms go public, the JSE listing requirements, methods of going public and IPO pricing mechanisms available to firms.

Chapter III examines previous research including evidence of underpricing and existing theories for the reasons for underpricing. The fourth chapter describes the sample of IPOs used in the study and explains research methods used.

Several aspects of IPO underpricing are investigated and discussed in Chapter V. Firstly, the average underpricing for the sample period will be analysed in aggregate and by time period. Thereafter, the relationship between the level of underpricing and offer size, hot and cold issue periods, absolute offer price and proportion of shares offered will be examined. Chapter VI concludes on findings.

Chapter II: IPO Process in South Africa

The act of going public is one of the most important steps in a company's life cycle. From the time the decision to go public is made, it is a number of months before the company is finally ready to list. In that time the company must ensure compliance with substantial regulatory requirements and must make and prepare to implement a number of crucial decisions regarding the method of listing and pricing of the offer.

This chapter investigates the reasons that firms go public with specific reference to the South African market. This is followed by a brief description of the listing requirements of the JSE as well as the listing methods available to firms. The final section of this chapter is an analysis of the pricing decisions and mechanisms available to issuing firms.

Why Firms Go Public

Listing on a stock exchange carries a number of benefits for firms, including opening up an enormous capital market in which firms can raise equity; facilitating merger and acquisition activity; and raising the public profile of the company. BDO performed a survey of Chief Executive Officers of JSE listed companies and compiled a schedule of the main reasons that the companies listed (BDO, 2011). An extract of the results has been included in Table 1 below.

The CEO's surveyed were almost unanimous in stating that the principal reason for listing was the raising of capital at the time of listing, and in the future. Furthermore, most noted that they would not have been able to grow the company to the extent achieved had they not been listed. This included the use of shares in merger and acquisition activity.

The second most important advantage was raising the business profile and brand awareness. The CEO's believed that in a highly competitive business environment strategic marketing and brand management is critical and going public and the exposure that inevitably comes with listing is seen as a key tool to achieve this.

Using an IPO as an exit strategy and a means for existing shareholders to cash out was the third most common reason. Owners cashing out include entrepreneurs,

families exiting family businesses and venture capitalists, but do not include holding companies unbundling subsidiaries. No other reasons for going public were referred to by more than one fifth of firms.

The most noteworthy of the remaining factors cited, was the facilitation of Black Economic Empowerment (BEE) deals. In the South African market, there is additional incentive to go public in order to facilitate BEE transactions. One of the main contributors on the BEE scorecard is the level of black ownership (South Africa - Department of Trade and Industry (DTI), 2011). Firms applying for licences from the state or supplying products and services to government are required to achieve a certain minimum score on the BEE scorecard. One of the aspects covered by the BEE scorecard is procurement, and firms earn higher points for higher percentage procurement from firms with high BEE ratings (DTI, 2011). Thus, firms in certain industries, (supplying services to government directly for example) have a significant incentive to achieve a good BEE rating. Firms supplying these providers also have an incentive, but to a lesser extent and thus there is a trickledown effect.

Setting a benchmark price for BEE transactions was ranked joint fourth and was only cited by 13 percent of respondents (BDO, 2011). This ranking may at first appear surprisingly low, given the strong political focus on empowerment and the wide media coverage of high profile empowerment deals. However, one must consider that the benefits and costs of BEE compliance are specific to each firm and industry. As a result, only certain ones will obtain a tangible benefit from achieving BEE compliance. Thus, by including firms from industries in which there is little benefit of achieving a high BEE rating, the results of the survey quoted above are likely to understate the importance of BEE transactions in industries in which it is important.

TABLE 1

Reasons for Listing on the JSE – Excerpt from BDO Survey

No	Reasons for Listing	No of Companies	%
1	Raise capital now and in the future	19	63%
2	Raise the business profile and create brand awareness	11	37%
3	As an exit strategy and to unlock value for shareholders	9	30%
4	Forced to list by the holding company in unbundling	4	13%
4	Benchmark the price for BEE and avoid empowerment discounting	4	13%
4	Drive reorganisation, governance and compliance	4	13%
4	Retirement of debt	4	13%
4	Get recognition of the business strategy	4	13%
9	Facilitate establishment and management of employee share schemes	3	10%
10	Improve credibility with stakeholders	3	10%

(Source: BDO Research Project into JSE Listing, 2011)

Similar results have been found internationally. A 2006 survey by Brau and Fawcett (2006) revealed that across the 336 Chief Financial Officers in the United States, facilitating merger and acquisition activity was ranked as the most important reason for going public. They noted that going public gives the company publicly traded shares which can be used in the purchase of other companies, can provide the firm with cash for acquisitions, and also gives the company a clear market value. This is consistent with findings in the South African context. The second ranked consideration was the establishment of a market price which, coupled with the first ranked point, clearly shows that CFO's view IPOs as a tool in the acquisition process. Brau and Fawcett (2006) then tested whether merger and acquisition activity is greater in the IPO sample than amongst benchmark firms. They observed 141 acquisitions coming from the IPO sample as compared to 96 for benchmark firms, with a chi square test significant at the one percent level. This supports the proposition that firms go public to facilitate growth and acquisitions.

Enhancing reputation was ranked third and adjusting capital structure was the fourth most important factor. Pagano, Panetta and Zingales (1998) found empirically that investment and firm growth are not positively related to likelihood of listing in Italian firms, but rather that firms conduct IPOs to rebalance capital structure *after* periods of high growth. The study was consistent with other European findings (Pagano et al.

cite studies in Spain and Sweden) but not with United States literature (see Mikkelson, Partch and Shah, 1997). The contrast is likely due to firm age, which is significantly higher in the European markets and Mikkelson et al. (1997) found that older US firms raised capital to decrease debt rather than finance expansion.

The next two reasons cited in the Brau and Fawcett (2006) survey were broadening the ownership base and allowing principal shareholders to diversify personal holdings. Pagano et al. (1998) found that companies that conduct an IPO have a significantly increased turnover in control over a three year period which is consistent with the theory that going public facilitates broadening of the ownership base and also offers some evidence for use of IPOs for the exiting of investments, especially by venture capitalists. Other reasons noted in the survey include attracting analyst attention and firms' having run out of private equity with debt financing becoming too expensive.

In deciding whether or not to go public, firms must balance the benefits noted above with some substantial costs. In the process of listing itself the firm incurs underwriter fees, registration fees and additional indirect costs to meet listing requirements. Added to the aforementioned expenses is the value that is transferred from existing to new shareholders through underpricing of the offer.

Once listed, firms are required to comply with a range of stock exchange regulations, increased auditing fees and distribution of annual reports amongst others. These increased costs are especially onerous for small companies as the costs are essentially fixed and do not increase proportionately as firms get larger. Furthermore, small companies generally do not have the administrative infrastructure of their larger counterparts to cope with the increased administrative burden of being listed.

JSE Listing Requirements

The JSE has set out certain criteria which must be met by all firms wishing to obtain a listing. Requirements cover profit history, share capital and shareholder base and financial reporting amongst other aspects. Firms currently listed must continue to meet these requirements to maintain their listing. The listing requirements of the main board of the JSE and the Alternative Exchange are summarised in Table 2 below.

The Alternative Exchange (AltX) was founded in 2003 to give small to medium sized companies access to capital markets and the listing requirements are less onerous than those of the main board. The AltX is a division of the JSE Securities Exchange and effectively replaces the Development Capital Market (DCM) and the Venture Capital Market (VCM). Approximately one third of the initial listings on the AltX were firms transferring from the DCM and VCM (Correia and Holman, 2008). The DCM and VCM were established for the same purpose as the AltX but were not successful due to the low quality of listings.

TABLE 2

Key Listing Requirements on the JSE:

Requirement	Main Board	AltX
Share capital	R25 million	R2 million
Profit history	3 years	N /A
Pre-tax profit	R8 million	N /A
Shareholder spread	20%	10%
Number of shareholders	500	100
Sponsor/DA	Sponsor	Designated adviser
Publication of financial results in press	Compulsory	Voluntary
Number of transaction categories	3	2
Special requirements	N /A	Financial director
Educational requirements	N /A	All directors to attend the Directors Induction Program

Obtained from "How to List" guidelines on the JSE website (Johannesburg Securities Exchange, 2011)

The JSE also has requirements specific to the actual process of listing. Firms seeking a listing are required to appoint a sponsoring broker who must be registered with the JSE. The responsibilities of the sponsoring broker are laid out in section four of the listing requirements and include ensuring that the applicant (issuing firm) meets the listing criteria, guiding the listing firm in the application of the listing requirements, ensuring the directors of the applicant understand their responsibilities and submitting the required documentation to the JSE (Johannesburg Securities Exchange, 2011).

Issuing firms generally hire an investment bank[3] to assist with coordinating the listing, compliance with listing requirements, selecting the best method of listing, drafting listing documentation, setting the offer price and other related tasks. The JSE regulations require all offers to the public to be underwritten and this is usually done by the investment bank (Barlow and Sparks, 1986).

Methods of Going Public

The JSE listing requirements (2011) allow for various methods through which firms can bring their securities into the public market.

Introduction

In an introduction, the applicant lists on the exchange without conducting any offer of shares. This would be preferred by firms not seeking to raise capital and which already have a shareholder base that is sufficiently broad to comply with the listing requirements. As firms listing via an introduction do not offer shares, introductions are excluded from the definition of IPO and are thus beyond the scope of this paper.

Offer of Shares

Firms seeking to raise capital or broaden their shareholder base can do so by either making an offer of shares to the general public, conducting a placement (where large blocks of shares are "placed" with one or more large investors, usually institutional investors) or use a combination of the two, known as a *hybrid* or *mixed offer*.

Placements are generally cheaper as they do not require the same extent of marketing and involve fewer counter parties than offers to the public. For this reason they are favoured by small companies. In South Africa this is evidenced by the fact that most IPOs on the AltX are done via placements (Correia and Holman, 2008). On the main board of the JSE the majority of small IPOs (approximately R37m and below) are also conducted via placements, with hybrid offers being more frequently used in larger IPOs (Lattimer, 2006).

Placements and offers to the public will form the main focus of this study.

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[3] The terms underwriter, investment banker and merchant bank are used interchangeably.

There are certain ways in which a company seeking a listing can become listed without going through the process of listing its own shares. Two examples of these so called "backdoor listings" are *reverse takeovers* and *cash shells* (Barlow and Sparks, 1986)*.* To execute a reverse acquisition, it is arranged that the company wanting to list is purchased by a smaller listed company. Control of the listing company is transferred from the small listed company to the existing shareholders of the larger firm via an issue of the listed company's shares or via the arranged sale of the smaller firm's shares. In a *cash shell* deal, the firm desiring a listing takes over a listed firm which has cash as the major portion of its assets and then uses the cash to acquire the operations of the other firm (Barlow and Sparks, 1986).

As *backdoor* methods involve using an existing listed company to facilitate listing, this class of listing method is excluded from the definition of IPO and consequently from this study.

Determining the Offer Price

Absolute Offer Price Range

Before conducting an IPO, firms have an opportunity to decide on the approximate price range for their stock, and regularly make use of pre-IPO stock splits to facilitate this in practice. For a given firm value, the split into the number of shares times the price would not be expected to be of economic significance at first glance. For example, consider a firm with an estimated value of $1,000 - the division into 100 shares of $10 as opposed to 1,000 shares of $1 would appear arbitrary. Empirical evidence has, however, shown this not to be the case. Evidence has shown that firms in the United States for example, favour offer prices between $10 and $20 (Ritter, 1998; Lipman, 2000).

In a cross sectional analysis of IPO underpricing, Chalk and Peavy (1987) tested the relationship between the absolute offer price and the extent of underpricing and found that the degree of underpricing in different offer price groups was significantly different. While total sample first day returns averaged 21.67 percent, the average initial return for the 174 IPOs priced below $1 was 56.43 percent; nearly five times as much as the rest of the sample. Ibbotson, Sindelar and Ritter (1988) added to this evidence, finding that offers with a price of $3 or less tended to be more underpriced

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than higher priced offers and surmised that the more speculative offers were priced lower.

Fernando, Krishnamurthy, and Spindt (2002) also found a relationship between underpricing and absolute offer price, however they found that the relationship was not linear, but U-shaped. They measured underpricing at its lowest for shares priced between $6 and $12 and higher for shares price below $6 or above $12.

The same study also found that institutional investors tend to avoid low priced stocks. Under Rock's (1986) Winner's Curse model (discussed in detail under *Reasons for Underpricing* later in this chapter), a greater proportion of uninformed investors will lead to greater levels of underpricing. In the low price ranges, the lower proportion of institutional investors (assumed to be informed) would be expected to result in higher levels of underpricing, as observed.

Under the Benveniste and Spindt (1989) market feedback hypothesis (also discussed in detail under *Reasons for Underpricing)*, informed investors are compensated for the truthful revelation of their information about the value of a stock. This leads to higher underpricing in the presence of a very high proportion of institutional investors, as observed in the higher price ranges.

The reasons Fernando, Krishnamurthy, and Spindt (2002) put forward for institutional investors avoiding lower priced stocks are increased liquidity and lower relative transaction costs (as suggested by Gompers and Metrick, 2000) and because they are thought to have higher quality (as in Lipman, 2000).

Thus, firms must select an offer price range that will attract the investors that they are targeting.

IPO Pricing Mechanisms

After the approximate offer price range has been established, firms have a number of pricing mechanisms available for determining the exact offer price; the two most common of which are fixed priced offers and bookbuilding (also known as American bookbuilding). The use of fixed price mechanisms generally involves setting the offer price relatively far in advance of the IPO; at a time when information about extent of demand is limited (Ritter, 2003). Typically IPOs for which the fixed price method was used were highly oversubscribed. Shares are then allocated using some sort of

equitable rationing scheme. The use of fixed price mechanisms tends to result in high underpricing (Loughran, Ritter and Rydqvist, 1994).

With respect to bookbuilding, a few aspects of the process differ from country to country (including size of file price range, frequency/legality of upward revision and the timing around the setting of the final offer price), but the fundamental process is consistent across international borders. Firms set a price range of approximately $2 (for example $10-12) and then conduct a road show of approximately two weeks, during which time they canvass potential investors to gauge demand for the IPO. The file price range is occasionally revised if demand is significantly higher or lower than expected. Close to the first date of trading, a final offer price is selected from within the file price range. Shares are then allocated *at the discretion* of the underwriter as opposed to a systematic or 'fair' allocation.

A large number of countries, especially in Europe, have moved to bookbuilding, largely due to the more accurate pricing made possible by the gathering of information prior to setting the offer price (Ritter, 1998). The direct costs of bookbuilding are significantly higher than fixed price offers, but these costs are often recovered indirectly through significantly lower underpricing. Loughran, Ritter and Rydqvist (1994) found that among discretionary allocation IPOs, fixed price resulted in average underpricing of 37 percent in comparison to bookbuilding which averaged 12 percent.

