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INVESTIGATING PRICE PERFORMANCE OF INITIAL PUBLIC OFFERS: A COMPARATIVE ANALYSIS OF THE JOHANNESBURG STOCK EXCHANGE AND THE NIGERIAN STOCK EXCHANGE

by

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DECLARATION

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I, Pauline Mutemeri, do hereby declare that this thesis which is submitted to the University of South Africa, Pretoria, is my own work and all references that have been cited and acknowledged.

Signed: P Mutemeri Date: 30 June 2019

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DEDICATION

This study is dedicated to my parents Agnes and Charles Mutemeri and my husband Aubrey for their continued love, support and guidance.

ABSTRACT

The advancement and development of the financial sector is fundamental for building an efficient economic system that enhances foreign and domestic investments. The aim of this study was to compare the relationship between the price performance of initial public offerings and macroeconomic indicators in the South African and the Nigerian economy. With the increase of IPO listing on both stock exchanges, it is of paramount importance that an analysis and examination of IPO performance and its contribution to the economy is conducted. Using the 91 and 19 initial public offerings that were listed on the Johannesburg Stock Exchange and the Nigerian Stock Exchange respectively during the years 2005 to 2015, price performance was measured by using the market-adjusted abnormal returns and the wealth relative model. The linear ordinary least squares regression model was used to measure the relationship between initial public offering performance and macroeconomic indicators. Based on the mean market adjusted returns, initial public offerings listed between 2005 and 2015 were under-priced. The regression model established that the first day, week and month price changes in Nigeria were 0.19, 0.48 and 0.77 times higher respectively than to South Africa. The regression analysis found that inflation and interest rates were positively correlated with price changes at the end of the first month of trade, whereas gross domestic product growth was not statistically significant. Therefore, to evade financial loss, investment decision making processes should consider factors such as geographic location, interest rates, inflation and the industry prior to making the decision.

Key terms

Day of trade, initial public offerings, initial return, listing price, mean market adjusted return, post-recession, prior-recession, raw return, wealth relative.

ABSTRAK

Die bevordering en ontwikkeling van die finansiële sektor is fundamenteel vir die ontwikkeling van ’n doeltreffende ekonomiese stelsel wat buitelandse en binnelandse investering aanmoedig. Die doel van hierdie studie was om die verhouding tussen die prysprestasie van aanvanklike openbare aanbiedinge en makro-ekonomiese aanwysers in die Suid-Afrikaanse en Nigeriese ekonomie te vergelyk. Met die toename in AOA-notering op albei aandelebeurse, is dit uiters belangrik dat ’n ontleding van en ondersoek na AOA-prestasie en sy bydrae tot die ekonomie uitgevoer word. Deur gebruikmaking van die 91 en 19 aanvanklike openbare aanbiedinge wat onderskeidelik op die Johannesburgse Effektebeurs en die Nigeriese Effektebeurs gedurende die tydperk 2005 tot 2015 genoteer is, is prysprestasie gemeet deur gebruikmaking van die markaangepaste abnormale opbrengste en die rykdomrelatiewe model. Die lineêre gewone kleinste kwadrate-regressiemodel is gebruik om die verwantskap tussen die prestasie van aanvanklike openbare aanbod en makro-ekonomiese aanwysers te meet. Op grond van die gemiddelde markaangepaste opbrengste was aanvanklike openbare aanbiedinge wat tussen 2005 en 2015 genoteer is, onderprys. Die regressiemodel het vasgestel dat die eerste dag-, week- en maandprysveranderinge in Nigerië onderskeidelik 0.19, 0.48 en 0.77 keer hoër as in Suid-Afrika was. Die regressieontleding het bevind dat inflasie en rentekoerse ’n positiewe korrelasie gehad het met prysveranderinge aan die einde van die eerste handelsmaand, terwyl bruto binnelandse produk se groei nie statisties beduidend was nie. Derhalwe, om finansiële verlies te ontduik, behoort investeringbesluitnemingsprosesse faktore soos geografiese ligging, rentekoerse, inflasie en die bedryf in aanmerking te neem voordat besluite geneem word.