A considerable drawback of bookbuilding lies in the ability of the investment banker to allocate shares at their discretion. This allows the underwriter to set a lower than optimal offer price (from the perspective of the issuing firm) and then allocate shares to favoured clients or executives of potential IPO firms who then make substantial profits when the shares begin trading. In return, the clients pay artificially high commissions to the investment banker for other, unrelated services and the executives of potential IPO firms choose that investment banker as the lead underwriter. The above practice, known as "spinning", can result in substantial loss of value for the issuing firm (Pettway, 2004 and Ritter, 1998).

An alternative pricing method is the use of auctioning, which has been associated with the lowest level of underpricing (Loughran, Ritter and Rydqvist, 2004) and, like bookbuilding, involves the gathering of information prior to setting the offer price.

Where auctioning is used the allocation of shares is not discretionary. The use of bookbuilding in preference to auctions is not yet fully explained by research (Pettway, 2004).

Chapter III: Previous Research

Substantial evidence has been accumulated globally over the past half century to suggest that on average IPOs are priced at a discount from their true economic value. The first section of this chapter reviews international evidence of initial premia with a brief review of the evidence of post-issue (or "aftermarket") performance. This is followed by an examination of South African studies of IPO underpricing and aftermarket performance.

The remarkable consistency with which empirical results have provided evidence of underpricing across time periods and markets has stimulated extensive investigation into the causes of this phenomenon (Ljungqvist, 2005). While the aim of this paper is not a direct test of any of the theories of underpricing, an appreciation for the reasons for underpricing is necessary for the understanding of IPO pricing in general and of the changes in underpricing over time. Furthermore, the results of this paper do provide an indirect test of certain theories. The second section of this chapter will review the main theories of underpricing and briefly discuss the empirical support for each one.

The final section of this chapter will summarise the needs for further research in relation to existing evidence discussed in the first two sections of this chapter.

Evidence of Underpricing

International Evidence - Initial Premia

Stoll and Curly (1970), Logue (1973) and Ibbotson (1975) first documented overwhelming evidence of the systematic underpricing of IPOs. Ibbotson and Jaffe (1975) conducted the first study over an extended time period covering all 2885 US IPOs between 1960 and 1970. They found the average initial premium to be 17 percent. Studies prior to that were generally over short time periods or on limited data (Barlow and Sparks, 1986). Beatty and Ritter (1986) examined the period from 1977 to 1982 finding the average underpricing to be somewhat higher at 26 percent.

Early studies in the United Kingdom revealed a similar phenomenon. Williams (1972) studied 268 IPOs between 1966 and 1970, observing average premia of 11 percent.

Identical findings were obtained by Vaughn, Grinyer and Birley (1977) for the period between 1966 and 1974.

Subsequent to these studies, there have been countless investigations worldwide on the initial premia on IPOs. Average first day returns in the US and UK over the preceding half century have been 18 percent and 16.8 percent respectively. Loughran, Ritter and Rydqvist (2007) have maintained a summary listing of international IPO findings. Refer to Figure 1 below.

Figure 1
Average Initial Return - 36 Countries
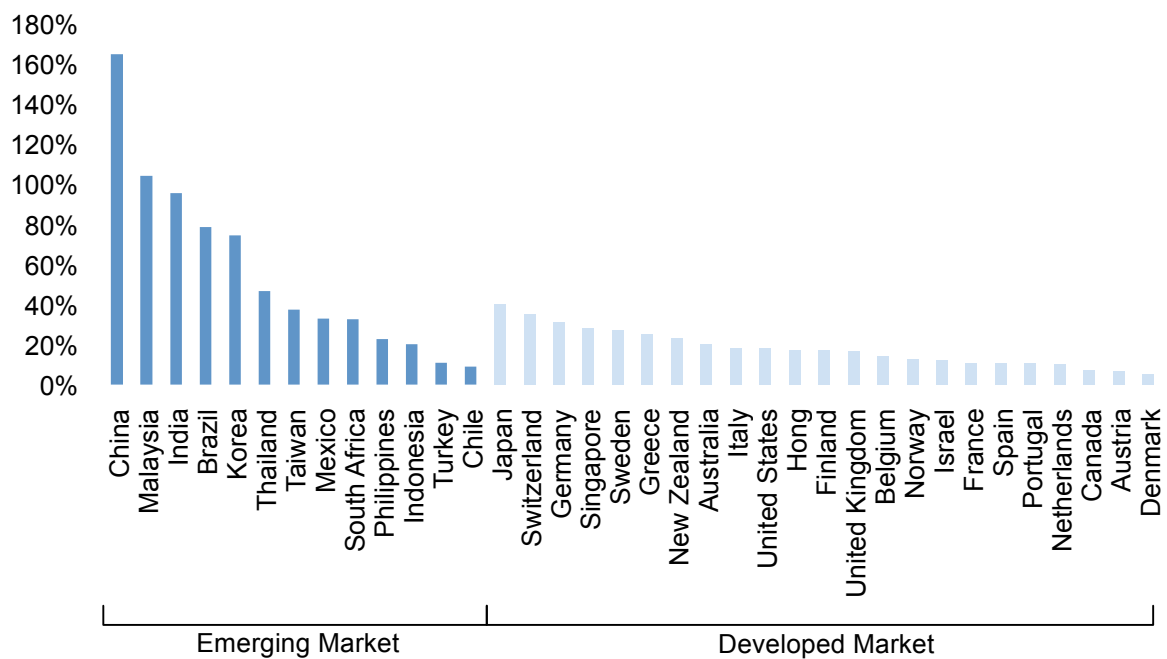
Source: Adapted from Loughran, Ritter and Rydqvist (2007)

Note: results presented in the chart above represent combinations of numerous studies to show an average across all years that have been examined in that particular country. As such, the time periods of different countries will not match exactly.

Classification of Emerging and Developed Markets is from MSCI (2011).

It is clear that the degree of underpricing varies considerably between countries. Germany experiences significantly greater underpricing than its neighbour, Austria (31 percent as opposed to 6.5 percent), while initial returns in Asia are notably higher

than South America. These differences are likely to be partly due to regulatory differences around the IPO process (Ljungqvist, 2005).

In general, developed markets like the United States, United Kingdom, Australia, Canada, Germany and the Netherlands tend to have lower levels of underpricing than emerging markets. 23 of the countries included in Figure 1 are included in the Morgan Stanley Capital International (MSCI) list of developed nations (MSCI, 2011). The average level of underpricing for these nations is 18.1 percent (median: 17.2 percent). This is somewhat lower than the simple average of all counties presented of 32 percent (median: 20 percent). The highest initial premia of the developed nations is Japan at 40.1 percent and only 8 out of the 23 (35 percent of the group) exhibit underpricing of more than 20 percent.

There are 13 emerging markets, as defined by MSCI (2011), in the chart above. The average initial premium among these countries of 56.1 percent is substantially greater than that of the developed nations (18.1 percent). Even when China and Malaysia, both with underpricing greater than 100 percent, are removed the average of 41.9 percent is still more than double that of developed nations. Similarly, the median of 37.2 percent is considerably greater than the 17.2 percent found in developed nations. 11 out of 13 emerging market countries (85 percent of the group) experienced underpricing of more than 20 percent. In addition to regulatory differences, a possible cause for the higher premia in emerging markets is the higher level of uncertainty in these countries which is discussed in further detail in the second section of this chapter, *Reasons for Underpricing,* below.

Early evidence of underpricing in emerging markets was obtained from Latin America by Aggarwal, Leal and Hernandez (1993) in a study including Brazil, Chile and Mexico. In Brazil, 62 new stock issues were studied between 1980 and 1990. The mean first day return was 78.5 percent and the median was 36.5 percent; both considerably higher than results obtained in developed markets. They found that the majority of the excess returns accrued to the shareholders on the first day of trading, noting that the median return after one month of trading was 44.9 percent (Aggarwal, Leal and Hernandez, 1993).

Data for Chile were collected for the period 1982 to 1990 and included 36 IPOs. Average initial returns over that period were 16.3 percent, though this was not

significantly different from zero due to the small sample size. Median return was only 0.5 percent. This level is lower even than that found in developed countries and the reason for the difference may lie in the issue process. Chile makes use of the auction pricing method which has been shown to result in lower initial returns (Aggarwal, Leal and Hernandez, 1993).

The sample for Mexico comprised 44 new offerings which took place between 1987 and 1990. The average first day return of 2.8 percent was not statistically significant and the median was 0.7 percent. However, the results of this study were strongly affected by the crash of October 1987 due to the short period under examination. The crash caused a fall in the Mexican market of nearly two thirds and IPO firms fell by even more. For this reason, the one month return of 33 percent is quoted by Loughran, Ritter and Rydqvist (2007) in the chart above and can be considered a more reliable measure. This figure is more in line with other emerging markets.

Chen, Choi and Jiang (2007) found that for 1,213 IPOs in China between 1990 and 2006, the average first day return was 213 percent. This number is well in excess of any observed in other countries. This is partly due to the fact that the sample was limited to IPOs of state owned firms, and partly due to the unique regulatory environment in China. Privatisation IPOs (PIPOs) tend to be significantly more underpriced than normal IPOs (Ikoku, *s.a*). Loughran, Ritter and Rydqvist (2007) note an average in China of 164.5 percent over a similar period, but with the inclusion of private firms.

In Nigeria, average underpricing was found to be 19.1 percent across a mixed sample of IPOs and PIPOs between 1989 and 1993 (Ikoku*, s.a.).* In India, Marisetty and Subrahmanyam (2006) examined 2,713 IPOs between 1990 and 2004, finding the average first day return to be 95.4 percent.

Comparisons of the results displayed in Figure 1 above must be made with caution. If one compares the average underpricing found in the UK as reported in Loughran, Ritter and Rydqvist in 1994 of 12 percent (as measure from 1959-1990) to that reported by the same authors in 2007 one will note an increase to 16.8 percent as a result of the extension of the measurement period up to 2006.

In an examination of trends in IPOs, Ritter and Welch (2002) note that averages over long periods hide the variations in levels of underpricing that are observed from year to year. They found that issuing volumes roughly doubled in each 5 year period from 1990 to 1999 and then again from 1999 to 2000 but then decreased by 50 percent into 2001. Underpricing followed a similar trend over that period growing from 7.4 percent before the 1990's to 11.2 percent in the early 1990's and then to 18.1 percent in the mid nineties, peaking at 65 percent in 1999 and 2000 before coming down to 14 percent in 2001.

In the seminal paper *"Hot Issue" Markets* by Ibbotson and Jaffe (1975), the authors define a 'hot issue' as one which rises to a higher than average premium in the aftermarket. They describe 'hot issue' markets as periods where the average initial performance of new issues is abnormally high. Hot issue markets are characterised by high volumes of IPOs and high levels of underpricing. Internationally there is overwhelming evidence to support the existence of hot and cold issue periods (Ibbotson and Jaffe, 1975; Ritter, 1984 and Bradfield and Hampton, 1988).

It is important to note that that the trends in underpricing have shown that the changes across time periods are not one directional. Underpricing has not consistently increased but has exhibited a cyclical nature.

In recent years, underpricing in emerging markets has generally followed the international trends described above. Initial returns in India peaked in the late 1990's, followed by a substantial decrease at the beginning of the next decade (Marisetty and Subrahmanyam, 2006). Underpricing in China has also followed this international pattern, though with a small time lag. Initial premia peaked in the late nineties but continued at greater than 100 percent up until 2002. Only in 2003 did average premium drop below 100 percent and it remained there for three years (Chen, Choi and Jiang, 2007). However, from 2005 to 2006 premia doubled to 170 percent, in line with the resurgence noted in most countries in the second half of the decade. No studies on underpricing could be found for Brazil, Chile and Mexico for past decade and a half.

Loughran and Ritter (2004) have attempted to explain the changes in initial premia over time. They examined three different theories – the change in risk composition hypothesis, the realignment of incentives hypothesis and the changing issuer

objective function hypothesis. The first, proposed by Ritter (1984) is based on the premise that higher uncertainty would lead to higher underpricing and that if the proportion of risky firms increases (decreases), the underpricing would increase (decrease). However, the degree of variation that has been measured appears far too large to be explained by the small changes in risk composition.

The latter two theories revolve around the willingness of issuers to accept higher degrees of underpricing. Ljungqvist and Wilhelm (2003) use agency theory to argue that the lower insider ownership will result in higher underpricing (discussed in further detail in section two of this chapter, *Reasons for Underpricing*) and that changes in ownership structure over time (decrease in CEO ownership specifically) led to increased underpricing in the 1990's. But Loughran and Ritter (2004) dismissed this notion due to increase in dollar value CEO ownership. Instead they introduce the third hypothesis which puts forward that firms are willing to accept higher underpricing in exchange for higher levels of analyst coverage and that due to the benefits that the relatively new practice of *spinning* offers to them, firm executives have an incentive to seek rather than avoid underwriters with a reputation for high levels of underpricing.

International Evidence – Aftermarket Performance

Due to the fact that a substantial number of new issues are oversubscribed, potential investors are often unable to obtain as many shares as desired. Such investors are forced to acquire the shares in the aftermarket and it has been an important aspect of IPO research to determine whether such investors receive excess returns and the issue has attracted much research attention (Ibbotson, 1975; Ritter, 1991; Aggarwal, Leal and Hernandez, 1993 and Page and Reyneke, 1997).

Whilst post-issue performance of the IPO firms is not the focus of this paper, the level of underpricing has been shown to have a significant relationship with longer term performance of the firm. Post-issue IPO firms tend to underperform the market (Ibbotson, 1975; Ritter, 1991; and Aggarwal, Leal and Hernandez, 1993) and this possibly contributes to the extent of underpricing as issuing firms offer the shares at a lower price in order to compensate for future poor performance. Lock-up provisions prevent investors from cashing out after the first day of trading and high initial premia are necessary to attract investors in light of the risk of poor aftermarket performance.

Ibbotson (1975) suggested that part of the reason for the high levels of underpricing observed, was the fact that compounding the low offer price, the first day closing prices were irrationally high. The reversion of the share price downwards towards its true economic value would result in underperformance.

Early international evidence was based on small sample sizes and short periods. In the 1990's, however, Ritter (1991), Loughran (1993) and Loughran and Ritter (1995) examined more than 3,500 IPOs in the United States and all three studies showed that new issues underperformed significantly. Loughran and Ritter (1995) found that an investor would be required to invest 44 percent more in IPO firms than matched non-issue firms to achieve the same wealth over a five year period post listing. Levis (1993) reported similar findings in the United Kingdom for the period 1980 to 1988. Further evidence of significant underperformance came from Brazil, Chile and Mexico (Aggarwal, Leal and Hernandez, 1993).

Evidence from the JSE – Initial Premia

There have been six major studies of underpricing on the JSE covering the period 1972 to 1998. Of the six studies, only one (Barlow and Sparks, 1986) was focused on initial premia. The remaining five were focused on the aftermarket performance of IPO firms; but some did include limited analyses of initial premia, which are discussed below. All five studies did measure the average initial premium over the period of study and in every case average initial returns were found to be significantly different from zero. The previous studies were conducted across all boards of the JSE and thus results quoted include the main board, the DCM and the VCM. Results are summarised in Table 3 below.