Sleutelterme

verhandelingsdatum; aanvanklike openbare aanbiedinge; aanvanklike opbrengs; gemiddelde markaangepaste opbrengs; postresessie; pre-resessie; onverwerkte opbrengs; welvaartfamilielid

ISIFINYEZO ESIQUKETHE UMONGO WOCWANINGO

Ukuqhubekela phambili kanye nentuthuko yomkhakha (sector) yezezimali kubalulekile ekwakheni inqubo yezomnotho esebenza kahle neqhubekela phambili ukutshalwa kwezimali zangaphandle kanye nezangaphakathi ezweni. Inhloso yalolu cwaningo bekuwukuqhathanisa ubuhlobo phakathi kokusebenza kwentengo yama-initial public offerings kanye nezinkomba zama-macroeconomic kumnotho weNingizimu Afrika kanye nowase-Nigeria. Ngokwenyuka kwe-IPO listing kuwo womabili ama-stock exchange, kubaluleke kakhulu ukuthi kwenziwe uhlaziyo nohlolo lokusebenza kwe-IPO kanye nomthelela wakho kumnotho kumele kwenziwe. Ngokusebenzisa ama-initial public offerings ka 91 no 19 kwi-Johannesburg Stock Exchange kanye nakwi-Nigerian Stock Exchange ngokuhambisana phakathi kweminyaka ka 2005 kanye no 2015, ukusebenza kwamanani entengo kwakalwa ngokusebenzisa ama-market-adjusted abnormal returns kanye ne-wealth relative model. Imodeli ye-linear ordinary least squares regression model kwasetshenziswa ukukala ubuhlobo phakathi kwama-initial public offering performance kanye nezinkomba ze-macroeconomic. Ngokulandela i-mean market-adjusted returns, ama-initial public offerings okwafakelwa kuhla phakathi kweminyaka ka 2005 kanye no 2015 kwakufakelwe ngentengo ephansi. I-regression model yathola ukuthi ngosuku lokuqala, ngeviki, kanye nenyanga, ukushintsha kwamanani entengo eNigeria, kwakungu 0.19, 0.48 kanye ne 0.77 ngezihlandla eziphezulu kuneNingizimu Afrika. Uhlaziyo lwe-regression analysis lwathola ukuthi i-infleshini kanye namazinga enzalo achaphazeleka ngendlela enhle ngokuhambisana noshintsho lwentengo ekupheleni kwenyanga yokuqala yokuhwebelana, lapho khona ukukhula kwe-gross domestic project kwakungakhulile kakhulu ngokwezibalo. Ngakho-ke, ukugwema ulahlekelo kwezezimali, izinqubo zokuthatha izinqumo ngotshalo-mali kumele kubonelele izinto ezifana nendawo okuyi-geographical location, amazinga enzalo, i-infleshini kanye nemboni ngaphambi kokuthatha isinqumo.

Amathemu abalulekile

usuku lokuhwebelana; ama-initial public offerings; i-initial return; i-mean market-adjusted return; i-post-recession; i-prior-recession, i-raw return; wealth relative

LIST OF ABBREVIATIONS AND ACRONYMS

AltX- Alternative Exchange
ASeM- Alternative Securities Market
CPI- Consumer Price Index
FES- Fixed Effects
FMB- Financial Market Bill
FSB- Financial Service Board
FSCA- Financial Sector Conduct Authority
GDP- Gross Domestic Product
GNP- Gross National Product
IMF- International Monitory Fund
IPO- Initial Public Offering
IPOs- Initial Public Offerings
JSE- Johannesburg Stock Exchange
MAAR- Mean market Adjusted Abnormal Return
NSE- Nigerian Stock Exchange
OLS- Ordinary Least Squares
PA- Prudential Authority
SEC- Securities and Exchange Commission (SEC)
SRP- Securities Regulations Panel
WR- Wealth Relative

CHAPTER ONE: INTRODUCTION

1.1 INTRODUCTION

1.1.1 AN INTRODUCTION TO THE BACKGROUND OF INITIAL PUBLIC OFFERS.

The resolution of listing issues to the general public on the stock exchange is a milestone in a firm`s life as it marks a major transformation and evolution in the relationship between the firm and its stakeholders (Lattimer, 2006). An Initial Public Offering (IPO) is an activity that describes the stock of a firm being issued to the general public for the first time (Mwendwa, 2014). Blum (2011) suggested that an IPO is the initial selling of issues to the public and a listing on a stock exchange with the expectation that a liquid market will evolve.

Issuing shares to the general public is an approach used to raise a larger pool of funds that has prompted various publications (Bansal and Khanna, 2012; Blum, 2011; Mashaba, 2014; Ritter, 2017; Harvey, 2016) on the behaviour of IPOs on stock markets under different economies (Schuster, 2003). A substantial number of publications (Bal and Gentry, 2006; Ivanauskas, 2015; Ritter, 2017; Kirkulak, 2008; Latham and Braun, 2010) recorded the returns earned by investors in IPOs and the main focus of most of these studies has been in developed markets. Ritter (2017) noted that the United States of America (US) market in particular has received a great deal of attention in the form of evaluations of IPO performance because of its long history and the substantial number of offerings on the stock markets.