TABLE 3

Average Initial Premia on the JSE

Author	Date	Data Period	No IPOs	Initial Premium	
				Mean	Median
Barlow and Sparks	1986	1972 – 1986	105	32.1%	23.9%
Bradfield and Hampton	1988	1975 – 1986	77	27.0%	-
Bhana	1989	1985 – 1987	80	65.6% [a]	-
Page and Reyneke	1997	1980 – 1991	118	32.7%	-
Lawson and Ward	1998	1986 – 1995	424	27.2%	15%
M'kombe and Ward	2002	1980 – 1998	541	26.8%	-
Average				29.4% [b]	

[a](69.7 percent for one week, as is often quoted for this study)

[b](Bhana is considered to be an outlier and this study has been excluded from the calculation of average. Refer to discussion below for further detail.)

Barlow and Sparks (1986) performed the earliest comprehensive study of underpricing on the JSE. For 105 IPOs over the period 1972 to 1986 they found the average first day premium to be 32.1 percent and measured the median initial return at 23.9 percent. The observation that the mean is considerably larger than the median is evidence of a common phenomenon in IPO underpricing; the distributions of initial returns tend to be heavily right-skewed (Ritter, 1998). This is the result of a relatively small number of IPOs earning substantial first day returns. Lawson and Ward (1998) find even greater evidence of skewness with the median (15 percent) approximately half of the mean (27.2 percent). No other studies on the JSE quote the median return.

The average initial returns found by Bradfield and Hampton (1988), Page and Reyneke (1997), Lawson and Ward (1998) and M'kombe and Ward (2002) were all similar to those of Barlow and Sparks (1986); all within 3 percent of the average across the JSE studies. Bhana (1989) measured underpricing substantially higher at 65.6 percent. However that study is limited to a 'hot' period in the late 1980's. Furthermore, this study included only 80 of the 308 listings between 1985 and 1987, and exactly half of the sample comprised DCM listings (Bhana, 1989) which have

been found to exhibit significantly higher levels of underpricing than listings on the main board (Barlow and Sparks, 1986). Lawson and Ward's (1998) sample included 294 listings over the three years from 1985 to 1987 and they measured annual average underpricing at 56 percent, 36 percent and 34 percent for those three years, which could be considered a more accurate reflection of underpricing over that period.

The most extensive study, covering the longest period and largest number of listings, was conducted by M'kombe and Ward (2002) and the average initial return of 26.8 percent is perhaps the most appropriate measure of historic underpricing on the JSE. This is lower than the average across all countries listed in Figure 1 above (32 percent), but is above the median of 20 percent, indicating that South Africa falls in the upper half.

With respect to other emerging markets, South Africa is less than half of the average for emerging markets listed in Figure 1 of 56 percent. South Africa has the fifth lowest average underpricing of all the emerging markets in Figure 1 above behind Chile, Turkey, Indonesia and the Philippines and is also considerably lower than the emerging market median of 37 percent.

Barlow and Sparks' research included analysis of changes in underpricing over time. The study revealed that premia on the JSE followed the international trend and changed within the period of their study. They found that hot and cold issue periods exist and that premia are higher in rising markets than in declining markets (all significant at the 1 percent level).

When stratified into groups of 3 years, it was found that clear variation existed across the period of study. First day returns ranged from 5 percent (1975-1977) to 54 percent (1984-1986). It is also interesting to consider that whilst the average premium is 32.1 percent, only one of the five tranches (1984-1986) had an average greater than 27 percent. The average underpricing outside of the hot period was only 18.6 percent. This evidence indicates that average underpricing over time is skewed by short periods of high underpricing.

The above results are very similar to those of Bradfield and Hampton (1988) who studied a closely corresponding period. Bradfield and Hampton split their sample into

a cold period from May 1975 to July 1985 (an average of 3.7 listings per year) and a hot period from August 1985 to August 1986 (36.9 listings per year). They found that the average initial premium in the hot period of 48 percent was significantly greater than that of the cold period at 25 percent.

Over the period examined in the above two studies, underpricing was consistently on the rise. However, M'kombe and Ward (2002) and Lawson and Ward (1998) examined the period immediately following it and found that from 1988 to 1993 there was not a single year in which the average underpricing exceeded 20 percent and there were in fact only two years above 10 percent. The period from 1994 to 1997 exhibited slightly higher levels of underpricing, and in the beginning of the internet boom of 1997 and 1998 (the final two years of their study) average initial premia exceeded 50 percent and 100 percent respectively (M'kombe and Ward, 2002). Figure 2 below shows the yearly average initial premia on the JSE for all years for which annual data were available.

Figure 2
Yearly Average Initial Premia
1975 to 1998
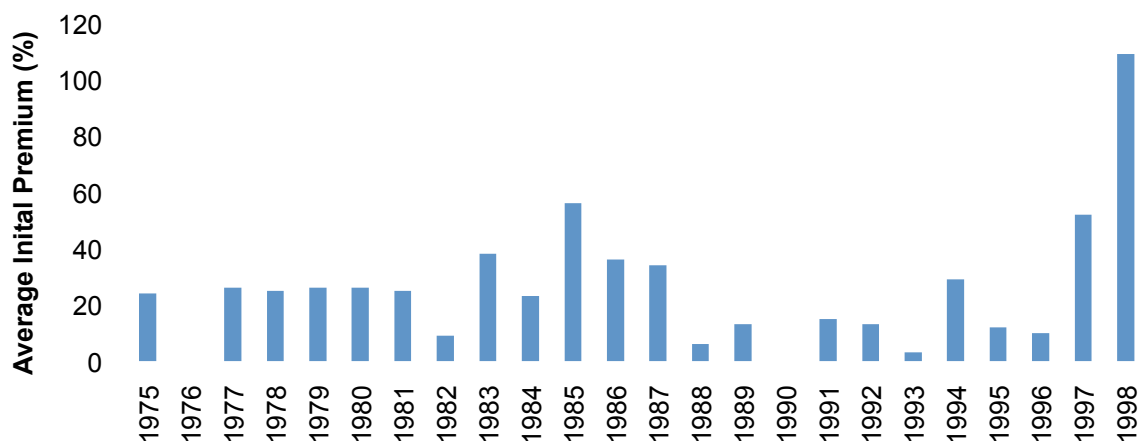
*Annual averages have been obtained from Barlow and Sparks (1975 to 1985), Lawson and Ward (1986 to 1995), M'kombe and Ward (1996 to 1998). There were no listings in 1976 and underpricing in 1990 was 0%.

From the graph it can be seen that underpricing in the mid seventies to early eighties was fairly consistent around 25 percent. This is followed by the visibly higher levels of the hot period in the mid 1980's. Subsequent to this underpricing went through a

period of low underpricing until the internet boom of the late 1990's. 1998 saw the highest level of first day returns ever observed on the JSE.

Even the 'cold' periods alone on the JSE (18-25 percent) are slightly greater than the averages noted in the UK and US, measured at 12 percent and 15.8 percent respectively (as measured up to 1990 and 1996 respectively (Loughran, Ritter and Rydqvist, 2007), the periods more closely matching the studies on the JSE).

With respect to emerging markets, the results of Page and Reyneke (1997), measured from 1980-1991, can be compared to those of Aggarwal, Leal and Hernandez (1993) from Brazil and Chile over a similar time period (1980 to 1990) which is preferable given the variations over time noted above. Initial premia in Brazil exceeded those found on the JSE considerably; 78.5 percent as opposed to 32.7 percent, while underpricing in Chile of 16.3 percent was relatively in line with the cold periods found on the JSE.

Underpricing recorded in India (95.4 percent) and China (164.5 percent) both exceed that found in South Africa enormously, but the 19.1 percent noted in African counterpart, Nigeria is somewhat lower than that found on the JSE.

As noted above, India and China experienced periods of low underpricing in the early 2000's following the internet bubble period of the 1990's, as did the United States (Loughran, Ritter and Rydqvist, 2007). However, those two emerging markets experienced a resurgence in initial premia towards the end of that decade in contrast to the US where underpricing declined slightly in 2008 and 2009. No study has been published on underpricing on the JSE after 2000.

Barlow and Sparks also examined the relationship between risk and underpricing. They used regression analysis to test the relationship between firm size (as a proxy for risk) and underpricing but did not find it to be significant at the 5 percent level. They did note that using sector as a risk proxy revealed that higher risk sectors were significantly more underpriced than lower risk ones. In this analysis they note that underpricing on the DCM of 55 percent was considerably higher than on the 32 percent found on the main board alone. These results are in line with Chen, Choi and Jiang (2007) and support Beatty and Ritter's (1986) proposition that higher

levels of uncertainty lead to higher underpricing which is discussed in further detail under *Reasons for Underpricing* below.

Evidence from the JSE – Aftermarket Performance

Five studies of aftermarket performance of IPOs have been performed in South Africa, yielding mixed results. In addition, one study has been performed on the Alternative Exchange.

The first examination of post-issue performance, by Bradfield and Hampton (1988), covered 77 IPOs between 1975 and 1986. They measured excess return by employing the Capital Asset Pricing Model (CAPM) to calculate expected returns using the risk free rate, stock beta and the market risk premium. They found that on average, IPO firms earned *positive* excess returns of 92 percent over the first year. This figure was reduced to 29 percent when measured from the end of the first day of trading (thereby excluding the initial premium). These results are in contrast to the findings of Ibbotson (1975), Ritter (1991), Levis (1993) and Aggarwal, Leal and Hernandez (1993) who all found evidence of *underperformance*.

The paper also confirmed the findings of Barlow and Sparks (1986) regarding the existence of hot and cold periods, and revealed that post-issue performance differs in hot and cold periods. Excess returns were noted in almost the entire 12 month post-issue period in 'hot issue' markets, as opposed to cold periods in which excess returns are positive for only a three month period. Bradfield and Hampton (1988) also tested for a relationship between opening premia and systematic risk, as measured by beta, and found the low correlation coefficient of 0.13 not to be significant at even the 20 percent level.

The same study revealed that IPOs with higher initial premia generally have higher abnormal returns in the aftermarket over the first year after listing. This supports the findings of Barlow and Sparks' (1986) survey in which respondents indicated that in order to have successful performance in the aftermarket, firms should issue at a relatively large opening premium. The theory that firms offer large initial returns to earn favour with the market for future transactions is known as the "loyal clientele" theory.

Bhana (1989) examined offerings on the JSE between 1985 and 1987 and found that investors who acquire shares at the initial offer price receive returns in line with the market over a one year period, supporting the efficient market hypothesis. However, investors who purchase shares subsequent to the initial offering experience negative risk adjusted returns over a one year time horizon. Following Ibbotson (1975) and Ritter (1991), Bhana attributed the underperformance to correction of the over-optimism and overreaction to the positive news regarding the IPO. Ritter (1991) found some tendency for firms with higher initial premia to perform worse in the aftermarket which supports the assertion that underpricing is exacerbated by the fact that closing prices on the first day of trading of new issues tend to be irrationally high, and that the post issue performance is a correction of this mispricing. This is known as the "over-optimism" hypothesis.

In the South African market, the findings of Bradfield and Hampton (1988) that higher initial premia generally have higher, positive abnormal returns do not support this notion. Page and Reyneke (1997) and M'kombe and Ward (2002) did not find evidence of a correlation between initial returns and aftermarket performance to support this assertion.

A study by Page and Reyneke (1997) compared the post-issue performance of 118 new issues between 1980 and 1991 with size and P/E matched benchmark firms. The paper reports that on average, IPO portfolios underperform size matched portfolios by 13.1 percent per annum and their relative sector indices by 18.4 percent per annum. In contrast to Bradfield and Hampton (1988), these results are consistent with international findings.

They find that, in line with Loughran and Ritter (1995), IPOs during hot issue markets perform significantly worse than those in cold periods (14.8 percent versus 9.6 percent). This provides support for the *over-optimism* hypothesis. Page and Reyneke (1997) also note that smaller firms, and those listing in more volatile sectors on the JSE, show greater evidence of underperformance than larger or more stable issuing companies.

In a study of post-issue performance from 1986 to 1995 Lawson and Ward (1998) examined 424 IPOs; the most extensive study at the time. As in Bradfield and Hampton's (1988) study, the CAPM was used to calculate the expected return. It

was found that investors who retained their investment for a one year period after listing received a significant, positive excess return of 3.16 percent but that the major portion of this was the initial premium. When the first day return was excluded, excess returns were not found to be significantly different from zero; providing further support for efficient market theory.

The study did not find evidence to support the proposition that IPOs with higher initial returns are more likely to underperform in the aftermarket, as observed in the United States by Ibbotson, Ritter and Sindelaar (1994) and on the JSE by Bhana (1989). In contrast, they found that offers which exhibited high initial returns, performed significantly better in the aftermarket (average one year return of 19.7 percent as opposed to -9.5 percent). These results join Bradfield and Hampton (1988) and Barlow and Sparks' (1986) findings in support for *loyal clientele* theory.

Lawson and Ward (1998) found that hot and cold periods did exist on the JSE between 1986 and 1995 and that initial returns in hot and cold periods differed significantly (34 percent and 12 percent respectively). They also found initial returns on the DCM (40.1 percent) to exceed those on the main board (23.8 percent) significantly. The study also revealed a significant positive relationship between level of underpricing and volumes traded in the aftermarket.

M'kombe and Ward (2002) extended the study of Lawson and Ward (1998) to include a longer period and additional benchmarks for aftermarket performance. They found evidence of significant underperformance for all three benchmarks used (CAPM, book to market portfolios and market capitalisation portfolios) and that underperformance increased over time. These results are consistent with findings in the United States (Loughran and Ritter, 1995) and the United Kingdom (Levis, 1993) but not with Bradfield and Hampton (1988) or Lawson and Ward (1998).

As well as evaluating post-issue performance, M'kombe and Ward (2002) also found that the level of underpricing was influenced by the Rand value of the offer price. In that study, the sample of 541 IPOs was split into four price categories; 0-99 cents, 100-199 cents, 200-499 cents and greater than 500 cents. It was found that mean underpricing decreased substantially from 63 percent to 41 percent, 20 percent and 4 percent from the smallest to the largest offer price groups in that order. The differences between groups were significant at the 1 percent level. These findings

are in line with Chalk and Peavy (1987), Ibbotson, Ritter and Sindelar (1988) but do not reflect the U-shaped relationship noted by Fernando, Krishnamurthy, and Spindt (2002) as discussed in Chapter II above.

In addition to the studies on the main board discussed above, an analysis of underpricing and post-issue performance on the Alternative Exchange was performed by Correia and Holman (2008). They examined 42 listings between October 2003 and September 2007 and found that average underpricing was 29 percent. The median underpricing over that period was 18 percent. The extent of underpricing on the AltX in this period is in line with the average on the main board of the preceding two decades and significantly lower than that found on the DCM.