Studies (Islam, Malik and Uddin, 2011; Fama and French, 2004; Chen and Pan, 2002) of the long-term price performance aftermarket of IPOs in developed markets such as the US stock market, and the German and UK market have also been undertaken. The results of these studies indicate that there are many anomalies in IPO price behaviour in financial markets that are regarded as competitive (Islam, Malik and Uddin, 2011). Chen and Pan (2002) observed that there are three major anomalies in IPO issue price behaviour. The first anomaly mentioned by Van Heerden and Alagidede (2012) is that IPOs deliver an abnormal initial return, which means that investors purchasing IPOs from the primary market have the potential to sell those same issues at a higher price on the initial secondary market. The second anomaly is that IPOs in general outperform the market and the industry in the short-run

aftermarket (Neneh and Van Aardt Smith, 2013). Thirdly, Brau and Carpenter (2013) argued that in the long run, IPO issues underperform the market and its industry counterparts.

Pastor and Verenesi (2005) found that macroeconomic conditions such as inflation and interest rates affect a firm's business performance, industry performance and ultimately the decision to issue shares to the general public. There is a greater likelihood that a firm will demand finance for growth in a positive economy, thereby increasing the chances of financing through IPOs (Angelini and Foglia, 2018). Investors are interested in knowing how macroeconomic conditions affect IPO performance and to what degree each condition influences new equity issuances (Jeon and Tran, 2008). Angelini and Foglia (2018) mentioned that if investor sentiments are sabotaged by the political and economic climate, firms may find it difficult to raise funds through IPOs.

An emerging market is a group of countries that has a greater capacity than developed countries to provide investors with higher earnings on their investments (Adeoje, 2016). Cavusgil (1997) observed that the characteristics of an emerging market are that the economy is small, there is a lower Gross National Product (GNP) per capita than in developed countries and a higher rate of fluctuation in the exchange rate, all of which pose a high risk for trading. Table 1.1 shows the difference between developed and emerging markets.

Table 1.1: Differences between developed and emerging markets

Dimensions	Developed Markets	Emerging Markets
Degree of economic development	High	Medium / low
State of economy	Developed/ stable	Unstable
Macroeconomic framework	Stable	Underdeveloped
Market conditions	Stable	Unstable
Rate of growth	Low	High
Cultural resistance to market economy	Low	Higher
Market infrastructure	Developed	Underdeveloped

Source: Adeoje, 2016

The trend in price performance in the aftermarket of IPOs remains inadequately investigated in emerging markets (Mashaba, 2014). Among the few publications on emerging markets, Achua (2011) investigated the IPO performance of African stock markets, Omran (2005) analysed Egyptian IPOs, Neneh and Van Aardt Smith (2013) explored IPOs on the JSE and Suren (2015) investigated the Sri Lankan stock market. Mashaba (2014) explored long-term returns of IPOs on the JSE while Dzimiri and Radikoko (2015) analysed IPO performance on the Zimbabwean Stock Exchange (ZSE).

1.2 PROBLEM STATEMENT

Moodley (2009) observed the price of the premiums offered by initial public offerings at the end of the first day of trade. During the period 1998 to 2007, Moodley (2009) reported that an average of 28.39% was found in initial returns and was significantly different from zero. Although Moodley (2009) investigated IPO price performance on the JSE and other authors (Agu, Olusegun and Uwuigbe, 2012; Udenka, 2012; Mashaba, 2014; Muller, 2009) have investigated the performance of IPOs in both South Africa and Nigeria, none have made a comparison of South Africa relative to another stock market in an emerging economy. The present study, on the other hand, investigates and compares the performance IPOs on the Johannesburg Stock Exchange (JSE) and the Nigerian Stock Exchange (NSE) and provides findings on why IPOs are under-priced or overpriced. With the increase in the number of firms recently going public on both the JSE and the NSE, it is vital to explore and analyse IPO share price performance and examine the extent to which this performance contributes to the economy at large.

The available literature (Ritter, 2017; Wang, 2005; Rust, 2015; Kucukkocaoglu, 2008) provides sufficient detail on more developed economies while looking less deeply at developing and emerging market economies. There is even less study covering Africa for the period 2005–2015, and investigating how IPO price performance is affected by macroeconomic variables. Earlier studies (Blum, 2011; Mwendwa, 2014) has provided only modest evidence of what should be expected from first day returns. The study produces evidence of what should be expected on the first day, week, month and year of trading so that stakeholders can make informative decisions before trading. From a South African perspective, studies by Mashaba (2014), Moodley (2009), Lawson and

Ward (1998) and Van Heerden and Alagidede (2012) have a strong JSE focus but do not compare IPO performance with other countries or discuss the extent to which IPO performance is affected by economic factors such as inflation, shifts in the GNP/per capita, currency exchange rates to the US dollar and interest rates. The lack of information on the influence of macroeconomic conditions on IPO performance leads to vague decisions as firms operate in an economy. This study seeks to address the issue of whether the macroeconomic variables mentioned above have any impact on the price performance of IPOs in South Africa and Nigeria. Such information could be beneficial to investors and potential investors prior to trading.

1.3 OBJECTIVES OF STUDY

The broad objectives of this study were to compare the performance of IPOs listed on the NSE and JSE in the period 2005 to 2015 and the impact of macroeconomics.

The objectives are listed below:

1. To investigate and determine the performance of IPOs listed on the JSE and NSE during the period 2005 to 2015.
2. To determine the impact of macroeconomic variables on IPO performance.

1.4 RESEARCH QUESTIONS

Following the objectives, this study seeks to address the following research questions:

1. What is the level of IPO performance on the Johannesburg Stock Exchange and the Nigerian Stock Exchange?
2. Can the level of an IPO performance be associated with the industry, period and stock market it is listed under, especially in emerging markets?
3. Is there any relationship between IPO performance and macroeconomic indicators such as inflation, interest rates and GDP in South Africa and Nigeria?

1.5 RESEARCH HYPOTHESES

Research hypotheses were developed to test the initial performance of JSE and NSE IPOs. These research hypotheses are stated below:

Hypothesis 1:

There is a relationship between the country of listing and the overall performance of IPOs (under-priced or overpriced). Geographical location is important in determining IPO performance.

Hypothesis 2:
Macroeconomic variables determine IPO performance.

Hypothesis 3:
There is a relationship between the industry of listing and the overall performance of IPOs.

1.6 JUSTIFICATION FOR STUDY

The study was a comparison of IPO performance of the two powerhouse countries in an emerging market (in Africa) and of how macroeconomics affect the performance of IPOs. Adeoje (2016) observed that Nigeria is the economic pulse of Africa and is said to be on the rise. The International Monetary Fund (IMF) (2017) ranked South Africa and Nigeria the highest in terms of GDP in 2017, having a GDP of $349.30 billion and $376.30 billion respectively. Nigeria is regarded as one of the powerhouses of Africa because in 2017, according to the World Economic Situation and Prospects (2018), the country contributed more than half of Africa`s improvements as a result of its increased oil and gas production.

In addition, the study evaluated the performance of IPOs that were listed between 2005 and 2015 as this period covers recent economic events. These include the housing bubble of 2007 and 2008, during which Apu Das, et al. (2012) argued that American banks repackaged housing debt as the global financial instruments “Collateralized debt Obligations” which were sold worldwide and led to unaffordable home loan repayments and a large number of sub-prime borrowers defaulting. The Global economic outlook (2008) also supported the notion that the global crisis was sponsored by the sub-prime mortgage crisis. Seshan (2009) argued that the collapse of Lehman Brothers in 2008 contributed to the financial crisis as credit flows dried up, leading to a spike in money market interest rates. The financial global crisis and the collapse of major stock markets such as Wall Street during the period 2007 –2009 and

the decline of the South African Rand against the US dollar in 2015 also forms part of the recent economic events. In addition to recent economic events, the rise of China and India in the trading market in 2005 enhanced international trading across countries.

The first reason for this study was that, from the issuing firm's point of view, the study findings would inform the issuer about profit making when trading, with regard to timing in trading, risk, return, importance of market feedback and signalling. Ritter (2003) observed that before IPOs are issued to the public, extensive marketing campaigns are conducted to ensure that offers are more appealing to the public. Based on the winner`s curse theory, there are two groups of investors, the informed and the uninformed (Rock, 1986). Issue prices reflect all information available in an efficient market. This therefore indicates that if investors are to trade successfully on the stock market they need information.

The second reason for undertaking this study was that, from a policy maker's point of view, the results could be of benefit in the formulation and execution of policies related to issue trading, as well as in the monitoring of stock exchange trading (Mashaba, 2014). The government would also be given insight into how to formulate policies and, rules, and information on how to encourage investments to benefit the growth of the economy (Alagidede and Van Heerden, 2012).

1.7 DEFINITION OF TERMS

The main terms used in this study are defined below:

- **Initial Public Offerings (IPO)**

The first time a firm issues shares to the general public is referred to as an IPO (Mashaba, 2014; Blum, 2011). An IPO occurs when a financial instrument is sold to the public for the first time, with the assumption that a liquid market will develop (Ritter, 1998).

- **Under-pricing**

Under-pricing is the valuing of a share at a price that is below its market value (Younesi, Ardekani and Hashemijoo, 2012). Under-pricing occurs when an issue generates a higher closing price on the first day of trade than the initial offer price. In most cases, the firm issuing shares sets the offer price at a level that ensures that the first-day return is positive (Berk and DeMarzo, 2011).