As no evidence has been obtained from the main board over the period of that study, it cannot be determined whether this apparent alignment of the AltX and main board is due to the focus on high quality listings bringing lower uncertainty, or whether underpricing on the main board will have seen a proportionate decrease due to a general decline of initial returns after the 'hot issue' market of the 1990's.

Areas Requiring Further Research

No evidence regarding the existence and extent of underpricing on the JSE after the year 1998 has been published. Evidence from this period is of particular importance given that all previous studies on the JSE include the high levels of underpricing experienced between 1985 and 1987.

Globally, there have been substantial changes in the levels of underpricing after internet boom period. To date there is no evidence from the JSE to determine whether the South African market has been subject to these changes.

Furthermore, due to the aftermarket focus of previous studies, there has been almost no cross-sectional analysis of initial premia on the JSE since 1986. Also, no research has been performed on the main board in a corresponding time period to the Correia and Holman (2008) study on the AltX.

This paper will examine the years immediately following the 'hot issue' period of the 1990's and determine whether it was followed by a cold period with low listing volumes and low levels of underpricing, as observed on the JSE following the hot issue market of the 1980's and as was found in the United States, India and China

following the 1990's. It will then be examined whether there was a resurgence in the latter part of the decade as in the other emerging markets, or whether underpricing on the JSE followed the United States and declined.

The results of this paper will be freely comparable with international underpricing in the post internet bubble period and will also be comparable to underpricing measured on the AltX between 2003 and 2007.

This paper will also include a cross-sectional analysis of size, absolute offer price and proportion of shares offered to determine whether these factors have a significant effect on the level of underpricing, and consequently, whether there is evidence to support certain theories of underpricing on the JSE.

Reasons for Underpricing

Given that issuing shareholders desire to maximise proceeds and make use of the expertise of investment banks to assist in selecting the optimal offer price, it would be expected that this price would be set close to the economic value of the share as perceived by the market. Yet from 1990 to 1998 US firms left over $27 billion on the table (Loughran and Ritter, 2002). This is all money that is forfeited by the pre-issue shareholders. Loughran and Ritter (2002) note that this amount is more than double the fees paid to investment bankers by the issuing companies and on average amounts to more than three years of profits.

On the face of it, the fact that issuing shareholders are not highly dissatisfied with this outcome is puzzling and has attracted much research attention. Yet the empirical evidence indicates systematic and intentional underpricing of IPOs. A number of theories have been proposed for the reasons that firms engage in this practice and these can be split into two main groups – those which are based on information asymmetry and those which are not. Generally the theories are not mutually exclusive and it is accepted that observed underpricing is the result of a number of contributing factors.

Asymmetric Information Models

Information asymmetry models are based on the premise that the three parties to an IPO – namely the issuing firm, the investment banker and the subscribing investors – possess different degrees of knowledge.

Rock's (1986) *Winner's Curse* hypothesis puts forward that where there is some degree of rationing in the allocation process (which is the case for the majority of IPOs) investors will get a smaller portion of the shares than desired. Informed investors will subscribe for shares only when they believe the offer to be underpriced. Uninformed investors will subscribe for shares in all offers indiscriminately. The *Winner's Curse* is that uninformed investors will get only a part allocation of the underpriced offers, but will receive the full allocation on (thus "winning") those that are overpriced – the exact ones which they do not want.

Rock's model assumes that the market requires the partaking of uninformed investors to fully take up the quantity of shares offered. Thus, to entice uninformed investors into the market offers must, on average, be underpriced to compensate them for the adverse allocation effects.

Koh and Walter (1989) performed a direct test in Singapore using a unique data set, which included information on the rationing process employed. They found that the chance of receiving an allocation in an issue that is overpriced is more than three times as likely as in one which is underpriced. Their testing showed that when the returns of an uninformed investor are weighted by the probability of obtaining an allocation under conditions of rationing, the average return decreases from 27 percent above the risk-free rate to an amount that is not statistically different from the risk-free rate. This is consistent with Rock's *winner's curse* model.

Michaely and Shaw (1994) approach the question from a different angle. They compared the degrees of underpricing in two different market groups: a sample of IPO master limited partnerships (MLP's) and a sample of regular IPOs. The MLP's have certain tax restrictions which institutional investors avoid. This allows the separation of retail (uninformed) investors and institutions (which are assumed to be informed). In the MLP market, the fact that it comprises only uninformed (retail) investors removes the information asymmetry and with it the need for underpricing. The study showed that in contrast to the regular IPO group which returned on average 8.5 percent in the period tested, the MLP group produced a mean return of -0.04 percent which was not statistically different from zero. Thus the results support

Rock's proposition that as the level of information asymmetry decreases, the level of underpricing will decrease.

An extension of Rock's theory is the proposition by Beatty and Ritter (1986) that the greater the *ex-ante* uncertainty regarding an IPO, the greater the level of underpricing. The choice of an investor to become informed can be likened to the acquisition of a call option. If the information uncovers a value that is greater than the offer price ('strike price'), the investor will 'exercise' his option (act on the information) and subscribe. Thus, the greater the uncertainty surrounding an IPO, the great the incentive for investors to become informed (due to the value of the 'option' being positively related to the level of uncertainty or 'volatility') and the greater the number of informed investors. This means that under the *winner's curse* theory the level of underpricing would need to be higher since the proportional allocation to uninformed investors is smaller.

There is significant support for this assertion (Ljungqvist, 2005 and Carter, Dark and Singh, 1998) and it is accepted by most asymmetric information models that higher uncertainty leads to a greater degree of underpricing.

Information Revelation (Market Feedback Hypothesis)

The second group of the information asymmetry models are the so called *information revelation* theories, also known as the *market feedback hypotheses.* To investigate these propositions one must revisit the difference between fixed price and American bookbuilding as methods of allocation. Under fixed price allocation, as found in the UK and South Africa, investors subscribe for shares and are allocated a portion on a pro-rata basis. And this results in the *winner's curse* as described above. This method has gradually been replaced by the American method of bookbuilding whereby investors are enticed to give information to the underwriter throughout the run-up to the offer, to enable the underwriter to accurately price the offering (Benveniste and Spindt, 1989).

In isolation, the informed investor would be disinclined to reveal positive information (and would be incentivised even to misrepresent positive information) because positive information would induce the underwriter to increase the offer price (and vice versa). The matter of how to persuade investors to share their positive views is addressed with two concessions from the underwriters. Firstly, a certain number of

shares are pre-allocated based on investor's bidding with low bids receiving smaller allocations while more optimistic bids receive higher allocations, thus rewarding investors for revealing positive views (Ljungqvist, 2005). And secondly, the underwriter compensates investors by only partially adjusting the price upwards. The investment bank must maintain its relationship with the investor market and must be known to reward investors who give up information in order to extract information from the market in future issues (Ritter, 1998).

The latter is clearly visible in testing and Barry, Gilson and Ritter (1998)[4] measured the average initial return on offers where the offer price is inside the initial file price range at 11.99 percent while the average initial return on issues where the offer price was revised upward from the file price range was 30.22 percent. Further support for the results of this study is indicated by Hanley (1993). However, Ritter and Welch (2002) note that when information can be obtained from a large number of investors, the incremental benefit from any one investor's information is limited and as such a reward of only a few percent would seem reasonable. The average underpricing they found in offers where the price has been revised upwards of 53 percent does not appear to be completely explained by the information compensation notion.

Market Signalling Hypothesis

Another class of information asymmetry models are the signalling hypotheses in which the informational advantage is not between groups of investors but rather between the issuing firm and the market. Ivo Welch's 1989 study formalises the assertion of Ibbotson (1975) that issuers leave money on the table to "leave a good taste in investors' mouths". Under this hypothesis the issuing firm has superior information regarding the quality of the firm. The owners of both high and low quality firms know the value of their firm but the high quality firm is faced with the problem of how to convey this information credibly.

Signalling through the offer price is proposed to be far more reliable than merely proclaiming to be a high quality firm. There is some likelihood that the true value of the firm will be exposed naturally between the IPO and further seasoned offerings,

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[4] In an unpublished paper, quoted by Ritter (1998)

thus revealing the low quality firm as such. The high quality firm will expect a favourable response from investors in the aftermarket and can thus 'recoup' the money left on the table. As only firms revealed to be high quality can recoup the losses of underpricing, this serves as a signal to investors. The recoupment could be in the form of further equity offerings (Welch, 1989) or positive reactions to dividend announcements (Allen and Faulhaber, 1998).

An immediate challenge to this theory would be the question of why firms would choose this as the best method of signalling. Other signalling tools include use of especially reputable underwriters (Booth and Smith, 1986) and auditors (Titman and Trueman, 1986), both of which would serve to add credibility to the firm's proclaimed quality at a considerably lower cost.

This is in contrast to Rock's model in which firms reluctantly accept that underpricing is necessary to keep uninformed investors in the market because under the signalling hypothesis firms willingly choose to use underpricing as a tool.

A further theory of signalling was proposed by Grinblatt and Hwang (1989) who argued that firms use the proportion of shares held by insiders and the extent of underpricing as a signalling tool. Higher quality firms would price the offers lower and also maintain a higher proportion of inside shareholding. This model would predict a positive relationship between the level of underpricing and the proportion of insider shareholding; both of which would be positively related to firm value.

Empirical testing has not been wholly supportive of signalling. It can be inferred from the model that firms that are more likely to return to the market with a seasoned offering would be expected to underprice to a greater degree. In fact the signalling argument would be largely irrelevant if the firm did not return to the market with a seasoned offering. Welch (1989) did produce empirical support for the prediction that many IPO firms would conduct additional offerings.

Jegadeesh, Weinstein and Welch (1993) conducted substantial testing on IPO returns and subsequent offerings and found that underpricing is statistically related to the likelihood and size of seasoned equity offerings. However, they noted that any post issue price increase would entice issuers back into the market and they found that positive post-IPO returns were a better predictor than IPO underpricing.

Further evidence that is contrary to signalling comes from Michaely and Shaw (1994) who examine two implications of the model. Firstly they test whether, as the signalling hypothesis would dictate, firms that exhibit higher degrees of underpricing (the so called high quality firms) follow this with higher earnings or more positive reactions to dividend increases. They found however, that firms with lower underpricing paid higher dividends and sooner and they found no evidence that underpricing is positively related to subsequent dividend policy, thus rejecting the theory put forward by Allen and Faulhaber (1989). They also refute Welch's (1989) proposition as they do not find that higher levels of underpricing are linked to an increased likelihood of returning to the market. In addition, Michaely and Shaw (1994) find that neither underpricing nor insider holdings provide a credible signal of firm value.

Agency Theory Models

Principal-agent problems have long been used to try to explain the underpricing puzzle. When firms go public, they hire an investment banker to assist with, *inter alia*, the pricing of the shares. The investment banker is being hired by the issuing company to obtain the best possible price for the offering. From the perspective of issuing shareholders, this would be the maximum price per share at which the offer will still be successful.

Where the underwriter has superior knowledge of market conditions to the issuing firm, the underwriter may exploit this advantage by pricing the offer below its true value. Baron and Holmstrom (1980) and Baron (1980) propose that this allows them to expend less effort on marketing and that it ingratiates them to their buy side clients.

In a direct test of Baron's model Muscarella and Vetsuypens (1989) found that underwriters underprice their own shares in IPOs as much as other companies. This is contradictory to the predictions of Baron, though it can possibly be argued that investment banks underprice their own offerings in order to add credibility to their argument that underpricing is a normal and necessary cost of going public.

The research of Muscarella and Vetsuypens (1989) is subject to the inherent limitation that there are not sufficient investment bank IPOs to produce large samples and does not allow for extensive testing. In a similar vein, but with

contrasting results, Ljungqvist and Wilhelm (2003) examine investment banks which hold stakes (directly or indirectly through their venture capitalist branches) in pre-IPO companies. They find that the level of ownership in the issuing firms is inversely related to the degree of underpricing.

Up until the 1990's, it was generally held that if a lead underwriter became known for setting the offer price too low so as to reduce their marketing efforts, issuing shareholders would avoid this underwriter and the reputational damage would outweigh the benefits of reduced marketing. However, on the 'darker-side', Loughran and Ritter (2004) highlight the incentive for investors to engage in rent-seeking behaviour by making side-payments to the underwriter in exchange for receiving larger allocations in hot IPOs. They note that it has become common practice for venture capitalists and executives of the issuing firms to create personal brokerage accounts with the investment bank.

In the process of *spinning* described in Chapter II above, the underwriter is given investment banking business (often at higher than market related commissions) in exchange for the hot issue allocations. Thus, it is to the advantage of the issuing firm's executives to choose an underwriter known for underpricing and it is to the advantage of the investment bank to underprice substantially. This argument would be underpinned if management are also offered share options at the listing price.

Following the extraordinary levels of underpricing experienced in the dot-com bubble period there was a host of investigations into the practice of *spinning*. The most notable case was that of Credit Suisse First Boston Corporation (CSFB) in which it settled for $100m against charges of "*abusive IPO allocation practices*" by the SEC (Securities Exchange Commission, 2002). The SEC reported that CSFB had allocated IPO shares to a large number of clients who returned between one and two thirds of these profits back to CSFB in the form of excessively high brokerage commissions.

Loughran and Ritter (2004) attribute the decrease in underpricing from the bubble period (in excess of 65 percent) to the post-bubble period (approximately 12 percent) to a large extent to the increase in regulatory scrutiny which led to a decline in the practice of *spinning*.

Under traditional agency theory the two main methods by which the principal can reduce the agency costs are monitoring and alignment of incentives through structuring of contracts. In the case of an IPO this would take the form of monitoring the effort expended on marketing the offer on the part of the investment bank and linking the underwriter's fees to the offer price.

Ljungqvist and Wilhelm (2003) measure that inside ownership in 2000 had declined 12 percent from 1996 and that, most notably, CEO ownership had almost halved in that time. This coincides with an unprecedented spike in underpricing. As the CEO is the agent who selects the investment bank and is influential in selecting the offer price, this supports the notion that as agent incentives are less aligned with the principal, the underpricing will increase. Loughran and Ritter (2004) refute this reasoning by noting that it is only *proportional* interest of CEO's that declined but that the dollar stakes increased which would be expected to increase incentive to control underpricing.

Institutional Theories

Legal Liability Hypothesis

Initially suggested by Logue (1973) in his seminal work and later formalised by Tinic (1988) and Hughes and Thakor (1992), this theory is based on the premise that underwriting firms are less likely to be sued if the offer is underpriced. This is because law suits only occur when a party experiences losses and the lower the offer price, the less chance that the share price goes below it and the less chance that subscribing shareholders will experience substantial enough losses to sue the underwriter.