- **Hypothesis**

A hypothesis is a statement of the relation between two or more variables. Rogers (1966) explained hypotheses as single provisional guesses or assumptions for use when designing a theory or planning experiments. A hypothesis is an explanation that is suggested by observation or knowledge but has not yet been proved or disproved (Clark and Hockey, 1981). Ary, Jacobs and Razavieh (1984) observed that a hypothesis is a tentative proposition recommended as a solution to a problem of some phenomenon. Prasad, Rao and Rehani (2001) added that a hypothesis is a clear or simplified statement that has explanatory power, and which explains the relationship between variables that should or will be tested.

- **Abnormal Returns**

An abnormal return is defined as the return obtained from a given portfolio or security over a period of time that differs from the expected rate of return (Ritter, 1998). Welch (1992) defined an abnormal return as the variance of the actual return and the expected return from market movements (normal returns).

- **Efficient Market**

An efficient market is a market where prices are not a biased approximate to the true value of the investment (Fama and French, 2004). Markowitz (1952) reported that market efficiency does not mean that the price set out by the market will be exactly the same as the true value every time, but requires that errors that are found in the market price are unbiased, that is, the price may be higher than or lower than the true value as long as the deviations are random and do not follow a pattern. Ang, Goetzmann and Schaefer (2010) argued that there are different forms of market efficiency, that is weak, semi-strong and strong market efficiency. Weak efficiency indicates that historical returns cannot forecast future excess returns. In the case of semi-strong

efficiency, information from the public cannot be used to predict future excess returns. Strong market efficiency implies that there is no information that can be implemented to forecast excess returns (Ang, Goetzmann and Schaefer, 2010).

1.8 LIMITATIONS OF STUDY

Short-term (over a 10-year period) IPO performance on the JSE and NSE was the focus of this study. Although the current study tried to address factors affecting IPO performance, it failed to document all of them. The key limitation was whether identified determinants and factors, including data gathered, were enough to assist policy makers, government, potential investors and other stakeholders to trade optimally for short-term returns.

1.9 STRUCTURE OF STUDY

This dissertation is structured as follows:

Chapter 1 introduces the research topic formally, discussing the background and context of the study and the problem statement. It provides a justification for the research objective, the questions, hypothesis, definitions and limitations. The chapter also explains the importance of the study.

Chapter 2 addresses anomalies, using theories that have been developed by various authors (Fama and French, 2014; Blum, 2011; Neneh, 2013; Alagidede and Van Heerden, 2012). These have stimulated a number of theories designed to explain financial anomalies. The explanations developed for IPO under-pricing involve deliberate or rational strategies by buyers and also those proposed by investors and the market. Chapter 2 explores previous studies on the same topic, including empirical studies of IPO price performance worldwide, with a particular emphasis on South African and Nigerian IPOs. The chapter discusses both theoretical literature and empirical evidence from previous studies. In addition, it addresses the procedures, processes and precedents in listing new issues on both stock markets, focusing on the costs associated with listing IPOs, the corporate advisory members and regulations regarding the issuance of a prospectus or a pre-listing statement.

Chapter 3 presents the research methodology employed in this study. The steps in the methodological process are first addressed within a theoretical framework. Thereafter, the objectives of the study are explored and the research design is discussed. Emphasis is placed on the various stages of the sampling process, including the design of the study instrument and the data collection process and the analysis of data. In addition, the chapter sets out the research design and the model specification that was assimilated in order to, inter alia, empirically test the hypotheses using the proxies for issuing new shares on the JSE and the NSE for the calendar years 2005 to 2015.

Chapter 4 evaluates parameters of IPO phenomena empirically. The results of the analysis of share prices are discussed in Chapter 4 and the interpretation of the results are presented. This includes an analysis of initial returns for issues that are either overpriced or under-priced as well as a sectoral analysis. In addition, Chapter 4 includes the calculations conducted using the raw return, market adjusted abnormal returns and wealth relative to determine the performance of IPOs listed on the JSE and the NSE.

Chapter 5 presents the conclusions and recommendations. It contains the main findings of the study. On the basis of these results, further recommendations are made to guide investors, issuing firms, underwriters and policy makers during the trading of securities.

1.10 CHAPTER SUMMARY

The Johannesburg and Nigerian Stock markets were both designed to facilitate the raising of primary capital with the aim of wealth creation and economic development. The JSE and NSE are considered to be the two most powerful stock markets in Africa, but there have been very few studies that have compared the performance of their primary markets. Providing more information on these stock markets will have benefits for investors, firms and market commentators who are considering listing on these stock markets.

Chapter 2 provides a review of literature dealing with the JSE and the NSE's initial IPO performance.

CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION

2.1.1 AN INTRODUCTION TO THE ENVIRONMENT OF IPOs.

Chapter 2 presents a review of the existing literature on IPO price performance. This literature relates to theoretical concepts and findings that helped the researcher to formulate the objectives of the study and to develop the research questions and hypotheses. The chapter consists of 10 sections. The second section, section 2.2, presents the benefits to a firm of listing shares on the stock exchange. Section 2.3 addresses the costs associated with going public while section 2.4 discusses IPO pricing. Section 2.5 explains the evolution and dynamics of the South African capital market while section 2.6 reviews the dynamics and transformations of the Nigerian capital market. Section 2.7 addresses theories for the under-pricing of IPOs while section 2.8 presents evidence of IPO performance world-wide. Evidence of IPO performance in South Africa and Nigeria is presented in section 2.9 while factors influencing IPO performance are discussed in section 2.10. Section 2.11 provides a chapter summary.

2.2 BENEFITS OF LISTING ON STOCK EXCHANGES

Issuing IPOs is an attractive alternative for firms to raise funds because of the wide variety of benefits it confers (Blum, 2011). Norman (2011) argued that the advantages of listing shares on stock exchanges include an increase in capital for the listing firm, privileges appreciated from liquidity, and a waiver or reduced interest charged in several operational segments.

Nehen and Smit (2013) observed that listing a firm on a stock exchange provides a platform for the company to raise funds from public equity through opening avenues for trading company shares. Jenkinson and Ljungqvist (2011) mentioned that obtaining funds through debt from banks for the purpose of business expansion may have its shortcomings; companies gain access to a cheaper and larger pool of funds through issuing shares to the general public. Blum (2011) argued that firms that wish to go public are granted an opportunity by public markets to access a large pool of funds on favourable terms and conditions from investors, and from private investors in particular.

As Norman (2011) noted, deciding to go public provides an organisation with an improved corporate governance reputation, and greater stature and credibility among customers, investors, business partners, and current and potential investors. Furthermore, Sher (2006) believed that the exposure of a company's profile and statements to the general public increases the demand for accountability from shareholders, and hence additional obligations and reporting requirements have to be met by the firm and its directors.

Allison, Hall and McShea (2008) observed that when a firm issues its stock to the general public, extended potential use of share options can be used to motivate and compensate employees. Issuing stock-based incentives to employees helps the firm to attract and retain efficient and effective employees, resulting in improved employee productivity (Norman, 2011). Productivity and employees' loyalty to the firm also increases when they are compensated with share options, since the value of rewards has a positive correlation with the well-being of a firm (Ritter, 1997).

Trading stock on public markets makes mergers and acquisitions less challenging as shares can be issued as part of the deal (Rust, 2015). Braun and Latham (2010) hypothesised that exposure in both local and global markets increases when public awareness is created, leading to increased business performance and an improved public perception of products and services. Listing a firm on the public market significantly enhances awareness of the company's brand, thereby improving the firm`s credibility with stakeholders. This results in greater pricing leverage and better price performance (Blum, 2011).

2.3 DRAWBACKS ASSOCIATED WITH LISTING ON STOCK EXCHANGES

While various benefits result from listing shares on the stock market, several shortcomings can be identified (Ritter, 1997). A decision to list on the stock exchange is associated with costs that are incurred; these costs can be grouped into direct and indirect costs (Neneh and Smit, 2013).

Lattimer (2006) explained that direct costs are costs that influence the firm directly and are related to the issuance of new stock in the process of listing. Direct costs of listing on any stock market can also be categorised as once-off costs or annual listing fees (Mashaba, 2014). Costs such as professional advisors' fees, documentation fees and statutory fees fall under once-off costs (Ritter, 1997).

On the other hand, Sher (2006) explained that annual listing fees are ongoing costs that the firm must carry. Companies listing on the JSE must adhere fully with the regulations of the Securities Regulation Panel (SRP), Financial Service Board (FSB) and the JSE, while companies that wish to list on the NSE must adhere to the Securities and Exchange Commission (SEC) and the NSE (JSE, 2004; NSE, 2018). According to FSCA (2018), the FSB changed to the Financial Sector Conduct Authority (FSCA) on the 1st of April when Prudential Authority (PA) and the FSCA merged. There are also annual costs associated with adhering to the above mentioned security bodies' requirements. These include record keeping, publication of annual and quarterly reports and the disclosure of companies' statements to the public are.