This theory appears to be supported by the levels of underpricing noted in the bubble period, as underwriters could have been wary of setting high offer prices, knowing that the valuations were highly optimistic to begin with. However, this is not consistent with investment banks' post issue coverage. Bradley, Jordan and Ritter (2003) analysed the so called 'quiet period' (25 days after offering date in which the investment bank may not give an opinion on the IPO stock) and found that lead underwriters often follow underpriced offers with 'buy' recommendations on the stock which is not behaviour that is consistent with lawsuit avoidance.

Tinic (1988) compared underpricing before the 1933 Securities Act (which opened underwriters up to litigation where previously they were essentially exempt) with post enactment underpricing and confirmed the expectation that it would increase. However, it has been well documented that underpricing has changed considerably over time (Ritter and Welch, 2003) so it is not clear that Tinic's results were not due to general fluctuations in underpricing.

Drake and Vetsuypens (1993) analysed a sample of 93 IPOs where the underwriters were sued and their results were not consistent with the legal liability hypothesis. They showed that the level of underpricing in sued firms was not different from that of other IPOs. Results indicated that the likelihood of litigation was driven by declines in market price in the period after the offering. The study also revealed that plaintiffs included investors who had purchased shares for up to 14.7 months, on average, after the issue and the authors believe that the underpricing is irrelevant in legal claims.

In addition, in countries in which class action against underwriters is unheard of, there is still underpricing in line with the international average (Ritter, 1998). Also, underpricing appears to be a very expensive manner in which to reduce the risk of legal liability (Ritter and Welch, 2002).

Ownership Dispersion

If an IPO is underpriced to the extent that substantial excess demand is created, the consequent rationing will lead to broadening of the ownership base. Agency theory predicts that the benefits of diversified ownership could come in two opposing ways. Firstly, Brennan and Franks (1997) argue that managers are incentivised to try to break up the ownership base to make it more difficult for any sort of hostile takeover and to decrease the level of monitoring through the removal of large ownership groups. The costs of monitoring can easily outweigh the benefits for investors who do not hold large portions and the *public good* nature of the monitoring can create free-rider problems (Shleifer and Vishny, 1986).

In direct opposition to this reasoning is the proposition by Stoughton and Zechner (1998) that the underpricing is used to *create* a large ownership block that will *increase* the level of monitoring and reduce agency costs. The basis of this theory is that the issuing firm seeks to obtain at least one shareholder, large enough for

monitoring to be cost beneficial. To compensate for the lack of diversification this would require on the behalf of the stockholder, the shares are offered at a discount and thus the offer is underpriced.

Clearly these two theories cannot both be entertained under the same market conditions and it is due to differing IPO markets with contrasting issuing mechanics that they can both reasonably exist. Whilst both are based on the assumption that underpricing creates excess demand which impacts on the ownership structure, Brennan and Frank's model is based on the assumption that prices are fixed and that allocations are pro rata, whereas the Stoughton-Zechner model assumes discretionary allocation to allow the intentional allocation to a single, large shareholder (Ljungqvist, 2005). There is limited empirical evaluation of both theories but in the research that has been done there is little to support monitoring as a reason for IPO underpricing (Arugaslan, Cook and Kieschnick, 2004).

An extension of the ownership dispersion argument is that underpricing leads to increased trading volumes in the aftermarket (Booth and Chua, 1996). Boehmer and Fishe (2001) found evidence that the greater the degree of underpricing, the greater the trading volumes in the aftermarket. For there to be benefit to the issuing firm, however, the higher volumes must be persistent (Booth and Chua, 1996).

Behavioural Theories

A growing group of researchers argue that the exceptionally high levels of underpricing noted, especially during the internet boom years, where in 1999 and 2000 a staggering $62 billion was left on the table (Ljungqvist, 2005), are unlikely to be solely due to informational disparity, diversification of ownership and avoidance of liability. They have turned to the behavioural aspects of the transactions for explanations.

Information Cascade Hypothesis (Bandwagon Hypothesis)

In making their own investment decisions, investors take into account the prior decisions made by other investors. For example, if there is low demand for an IPO initially, as new investors analyse the IPO they are biased against it and often do not buy even though they believe it to be undervalued, purely because other investors did not buy (Welch, 1992).

Thus the issuing firm has an incentive to underprice the offering to ensure that initial demand is high and even to generate additional demand from investors who disregard their own negative information in favour of the prevailing opinion.

The bandwagon and the market feedback hypotheses can be combined to produce a noteworthy result. Under the latter, when the signal from the market is positive, investors know that an upward revision will only be a partial adjustment. Knowing that the shares are still going to be underpriced, investors will want to purchase more and the opposite is true of downward revisions. This results in a positive sloping demand curve and a significant problem for issuers who receive negative feedback because cutting the price too much may further discourage investors from subscribing and lead the IPO to fail. In these cases it is perhaps more advantageous to withdraw or postpone an offering rather than revising the price downwards too much (Ritter, 1998).

There is limited empirical testing of the model. Amihud, Hauser and Kirsh (2003) found that in general offers are either highly oversubscribed or have extremely low demand and that there are very few cases in between. This is clearly consistent with the bandwagon hypothesis.

This theory can be closely linked to the agency theory models where investment banks have superior information to the issuing firm. The underwriter may be inclined to price the offer too low to take advantage of the hype created with the cascading information to reduce their marketing efforts (Habib and Ljungqvist, 2001).

Prospect Theory

In another behaviour based theory, Loughran and Ritter (2002) approach the underpricing puzzle from the perspective of the issuers and ask the question why issuers are willing to accept the substantial wealth transfers. They propose a prospect theory which assumes that issuers are more concerned with the *change* in wealth and the *level* of wealth.

They find empirically that the majority of money left on the table comes from a smaller number of highly underpriced IPOs. In the period examined, the average amount was $9.1m as compared to the median of $2.3m. They showed that the largest contributors were the IPOs where the offer price was adjusted upwards.

Thus, at the same time as the issuer's wealth is being transferred through underpricing, they are receiving the news that the shares they still hold are worth much more than they expected. The fact that their wealth level is higher than their reference point (initial file price range and then initial offer price) overshadows the fact that they have missed out on potential additional wealth.

As noted earlier, Hanley (1993) found that increases on the initial file price are only partial adjustments and the prospect theory argument is in line with Benveniste and Spindt's (1989) information revelation hypothesis. Direct testing of the prospect theory explanation by Ljungqvist and Wilhelm (2005) showed some support for the theory but this represents an area requiring further research.

Prospect theory may not be useful in explaining underpricing in general but is useful for gaining insight into the dot com bubble underpricing phenomenon.

Chapter IV: Data and Methodology

In the period from 1 January 2000 to 31 December 2008 there were a total of 184 of new listings as published in the JSE handbook. Of these new listings 69 were on the AltX and these are excluded from the sample as this study is focused solely on the main board. The JSE handbook also included listings in the form of rights issues and follow-on offerings which are also outside the scope of this study. 46 listings met the definition of initial public offering.

Initial offer prices and number of shares offered were obtained from three data sources: Bloomberg, Reuters and the JSE. Unfortunately there was a degree of incongruity between them. It is believed that inclusion of questionable data would undermine the reliability of the study significantly and it was considered more appropriate to use a smaller sample of higher integrity. For this reason, only data that could be cross-checked between two of the three sources were used. Refer to Appendix 3 for further details.

After removing all IPOs for which listing data were not available or could not be cross-checked, there were 37 firms remaining in the sample. Bloomberg, Datastream and INET were used to obtain first day closing price and prices were cross-checked in the same manner as described above. In some cases where discrepancies existed or where data were missing, individual prices were further checked against McGregor BFA. Three IPOs were excluded from the sample at this point because no reliable closing price could be found due to lack of data, dual listing issues and timing difficulties. Refer to Appendix 1 for further details of these.

The sample used in testing consists of a total of 34 IPOs over the 9 year period, with the largest concentration of listings being in 2007 (14 IPOs) as shown in Figure 3. The number of firms listing has decreased considerably partly due to the popularity of the (AltX), specifically amongst the small-cap firms. From the period 2003 to 2007 42 companies listed on the AltX (Correia and Holman, 2008). The AltX essentially replaced the Development Capital Market and the Venture Capital Market and the previous studies of underpricing on the JSE have included both the main board and the DCM and VCM. Barlow and Sparks (1986), Bhana (1989) and Lawson and Ward

(1998) performed separate analyses of the main board and the DCM (the VCM is considered too small to be analysed separately), finding underpricing on the DCM to be significantly higher than on the main board. As such, the results of this study are most comparable to these analyses of the main board.

Figure 3
Number of IPO's Per Year
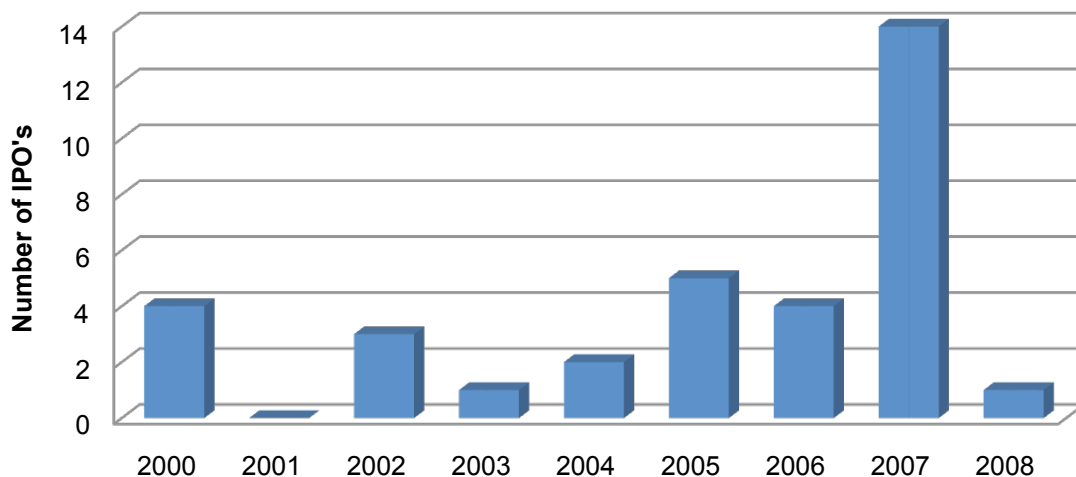
The above chart only includes IPOs for which sufficient, reliable data could be obtained and does not represent all listings on the JSE over the period.

From the chart above it is clear that there is substantial variability in the number of IPOs per year. The average over the period of study of four IPOs per year is somewhat lower than the 10 IPOs per year in the period 1980 to 1991 in the study by Page and Reyneke (1997); however that study did include the exceptionally high volumes of the late 1980's. Lawson and Ward (1998) identified 535 IPOs between 1975 and 1995 with an annual average of 25, which included the hot market of the 1980's. Thus, listing frequency in the period under examination is markedly lower than in prior studies. The latter part of the sample period shows increased volumes and the quietest period follows the 'hot issue' bubble period directly. This is in line with historic cycles in which hot periods are followed by periods of low listing volumes.

IPO size has been measured using market capitalisation, total assets and total proceeds. The total proceeds of the issue has been calculated by multiplying the offer price by the number of shares offered. This is consistent with international

studies (Beatty and Ritter, 1986; Miller and Reilly, 1987). Number of shares offered was only available for 21 IPOs. Market capitalisation and total assets data were obtained from Bloomberg with any missing information being obtained from Datastream. Data were available for all firms in the sample.

The average market capitalisation at time of listing was R1.6 billion while the median market capitalisation was R906 million. Twelve IPO firms had a market capitalisation of greater than R1 billion on listing date, with the largest being Telkom Ltd at R15.7 billion. Eleven firms were below 500 million with the smallest being Square One Solutions Ltd at R53 million.

The sample includes firms from a range of industries including real estate holding and development, construction, mining and energy and retail.

The total sample includes nine real estate funds and the pricing behaviour of these funds can be slightly different from operating companies. Property funds hold a portfolio of properties and typically trade at a discount to net asset value (Ritter, 1998). They are generally not widely held prior to listing as they are founded with the intention of listing to raise capital.

There is not a consistent practice with regard to the treatment of property funds. Some international studies exclude property funds (Ritter, 1998; Carter, Dark and Singh, 1998; Ljungqvist and Wilhelm, 2003) but all previous studies on the JSE include property funds (Barlow and Sparks, 1986; Bradfield and Hampton, 1988; Bhana, 1989; Page and Reyneke, 1997; Lawson and Ward, 1998 and M'kombe and Ward, 2002). For this reason, all testing and analysis is performed with property funds included. Additional testing excluding these IPOs is performed in some instances.

The remaining IPO firms are spread across a wide range of industries which, coupled with the small sample size, would prohibit any form of analysis by industry.

Formulation of Hypotheses

Based on the discussion of areas requiring further research in Chapter III, the primary objectives of this study are:

a) To establish whether or not IPOs are significantly underpriced and to measure the extent of underpricing

b) To establish whether or not the degree of underpricing is related to certain IPO characteristics.

The results of the above will be compared to previous international and local research.

The above objectives have been formulated into the following hypotheses:

H1   The initial return on IPOs is not significantly different from zero

H2   Hot and cold listing periods do not exist on the JSE

H3   Initial returns are independent of IPO size (as a proxy for risk)

H4   Initial returns are independent of the absolute offer price

H5   Initial returns are independent of the proportion of shares offered

Calculation of Average First Day Return

The extent of underpricing is measured by comparing the closing price at the end of the first day of trading with the original offer price. Consistent with international and local studies, first day return is calculated as:

$$R_1 = \frac{P_1}{P_0} - 1$$

Where R_1 is the first day return, P_1 is the first day closing price and P_0 is the initial offer price.

Average premia can be calculated in a number of ways. Most commonly a simple average across the whole sample is used. This gives an equal weighting to all IPOs and is useful in making inferences across large, varied populations. Alternatively a size or period weighted average could be used. However, to enable meaningful comparison with other studies, the simple average is favoured in this paper. The other methods of calculating the mean offer additional insight, and these means will be examined as part of detailed analysis of size and period in Chapter V below.

In addition to comparing sample averages, it is important to consider the median. Initial return distributions are usually right-skewed because of a small number of offerings with exceptionally high returns (Ritter, 1998; Lawson and Ward, 1998). In

cases where the distribution is skewed, the median is a better measure of the return expected on any single offer and is less affected by any exceptional single IPOs, especially in a small sample. Thus the median is a consistent measure and adds important insight into the analysis of underpricing.

The testing of the different hypotheses requires the use of a range of methodologies. These are explained in detail along with the results in Chapter V.

Chapter V: Results

In this chapter the results of testing performed are discussed in three sections; average initial premia, changes in underpricing over time and cross sectional analysis of underpricing.

Average Initial Premia

The average level of underpricing was found to be 17.1 percent for the total sample and slightly higher at 20.4 percent when property funds are excluded. Table 4 presents a summary of the results.

H1 The initial return on IPOs is not significantly different from zero

Results of the student's t-test are summarised in panel B of Table 4 below. For both samples the null hypothesis that the mean return is not different from zero can be rejected at the one percent level. This is consistent with all previous studies of underpricing on the JSE.