In addition to direct costs associated with listing stock on stock exchanges, Mashaba (2014) hypothesised that the time and effort required by management to achieve a successful IPO listing form part of direct costs. The process of IPO listing is time consuming as senior management take time from their daily duties of running operations to process the new offering (Blum, 2011). Furthermore, the process of registering an IPO can be a daunting and difficult exercise if management is not familiar with the procedure. The process can take anywhere from nine to twenty-six months (Rock, 1986).

Indirect costs can be incurred at the initial stage of the IPO process and may also be annual expenditures (Ritter, 2003). Bell, Correia and Preimanis (2006) observed that IPO price discounts are an example of an indirect cost at an initial stage of an IPO. Bid-ask spreads are recurring indirect costs associated with listing a firm on the stock market. As noted by Ritter (1997), stock markets in developing countries such as African nations are less organised or regulated than those in developed countries because governing bodies of developing countries have mechanisms that are set up to control price fluctuations and share prices. Thus, the true value of a firm may be

grossly overpriced or under-priced and this is a cost that the firm has to bear (Lattimer, 2006).

Disclosure requirements carry loss of privacy and Ritter (1997) noted that once a firm decides to go public, it is forced to disclose information to the general public that was previously held in confidence. Information such as the way the organisation is governed, executives' compensation, security and international relations is exposed to the public (Sher, 2006).

2.4 IPO PRICING METHODS

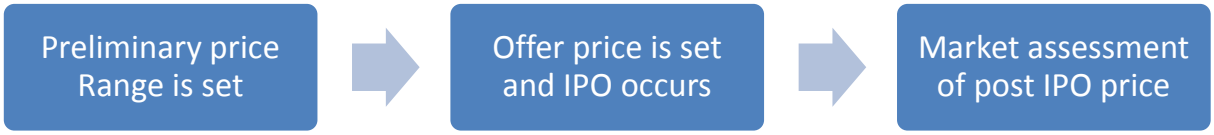
The price set for a share is the true value of its property and prospect for future development and growth (Asghari and Bateni, 2014). IPO pricing and valuation occupies a vital role in finance because it provides participants of the public markets the opportunity to value a set of corporate assets (Lowery, 2004).

Sun (2015), mentioned that underwriters are appointed by the issuing firm to carry out the IPO transaction. The process of IPO pricing is one of the most important phenomena in finance, mainly because underwriters do not include all the information available in the offer price (Lowery, 2004). With this in mind, Lowery (2004) noted that there is a positive relationship between the performance of an IPO and the information known by underwriters prior to its being listed. Informed investors who are in possession of private information regarding the value of the IPO provide underwriters with this information with the aim of being compensated later (Ritter, 1997). Underwriters reward the investors by including the information given them into the offer price, allowing investors to earn higher returns on the close of first day of trade (Benveniste and Spindt, (1989).

Lowery (2004) listed three stages in the process of IPO pricing: firstly, the issuing firm and appointed underwriters agree on a range of prices set out by the SEC in Nigeria and FSCA in South Africa. Upon agreement, the offer price is set and the IPO only takes place at the close of trading on the day before the offering (Lowery, 2004). Market assessment of the value of the firm is the final stage and occurs only after the

issue starts trading. The stages involved in the IPO pricing process are displayed in figure 2.1.

Figure 2.1: IPO pricing process



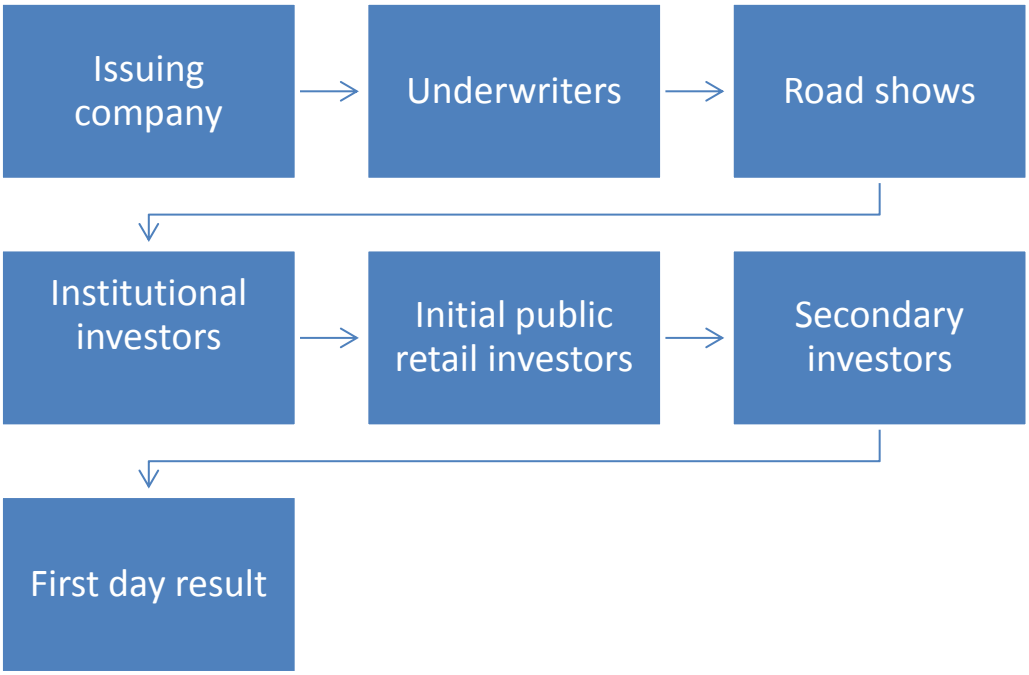
Source: Lowery (2004)