TABLE 4

Average Initial Premia

Panel A: Descriptive Statistics	Total Sample	Ex Prop Funds
Mean	17.1%	20.4%
Standard deviation	24.9%	28.0%
Median	9.4%	10.0%
Count	34	25
Max	89.0%	89.0%
Min	-20.0%	-20.0%
Count of positive return	27[#]	20
Count of zero or negative return	7[#]	5

Panel B: T-test of Means	Total Sample	Ex Prop Funds
T-statistic	4.00	3.63
Probability	0.0%	0.1%
Decision (5% conf. level)	Reject H_0	Reject H_0

[#]Mean positive return was 22.5%; mean negative return was -4.0%

The average initial premium of 17.1 percent is substantially lower than the average of prior studies on the JSE of 29.4 percent. Furthermore it is distinctly lower than any

single previous study with the next lowest being M'kombe and Ward (2002) who found the average first day premium to be 26.8 percent. This is likely the result of two factors.

Firstly, all other studies of the JSE have included the development capital market which has exhibited significantly higher levels of underpricing. Barlow and Sparks (1986) found that average underpricing on the DCM was 55 percent as compared to 29 percent found on the main board. Similar results were obtained by Lawson and Ward (1998) whose study reported an average DCM listing premium of 40.1 percent in comparison to 23.8 percent found on the main board, which is more in line with the findings above.

Bhana found the initial premium on the main board to be 65.6 percent; only slightly lower than the DCM average of 68.5 percent, though these results are subject to significant limitations as discussed in Chapter III. Bradfield and Hampton (1988), Page and Reyneke (1997), and M'kombe and Ward (2002) do not differentiate between initial premia on the main board and on the DCM.

Correia and Holman (2008) examined IPOs on the AltX between October 2003 and September 2007 and found underpricing to be 29 percent. Over a corresponding period, underpricing on the main board was 20 percent. If the two are combined the weighted average underpricing for the combined boards of the JSE was 26 percent. This is very similar to the long term average on the JSE of 26.8 percent (M'kombe and Ward, 2002).

The second reason that initial premia are lower in this study is that underpricing levels were particularly high in the 'hot issue' market of the 1980's and all previous studies on the JSE included this period. Thus, it would be expected that this period under examination would have a lower average than that of other studies on the JSE. Changes in underpricing over time are discussed in further detail under Hypothesis 2 below.

The level of underpricing observed on the JSE in the period under examination is very similar to the average underpricing in developed markets of 18.1 as discussed in Chapter III and is especially close to findings in the United Kingdom (16.8 percent), Finland (17.2 percent), Hong Kong (17.3 percent) and the United States

(18.0 percent) (Loughran, Ritter and Rydqvist, 2007). It must be noted that these are averages over a period of more than 30 years and it has been shown that underpricing after the internet boom has been low (India – Marisetty and Subrahmanyam, 2006; China - Chen, Choi and Jiang, 2007; UK – Loughran, Ritter and Rydqvist, 2007).

However, there is very little data available to compare average initial premia between countries in the post 2000 period, or to compare post 2000 underpricing to pre 2000 pricing for individual countries. The summary of international underpricing maintained by Loughran, Ritter and Rydqvist (2009) only includes the average underpricing per country across *all years* studied in that country and does not include any time period breakdown.

Annual underpricing data for the post 2000 period is available for the United States, China and India. Consistent with previous research, underpricing in South Africa has remained higher than the in US and substantially lower than India and China. Initial returns in the United States averaged 12 percent over the period 2001 to 2008. In China, the average initial premium was 123 percent between 2000 and 2006, and Indian first day returns between 2000 and 2004 were 50 percent on average.

The JSE average initial premium of 17.1 percent is well below the average for emerging markets (56.1 percent) and exceeds only Chile and Turkey (Loughran, Ritter and Rydqvist, 2009).

The median first day return of 9.4 percent is approximately half of the sample mean. This evidence of a highly right-skewed distribution is similar to that observed by Lawson and Ward (1998) who found that for the period from 1986 to 1995 the median return of 15 percent was approximately half of the sample mean of 27.2 percent. The skewed distribution is the result of a relatively small number of offerings earning substantial first day returns; in this case, 4 IPOs earning returns above 60 percent.

The distribution of first day returns is shown in Figure 4. More than one third of the sample earned a return between zero and ten percent. The median of 9.4 percent lies within this range but the mean return of 17.1 percent is substantially higher. The skewness of the distribution is clearly visible in Figure 4.

Figure 4
Histogram of First Day Returns
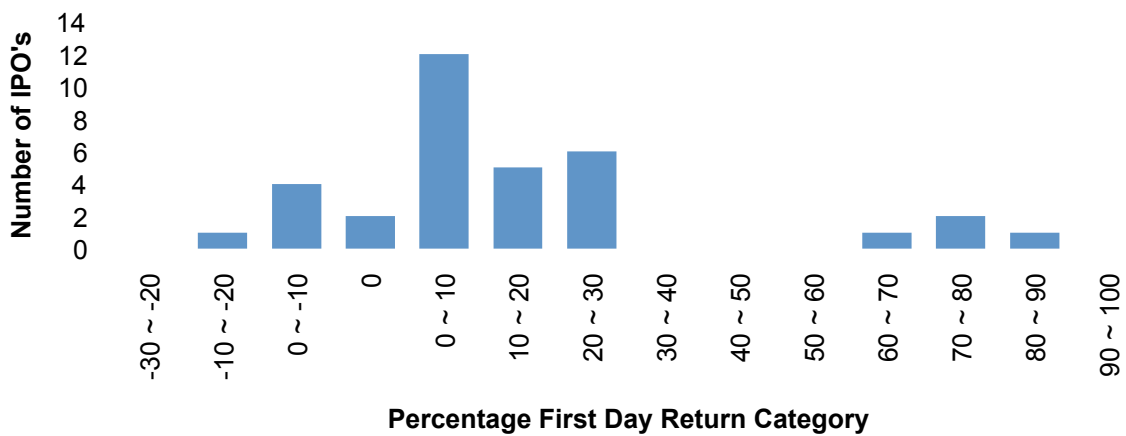
Figure 5 below shows initial returns by company and reveals that there is considerable variability of returns. This observation is supported by the high standard deviation of 24.9 percent. There are four IPOs which earn returns in excess of 60 percent, but the next largest does not exceed 30 percent. The highest first day return was 89 percent for Sea Kay Holdings (Ltd) with the lowest being -20 percent for Exxoteq Ltd. 5 IPOs (15 percent of the sample) closed the first day of trading below the initial offer price and 2 IPOs closed exactly at the offer price. The latter presents too little evidence to indicate price stabilisation activity on the part of the underwriters as investigated by Hanley, Kumar and Seguin (1993) in their study of price stabilisation of IPOs.

Figure 5
Initial Premium by Company
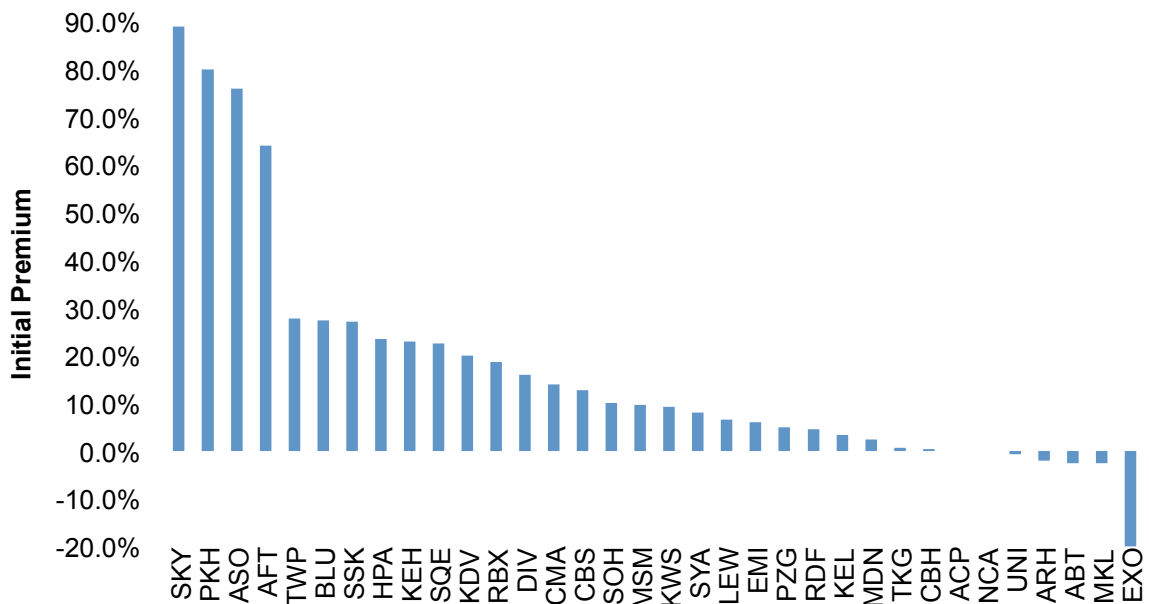
Krigman, Shaw and Womack (1999) noted that while 12 percent of the 1,232 US offers they studied had underpricing of 30 percent or more, 25 percent closed at or below the offer price. The proportion of South African IPOs with returns greater than 30 percent is also 12 percent and IPOs with zero or negative first day returns totalled 21 percent of the sample. This distribution of results is consistent with the observations of Krigman et al.

For the sixteen underpriced offerings for which sufficient data were available, the total amount of money left on the table was R1,346 million. The five most severely underpriced offers, earning returns in excess of 27 percent, accounted for 65 percent (R875 million) of the total. In an evaluation of the $27 billion that was left on the table in the US between 1990 and 1998, Loughran and Ritter (2002) found that the majority came from a small number of offerings. The median of $2.3 million was substantially lower than the average amount left on the table of $9.1 million. In the sample analysed above, the median of R40 million was in similarly less than half of the average of R84 million.

Changes in Underpricing Over Time
An inspection of the underpricing per year in Table 5 below reveals that underpricing has not been consistent over the period under examination. It also shows a clear

distinction between a higher and a lower period. The highest annual average before 2006 is 12.7 percent in 2000, with all others being below 7 percent. This is in stark contrast to the period 2006 to 2008 where each year is above 23 percent.

TABLE 5
Average Underpricing by Year

Year	No IPOs	Average Underpricing
2000	4	12.7%
2001	0	N/A
2002	3	-6.4%
2003	1	6.0%
2004	2	2.1%
2005	5	6.8%
2006	4	23.7%
2007	14	27.6%
2008	1	23.0%
Total Sample Average*	**34**	**17.1%**

*Where the average is weighted on number of issues per year. The result is the total sample average noted above.

The lower underpricing observed in the earlier period adds to the growing body of evidence of the cyclical nature of initial premia. Internationally Ibbotson and Jaffe (1975), Ritter (1984) and Ritter and Welch (2002) have analysed underpricing trends in the United States over a period stretching back to 1960. They documented clear cycles, sometimes approximately 5 years and other times as short as two years.

Following the exceptionally high initial returns of the internet boom period, there has been evidence of a global decline in underpricing. Studies in the United States, India and China have provided useful evidence for comparison of changes in initial returns in the past decade.

In the United States initial returns averaged 15.8 percent up to 1996, and over the period 2001 to 2008 decreased to 12 percent (Loughran, Ritter and Rydqvist, 2009). Underpricing on the JSE went from 26.8 percent measured up to 1998 (M'kombe and Ward, 2002), down to 17.1 percent between 2000 and 2008.

In China, initial returns from 1990 to 1998 averaged 269 percent as compared to 123 percent between 2000 and 2006 (Chen, Choi and Jiang, 2007). In India average first day returns between 1990 and 1998 were 96 percent and this figure declined to 50

percent between 2000 and 2004 (Marisetty and Subrahmanyam, 2006). On the JSE, average initial returns between 1990 and 1998 were 17 percent, and this figure dropped to 5 percent between 2000 and 2005.

Underpricing in South Africa has remained higher than the in US and lower than India and China. The decrease in underpricing noted in South Africa after the internet boom appears to be roughly in line with the global decline in first day returns. The global decline is partly a reaction to the excessive levels experienced in the 1990's and partly the result of the poor performance of equities in general. Refer to examination of hot and cold periods under Hypothesis 2 below.

The cyclical nature of underpricing is clearly visible in Figure 6 below which is an extension of Figure 2 from Chapter III to include the results of this paper. The initial returns in the period from 2000 to 2005 make up the lowest five year period since 1975; a reaction to the highest period as noted in the late 1990's. A similar decline is evident after the 'hot issue' market of 1985-1987. In the period from 2006 to 2008 the average underpricing is marginally above the median yearly average of 23 percent. Using data from Barlow and Sparks (1986), Lawson and Ward (1998), M'kombe and Ward (2002) and the results of this paper, average underpricing for the 615 IPOs between 1972 and 2008 is 25.7 percent. The results of this paper show underpricing to be notably lower than the average over the previous 35 years.

Figure 6
Yearly Average Initial Premia
1975 to 2008
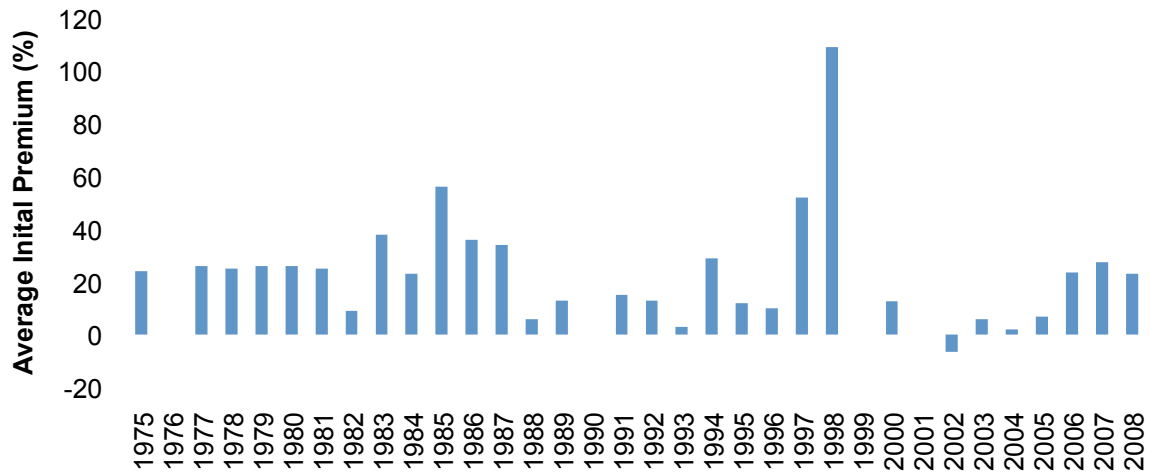
Annual averages have been obtained from Barlow and Sparks (1975 to 1985), Lawson and Ward (1986 to 1995) and M'kombe and Ward (1996 to 1998). There were no listings in the years 1976 and 2001, average underpricing was 0% in 1990 and no data were available for 1999.

Due to the constraints of the small sample size, it is not possible to compare underpricing on a year on year basis meaningfully. Instead the sample can be split into a hot and a cold period. Consistent with the methodology of Ritter (1984) and Barlow and Sparks (1986), the periods can be identified through inspection of annual premia over the period. Consistent with the Ibbotson (1975) definition of 'hot issue' markets (periods of high underpricing), Figure 6 above illustrates a 'hot' period from 2006 to 2008 where initial returns are higher than average for the period under review. Thus, the sample can be split into a cold period of 2000 to 2005 and a comparatively hot period from 2006 to 2008 with the average number of listing per year being 2.5 and 6.3 respectively.

The average first day return in the cold period is 5 percent in comparison to 26.5 percent in the hot period. In the hot period, the average return is significantly different from zero at the 1 percent level (t-statistic of 3.99) but there is only weak evidence to suggest that the mean return in the period from 2000 to 2005 is not zero (t-statistic of 1.95). This is mainly due to the low mean and relatively high standard deviation of 10 percent.

H2 Hot and cold listing periods do not exist on the JSE

In a student's t-test, the null hypothesis that the mean first day returns are equal in the hot and cold periods can be rejected at the one percent level (t-stat of -3.01). The exclusion of the property funds has the no effect on conclusions. As expected the median, maximum, minimum and proportion of positive returns are all greater in the hot period. Results are summarised in Table 6 below.

TABLE 6

Summary Results of Tests for Existence of Hot and Cold Periods

Panel A: Descriptive Statistics	Total Sample		Ex Property Funds	
	Hot	Cold	Hot	Cold
Mean	26.5%	5.0%	28.1%	3.9%
Std Dev	29.0%	10.0%	30.1%	12.7%
Median	20.0%	6.0%	20.0%	3.7%
Count	19	15	17	8
Max	89.0%	22.5%	89.0%	22.5%
Min	-2.0%	-20.0%	-2.0%	-20.0%
Positive return	17	10	15	5
Negative or zero return	2	5	2	3
T-statistic	3.99	1.95	3.85	0.86
Probability	0.1%	7.2%	0.1%	41.8%

Panel B: T-Test Of Means	Total Sample	Ex Property Funds
T-statistic	-3.01	-2.83
Probability	0.31%	0.47%
Decision (5% conf. level)	Reject H_0	Reject H_0

In the only tests of hot and cold periods on the JSE, Barlow and Sparks (1986) and Bradfield and Hampton (1988) also find that initial returns are significantly different in hot and cold periods. Both studies examined the period from 1975 to 1986 and found that the initial returns were greater in the hot period from 1984 to 1986 than in the preceding cold period; statistically significant at the one percent level. This adds to international evidence of hot and cold periods in a range of countries (Ibbotson, 1975; Ibbotson and Jaffe, 1975; Ritter, 1984; Welch, 1989; Ritter, 1998).

The downturn in the cycle observed in 2000 is the result of the post 'dot-com bubble' depression. Underpricing was at record highs in the late 1990's. Equity valuations were exceptionally high and there was an unprecedented volume of firms conducting

IPOs to capitalise on the high investor confidence and willingness to pay for equity stakes. In contrast, after the bubble period, equity valuations were comparatively low and the capital firms could raise via equity offerings was significantly diminished. Compounding this was the global depression following the terrorist attack on September 11, 2001. As a result IPO activity almost ceased with zero IPOs in 2001 and a total of 6 in the three years up to 2004.

The average number of listings per year more than doubled in the following three years. A major contributing factor was the very strong bull market in general equities experienced from 2002 to 2007. As in the late 1990's, equity prices rose and firms' ability to raise capital in the form of equity increased. Figure 7 below shows the JSE All Share Index (ALSI) in relation to the yearly initial premia from 2000 to 2008.

Figure 7
Yearly Average Initial Premia and JSE All Share Index
2000 to 2008
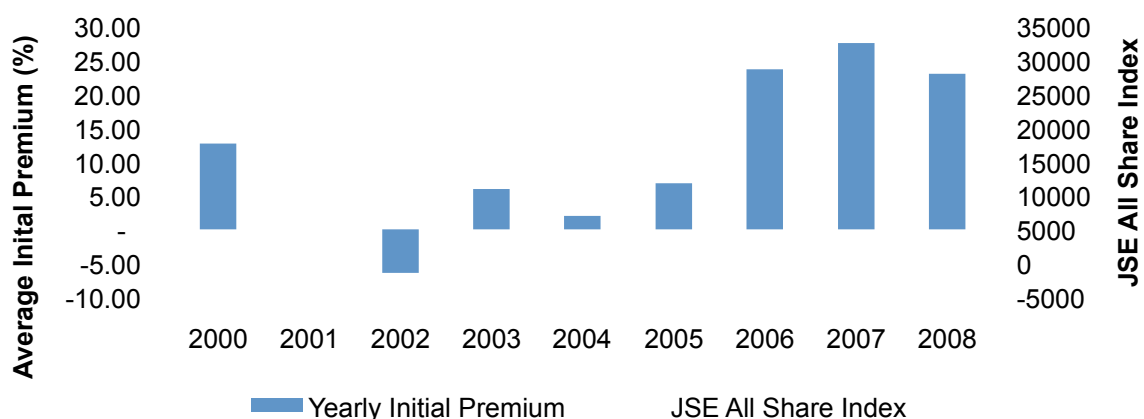
Cross Sectional Analysis of Underpricing

Effect of IPO size (as a proxy for risk) on Underpricing

Ritter (1984) and Beatty and Ritter's (1986) extensions of Rock's *Winner's Curse* model state that greater uncertainty surrounding an IPO leads to greater underpricing of that IPO. In Ritter's (1984) changing risk composition hypothesis, he proposes an explanation of variations in underpricing over time by examining changes in the proportion of risky IPOs. If riskier IPOs are more underpriced, then a higher proportion of risky IPOs will lead to higher average underpricing.

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To test the proposition that greater uncertainty surrounding an IPO leads to greater underpricing, it is first necessary to find an appropriate proxy for risk. However, as noted by Ritter (1984) there is an inherent limitation in comparing the extent of the underpricing of an offer to a proxy of its uncertainty, because one would be testing the hypotheses jointly; that is, one would be examining the relationship between underpricing and risk as well as the accuracy of the risk proxy. The risk proxy is required to be highly positively correlated with the uncertainty surrounding the offer. Ritter goes on to note that as the aim of the investigation is to test theories of underpricing and not to formulate trading strategies, the measure is not required to be ex-ante.

Ritter's (1984) research included the use of a range of proxies and revealed that the results were not sensitive to the choice of proxy. Many studies have favoured measures of size as a proxy for risk (Chen, Choi and Jiang, 2007; Beatty and Ritter, 1986). These include measure of *firm* size including sales, market capitalisation and total assets as well as measures of *offer* size such as gross proceeds.

Habib and Ljungqvist (1998) demonstrate that underpricing is strictly decreasing in gross proceeds even with uncertainty held constant. This is because proceeds are positively related to the number of newly issued shares while post IPO price is negatively related to that number as a result of dilution (Ljungqvist, 2005). This is a significant limitation on the suitability of gross proceeds as a proxy for uncertainty. For the purposes of this paper, market capitalisation is considered to be the most appropriate. As this information is published daily, information is always relevant to market conditions and is not subject to any time lag. Furthermore, as market capitalisation is widely quoted, it is believed that data would be of high integrity. In addition, market capitalisation is comparable across industries and is not affected by accounting adjustments. However, further analysis is performed using assets and proceeds as proxies for risk.

Market capitalisation weighted average underpricing was found to be 13.7 percent and is lower than the equally weighted average of 17.1 percent. This supports the proposition that riskier (smaller) IPOs are subject to higher levels of underpricing than lower risk (larger) ones.

H3 Initial returns are independent of IPO size

To test the relationship between size and underpricing the sample was split into two equal size groups based on market capitalisation. Panel A of Table 7 below presents a summary of results. The mean initial return for the big IPO firms was 14 percent as opposed to 20 percent for small IPOs. Standard deviation was also higher for the smaller group, which supports the proposition that smaller IPOs are higher risk. Due to the higher standard deviation in the smaller group, the mean was not significantly different from zero at the one percent level (p-value: 0.016).

The difference in means between two groups was not found to be significant in a student's t-test (p-value 0.215). However, an f-test revealed that the variance in the small group was significantly higher than that of the larger group (at the one percent level). These results indicate that smaller IPOs are higher risk than larger ones and thus that IPO size, as measured by market capitalisation, is a good proxy for uncertainty. The insignificant difference in means indicates that there is no evidence to support the theory that higher levels of uncertainty will result in higher levels of underpricing.

The insignificant relationship is not consistent with the predictions and findings of Beatty and Ritter (1986) but is in line with the results of Barlow and Sparks (1986). The latter study included a regression analysis which revealed a positive relationship between market capitalisation and initial premia - the opposite of Beatty and Ritter's (1986) predictions - but also found the relationship to be insignificant.

Chen, Choi and Jiang (2007) found that in China, larger firms have significantly lower initial returns and that the average size of firms with exceptionally high initial returns is significantly smaller than other firms. Michaely and Shaw (1994) also find that size has a significant effect on the level of underpricing.

Further analysis of the test sample was performed using assets as a measure of size. The results of this testing are included in Panel B of Table 7 below. Similar to the analysis using market capitalisation, the mean underpricing for small IPOs was notably larger than for big ones (23 percent compared to 11 percent), both significantly different from zero at the one percent level. Contrary to the findings using market capitalisation, the mean initial premium for small IPOs was significantly

larger than for big IPOs when assets were used as a measure of size. The results were not significant at the 5 percent level and thus the evidence is relatively weak, but does show some support for Beatty and Ritter's theory (1986).

TABLE 7

Average Initial Premia by Size

Panel A: Market Capitalisation	Total Sample		Ex Prop Funds	
	Big*	Small*	Big	Small
Mean	14%	20%	17%	24%
Std Deviation	17%	31%	19%	35%
Count	17	17	12	13
T-stat	3.367	2.707	3.118	2.463
Probability	0.00	0.02	0.01	0.03
Two sample t-test p-value		0.22		0.54
F-test		0.02		0.06

Panel B: Assets	Total Sample		Ex Prop Funds	
	Big	Small	Big	Small
Mean	11%	23%	17%	23%
Std Deviation	10%	33%	22%	34%
Count	17	17	12	13
T-stat	4.380	2.896	2.772	2.500
Probability	0.00	0.01	0.02	0.03
Two sample t-test p-value		0.08		0.54
F-test		0.00		0.06

* The big group includes all IPOs with a market capitalisation (or assets) greater than the median and the small group comprises all IPOs smaller than the median.

The relationship between size and underpricing was further analysed by splitting the sample up into size groups in different ways. The detailed results of this testing are included in Appendix 2.

The most noteworthy result was that where the sample was split into three size groups, using assets as a measure of size, mean underpricing and standard deviation both increased as size decreased. The differences were not significant, but the relationship is as predicted by Beatty and Ritter (1986) and the small sample size could account for the insignificant results.

Beatty and Ritter (1986) used proceeds as a measure of size and found that premia are positively related to the reciprocal of gross proceeds. On the JSE in the period under review, reliable data pertaining to the number of shares issued (as used to calculate gross proceeds), could only be obtained and cross checked successfully for 21 IPOs. The correlation between the reciprocal of gross proceeds and the level of underpricing was found to be -0.09 (-0.12 excluding property funds). These results are not consistent with the findings of Beatty and Ritter, though the sample size may be considered too small to draw conclusions.

Ritter and Welch (2002) argue that a major contributing factor to the exceptionally high levels of underpricing observed in the late 1990's was the increase in proportion of technology firms going public. In the 1980's and early 1990's approximately 25 percent of firms conducting IPOs were technology firms. The figure rose to 37 percent after 1995 and to 72 percent during the 'dot-com bubble' period and then dropped back to 27 percent in 2001. This was mirrored by the proportion of firms that had negative earnings in the twelve months prior to listing over the same period. On the face of it, this would appear to account for the changes in underpricing over that period and this is supported by the view that the increase in IPO volumes brings a decrease in the quality of issuing firms.

Under this reasoning we would expect to see a higher proportion of 'risky' firms concentrated in the hot issue period from 2006 to 2008 and a higher proportion of lower risk firms in the cold period preceding it. In other words, we would expect a higher proportion of small firms in the hot period than in the cold period. A contingency table was used to test this proposition.

The hot and cold periods, as split under hypothesis two above, were sub-divided into the 'big' and 'small' groups as split in the size analysis under Hypothesis 3 above. Of the 19 IPOs in the hot period, 12 were big and 7 were small. In the cold period, there were 5 big and 10 small. This distribution is in opposition to the predictions of the changing risk composition hypothesis which put forward that the proportion of small firms would be greater in the hot period. However, the Fisher p-value of 0.166 shows that the relationship is not significant and there is little evidence that the risk composition has changed over the period.

The average underpricing of 17 percent found in this paper is substantially lower than the 29 percent found on the AltX by Correia and Holman (2008). Whilst a main focus of the AltX has been maintaining high quality listings to avoid the shortcomings of the Development Capital Market, the companies listed on the AltX are generally of a lower quality and higher risk than those listed on the main board. Thus, the fact that underpricing on the main board is lower than that of the AltX provides support for the argument that higher risk results in higher underpricing.

Similar results were obtained by Barlow and Sparks (1986) and Lawson and Ward (1998) who both found that underpricing on the main board was substantially lower than on the DCM. This also provides support for the notion that higher risk results in higher levels of underpricing. Unfortunately the number of IPOs in the period under examination does not allow for use of industry as a proxy; however this represents an avenue for further research across a longer time period with more data points.

Effect of Absolute Offer Price on Underpricing

The previous studies of Chalk and Peavy (1987), Fernando, Krishnamurthy, and Spindt (2002) and M'Kombe and Ward (2002), as discussed in Chapter II and III above, split their samples into 5, 8 and 4 price groups respectively and then compared the average underpricing between the groups. The total sample of 34 is too small to split into numerous groups and was split instead into two equal groups (greater than 500 cents and less than 500 cents).

H4 Initial returns are independent of the absolute offer price

The average underpricing for the group with offer prices of less than 500 cents was 22 percent; almost double that of the offers with a price of more 500 cents at 12 percent. The difference in means is not significant but the p-value of 0.12 does present weak evidence that the lower the offer price is, the higher the underpricing of the IPO is. It is consistent with M'kombe and Ward (2002) and Chalk and Peavy (1987) that the group with the smaller offer prices has a higher average level of underpricing. Summary statistics are displayed in Table 8 below.

The standard deviation of the lower price group was also significantly larger than that of the higher price group; 33 percent in comparison to 11 percent. An f-test to determine whether the variances of the two groups are different was significant at

the 1 percent level. This supports the findings of M'kombe and Ward (2002). It is also in line with uncertainty theory of Beatty and Ritter (1986) that the group with the higher level of risk (as measured by standard deviation) also exhibits higher average levels of underpricing, albeit not significantly higher.

TABLE 8

Average Initial Premia by Absolute Offer Price

Offer Price (cents)	500 or less	Greater than 500
Number	17	17
Mean	22%	12%
Standard Deviation	33%	11%
	Probability	
T-test	0.12	
F-test	0.00	
Decision (5% conf. level)	Accept H_0	

Additional analysis was performed by splitting the sample into three groups. Inspection of the distribution of offer prices revealed three natural groupings; less than 200 cents, between 200 and 500 cents and greater than 500 cents. Analysis of these groups provided further support for the findings of M'kombe and Ward (2002) as the average initial premia was highest for the small group at 30 percent and the standard deviations also decreased from 37 percent to 21 percent and 11 eleven percent for the small to large groups respectively. The ANOVA F ratio was not significant (possibly a result of the small number of IPOs in each group). The linear relationship noted above is in line with the findings of Chalk and Peavy (1987) and Ibbotson, Ritter and Sindelar (1988) and does not show evidence of the U-shaped relationship found by Fernando, Krishnamurthy, and Spindt (2002).

Effect of Proportion Offered on Underpricing

Under the signalling hypothesis of Grinblatt and Hwang (1989), firms are believed to use the proportion of shares held by insiders and the extent of underpricing as signalling tools. A similar theory was proposed by Wasserfallen and Wittleder (1994) who argued that a higher rate of retention serves as a signal to investors that the existing shareholders have high expectations of future value of the firm and shows a willingness to carry the risk of the post-IPO firm.

Furthermore, some surveys have revealed that management in some issuing firms believe that the discount on issuing should be adjusted for the proportion of shares offered to the public (Barlow and Sparks, 1986). The higher the proportion of shares offered to the public, the smaller the discount needs to be. Conversely, when only a small portion of shares is being offered to the public, it is important that the offer be a success to maintain the prestige of the shares held by existing shareholders.

The proportion of shares offered can be defined as follows:

$$\frac{\text{Number of shares offered in IPO}}{\text{Number of shares in issue immediately after the offer}}$$

H5 Initial returns are independent of the proportion of shares offered

It is generally the case with IPOs that the proportion held is the majority. This is not the case with property funds because property funds are often founded with the intention of being listed to raise capital and thus the investor base prior to issue will be limited. The 21 firms for which data regarding shares issued could be obtained contained 6 property funds. All 6 property funds offered more than 50 percent of the outstanding shares. Due to this peculiarity, this analysis is performed excluding property funds.

In only 2 out of the seventeen offers remaining in the sample were more than half of the post-issue outstanding shares offered in the IPO. The average proportion offered is 36 percent (median 30 percent). The results of the regression analysis are summarised in Table 9 below.

TABLE 9

Summary of Regression: Proportion of Shares Offered and Initial Premia

Summary Regression Statistics			
R Square			0.008
			Significance F
ANOVA		*F*	
Regression		0.128	0.725
	Coefficients	*t Stat*	*P-value*
Intercept	0.158	1.256	0.228
X Variable 1	0.102	0.358	0.725

The positive coefficient observed is in contrast to the predictions of the questionnaires but in line with the findings of Wasserfallen and Wittleder (1994); however the p-value of 0.73 does not show even weak evidence of a relationship. These results are consistent with Michaely and Shaw (1994) who found the coefficient for insider holdings to be insignificant in a direct test of Grinblatt and Hwang's (1989) signalling hypothesis.

In a test on the JSE Barlow and Sparks (1986) found a negative correlation between the proportion of shares offered and the level of underpricing, but also found that the relationship was not significant. Thus, there is no evidence that the proportion of insider shareholding has any explanatory power in the level of underpricing on the JSE.

Chapter VI: Conclusion

This paper has documented the underpricing of a sample of 34 South African IPOs that listed on the main board of the JSE between 2000 and 2008. The existence of underpricing is consistent with previous studies both internationally (Ibbotson, 1975; Levis, 1993; Aggarwal, Leal and Hernandez, 1993; Chen, Choi and Jiang, 2007) and on the JSE (Barlow and Sparks, 1986; Lawson and Ward, 1998; M'kombe and Ward, 2002).

The average initial return of 17.1 percent is very similar to the average underpricing in developed markets of 18.1 and is in line with findings in the United Kingdom, Finland, Hong Kong and the United States in particular. However, these are averages over a long period of time and it has been shown that underpricing after the internet boom has been low. Initial returns in South Africa are considerably lower than the average in emerging markets (56.1 percent) and higher than in only Chile and Turkey.

The average initial premium found is somewhat lower than the average of prior studies on the JSE of 29.4 percent. This provides support for the assertion that underpricing changes over time. This is believed to be the result of three main factors. Firstly, this study only includes listings on the main board of the JSE whereas all previous studies included the Development Capital Market; which is known to have a higher degree of underpricing. Secondly, previous studies on the JSE all included the 'hot issue' market of the late 1980's. The data period of this study follows a 'hot issue' market directly and it has been found that historically, periods following 'hot issue' markets tend to exhibit low underpricing.

The decline in underpricing on the JSE is in line with decreases in the United States, China and India; the only countries for which data could be obtained for a matching period.

This paper also tested for the persistence of hot and cold issue periods on the JSE and it was found that returns in the hot period from 2006 to 2008 (26.5 percent) were significantly greater than in the cold period from 2000 to 2005 (5.0 percent). As noted

above, the cold period follows the 'hot issue' market of the internet boom directly and the low level of underpricing is in line with that noted in the years immediately following the 'hot issue' market in the 1980's. These results add to the previous evidence of the existence of hot and cold periods and the higher levels of underpricing observed in hot periods.

A number theories of underpricing – based on the existence of information asymmetry –argue that higher levels of uncertainty surrounding an IPO will result in higher levels of underpricing in that IPO. This proposition was tested by using size as a proxy for risk. Market capitalisation, total assets and gross proceeds were used as measures of size. No evidence was found to indicate the existence of a cross-sectional relationship between market capitalisation or gross proceeds and the degree of underpricing. Weak evidence that initial premia for small firms (23 percent) was significantly greater than large firms (11 percent) was found when total assets was used as a measure of size. This provides some support for the proposition that higher risk IPOs are associated with higher initial returns. The variance of the sample of small firms was significantly higher than that of the larger firms, indicating that size is a suitable proxy for risk.

The effect of absolute offer price on the degree of underpricing was examined and it was found that the higher initial premia (22 percent) of IPOs with low offer prices was not significantly different from IPOs with high offer prices (12 percent). The insignificant relationship is not consistent with the findings of M'kombe and Ward (2002) but could be due to the small sample size. The variances of the two groups were significantly different but, similar to the analysis of offer size discussed above, the higher variance did not translate into significantly greater initial returns.

It was found that the proportion of shares offered did not have a significant effect on the degree of underpricing. This is not supportive of the signalling hypothesis but this result adds to a growing number of unsuccessful tests of this theory.

The evidence in this study must be interpreted with caution due to the small sample sizes and the concentration of IPOs in a small number of years in the latter part of the period examined; though these limitations are common to a number of emerging markets. However, the consistency of the majority of the evidence in this paper with

previous research indicates that the results are not specific to this sample or time period.

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Appendix 1

Data Exclusions

The following three IPO companies have specific characteristics which affected the post-issue pricing and have consequently been excluded from the sample:

Central Rand Gold (CRD): conducted a 5/2 stock split for which it was not possible to reconcile the difference in portions making up the South African shares in relation to the London share as this was done simultaneously to the IPO. Primary demand was in the United Kingdom and thus it is deemed appropriate to exclude this stock from the sample.

Oanda (OAO): is an oil company which was previously listed in Nigeria. For some reason, there were no two data sources that provided prices that agreed for this firm. Thus, with no reliable price the firm could not be included in the sample.

Metmar (MML): started out as Heritage collection Holdings and then changed its name and issued more shares as Metmar Ltd. A closing price of 158c, resulting in underpricing of 48 percent can be cross-checked between Bloomberg and McGregor BFA but there is uncertainty regarding the best date on which to take the price as there appear to have been hold shares around the time of the offering. It is thus considered best to exclude this IPO from the sample.

Appendix 2

Additional Analysis of Average Premia by Size

It is common in research, for methodologies to differ slightly between studies. With regard to analysing the effect of IPO size on the level of underpricing, researchers have a range of measures of size and methods of splitting the sample at their disposal, as discussed in Chapter V. In order for the results of future studies to be comparable to testing performed in this study, a brief description and the results of additional analyses have been included in this appendix.

The results of testing in Chapter V are based on the total sample being split into two equal groups; IPOs bigger than the median, and those smaller than the median. In this section two further analyses were performed for each measure of size (market capitalisation and assets) by splitting the sample into different groups. This was done by using natural groupings of market capitalisations and assets through inspection of the distributions displayed graphically.

In the first set of tests the sample was split into two groups (greater than R1bn and less than R1bn) and in the second set of tests it was split into three (greater than R2bn, between R2bn and R500m and less than R500m). The same procedures were performed as in Chapter V, with the exception of ANOVA replacing the t-test in the case where the sample was split into three groups. The results of all additional analyses are summarised in Table 10 below.

The most noteworthy result was that mean underpricing and standard deviation both increased as size decreased where assets were used as the measure of size. The differences were not significant, but the relationship is in line with the predictions of Beatty and Ritter (1986). The small sizes of the groups of thirteen, nine and eleven could account for the insignificant results.

Panels C and D in Table 10 display the results of the same testing procedures as above, performed on the sample excluding property funds. These results are similar to those of the total sample.

TABLE 10

Average Initial Premia by Size – Additional Analysis

TOTAL SAMPLE

Panel A: Market Capitalisation	Two Groups		Three Groups		
	>1bn	<1bn	>2bn	2bn>x>500m	<500m
Mean	17%	17%	14%	25%	8%
Std Deviation	19%	28%	12%	33%	13%
Count	12	22	8	15	11
T-stat	3.178	2.836	3.272	2.958	1.923
Probability	0.01	0.01	0.01	0.01	0.08
ANOVA P-value				0.18	
T-test P-value	0.49				
F-test	0.17				

Panel B: Assets					
	>1bn	<1bn	>1bn	1bn>x>500m	<500m
Mean	11%	21%	11%	13%	27%
Std Deviation	10%	31%	10%	25%	35%
Count	13	20	13	9	11
T-stat	3.860	3.032	3.860	1.591	2.589
Probability	0.00	0.01	0.00	0.15	0.03
ANOVA P-value				0.26	
T-test P-value	0.13				
F-test	0.00				

EXCLUDING PROPERTY FUNDS

Panel C: Market Capitalisation					
	>1bn	<1bn	>2bn	2bn>x>500m	<500m
Mean	18%	22%	14%	30%	7%
Std Deviation	19%	34%	12%	36%	18%
Count	11	14	8	12	5
T-stat	3.128	2.428	3.272	2.859	0.929
Probability	0.01	0.03	0.01	0.02	0.41
ANOVA P-value				0.26	
T-test P-value	0.13				
F-test	0.08				

Panel D: Assets					
	>1bn	<1bn	>1bn	1bn>x>500m	<500m
Mean	13%	23%	13%	17%	27%
Std Deviation	12%	32%	12%	28%	35%
Count	7	18	7	7	11
T-stat	2.728	3.110	2.728	1.642	2.589
Probability	0.03	0.01	0.03	0.15	0.03
ANOVA P-value				0.53	

T-test P-value	0.20	
F-test	0.02	

Appendix 3

Inconsistencies between Data Sources

It was noted in Chapter IV that there was a degree of incongruity between the data sources used to obtain IPO data. This appendix includes an explanation of the differences and what data were used and then includes a comparison of results using different sources.

Summary of Inconsistencies between Data Sources

Reuters and Bloomberg both provide lists of IPOs, which include offer price, date and number of shares offered (though some data were missing in this field). The JSE Markets division provided a schedule of listings including offer price, date and number of shares offered, but did not differentiate between IPOs and other listings. All sources included the AltX and these IPOs were removed.

The Bloomberg list contained 39 IPOs on the main board and Reuters 33. However, only 20 IPOs were common to both lists. The offer price was the same for all 20, but the number of shares issued differed for two. For the 19 Bloomberg IPOs which did not appear in the Reuters list and the 11 Reuters IPOs which likewise did not appear in the Bloomberg list, the offer prices were cross checked to the data provided by the JSE.

From the Bloomberg list of 39 IPOs, 31 prices agreed to the JSE data, with 8 not matching. 20 out 22 Reuters offer prices could be agreed to the JSE data, with the remaining 11 not appearing in the JSE list.

Comparison of Results Using Different Data Sources

To test whether the choice of data service would affect the results of testing, three samples were created from the three sources. The Bloomberg and Reuters samples were simply their IPO lists. A sample was constructed from the JSE data by extracting all listings which also appeared in either the Bloomberg or the Reuters list; a total of 40 IPOs. For each of the three samples, mean, standard deviation and median were calculated. In addition, a student's t-test was performed to test whether the mean underpricing was significantly difference from zero. Results are summarised in Table 11 below.

TABLE 11

Comparison of Results from Different Data Sources

Panel A: Descriptive Statistics	JSE	Reuters	Bloomberg	Actual Sample
Mean	15.6%	19.5%	12.4%	17.1%
Standard deviation	25%	27%	23%	25%
Median	9%	10%	7%	9%
Count	40	31	36	34

Panel B: T-Test – Mean Equal to Zero				
T-statistic	3.92	4.05	3.20	4.00
Probability	0%	0%	0%	0%
Decision (5% conf. level)	Reject H_0	Reject H_0	Reject H_0	Reject H_0

There were two IPO's in the Reuters sample for which closing prices could not be obtained and the three IPOs excluded from the actual sample discussed in Appendix 1 have also been excluded for the purposes of this test.

The range of means is 7.1 percent, which represents more than one third of any of the means observed. The range in medians is 3 percent which is slightly smaller in relation to the medians observed. The variation is from two sources. Firstly, the samples all contain some IPOs that are common to other samples, and some that are unique to that sample. Furthermore, where the same IPO is included in two samples, the offer price may differ between two data sources and thus with the closing price being the same, the initial return will be different.

The means for all samples were significantly different from zero at the one percent level; consequently the choice of data source would not have an effect on the conclusion that underpricing exists. The impact would be in measuring the extent of underpricing, and comparing underpricing between countries and time periods. Initial returns of 12.4 percent, as observed in the Bloomberg sample are as low as measured in the United States and lower than a number of developed countries (Loughran, Ritter and Rydqvist (1994, updated 2007). Underpricing of 19.5 percent is higher than the average observed for developed countries of 18.1 percent (Loughran, Ritter and Rydqvist (1994, updated 2007).

Given the fairly substantial differences in average underpricing between the different data sources, only data that could be cross checked has been used as it is believed that this will make the results of this paper significantly more reliable.