There are a three IPO pricing methods that underwriters[1] tend to employ to determine fair value of a firm namely book building, fixed price and auctions[2] (Lowery, 2004). Benveniste and Spindt (1989) explained that when using fixed price and auction pricing methods, shares are priced prior to subscription; when using a book building method, however, shares are priced only after a variety of practices that seek to assess market conditions have been completed, such as road shows. Firms that make use of the book building method of pricing are less under-priced than firms that make use of the fixed price method (Ritter, 1991).

In the book building process, an investment bank is appointed to underwrite an IPO and given full responsibility and control over the allocation of shares when pricing the offer (Benveniste and Spindt, 1989). Thereafter, the issuing firm will select a lead underwriter, also known as a book runner, to manage the process from the initial stage to completion (Ritter, 1991). Murthy and Singh (2001) argued that the reason the shares have to go through three different investors is that in the past the process of issuing shares has been unfair as all investors were not given the opportunity to purchase them. Investors were excluded from the allocation process and called for measures that would give everyone a fair chance to buy (Murthy and Singh, 2001). Figure 2.2 displays steps undertaken in the book building process.

[1] Underwriter refers to any party that evaluates the seller or buyer`s risk for a fee.
[2] Fixed price refers to the price at which the seller determines a fixed price for IPOs, whereas in the book building process, road shows are run by underwriters taking non-binding orders from investors prior to issue price setting (Ritter, 1997). In an auction process, the highest bid determines the price of the IPO.

Figure 2.2: Steps in the book building process.



Source: Murthy and Singh (2001)

Chemmanur and Liu (2001) observed that when a firm implements a fixed price offering as a method for IPO pricing, shares are priced without first considering investor demand. Shengfeng (2005) explained that the fixed pricing method is used in several countries, including the UK, where supply and demand of stock is not balanced. The numerous flaws of the fixed price method have become apparent in IPO pricing as it does not reveal the value of the listed company, with the result that companies and investment banks can fictitiously make the earnings per share higher (Chemmanur and Liu, 2001). For this reason, the fixed pricing method is being replaced by the booking method because of the latter's attractive benefits (Benveniste and Spindt, 1989).

Chemmanur and Liu (2001) believed that the best way to issue shares is by conducting an auction for the shares belonging to the firm going public. Kucukkocaoglu (2008) supported that when a company wants to execute the auction mechanism for pricing IPOs, it sets a non-restrictive price range measure for investors rather than accepting bids on the amount the investor is willing to pay. Jenkinson and Ljungqbist (2001) suggested that shares of companies that have made use of the auction mechanism

have deteriorated badly subsequent to the initial offering. In addition, Kucukkocaoglu (2008) noted that stocks that have been sold using the auction method have lost market share globally; this method has been replaced either by the book building method or by the fixed price offering mechanism. In addition, Beirbaum and Grimm (2002) argued that firms prefer to make use of the fixed price offering mechanism rather than the auction mechanism because the fixed price permits the firm to prompt the optimum level of information production.

Shengfeng (2005) observed that there are three main differences to the three methods, namely the price determination mechanism, the share allocation, and information extraction. Table 2.1 reflects a comparison of the three methods.

Table 2.1: Comparison of three pricing methods

Category	Book building	Fixed price	Auction
Information is obtained from Investors	Yes	No	Yes
Discretion of investment bank on allocation	Yes	No	No
Determination of offer price	Price determined prior to subscription but after quotation.	Determined prior to subscription.	Price determined at time of subscription by uniform price sealed bidding.
Under-pricing and its variance	Relatively low	Higher	Lowest

Source: Ritter (1991)

2.5 THE EVOLUTION AND DYNAMICS OF THE SOUTH AFRICAN CAPITAL MARKET.

This section discusses the evolution and dynamics of the JSE. Section 2.5.1 presents the full history of the development and advancement of the JSE. Section 2.5.2 presents the requirements for listing on the JSE.

2.5.1 EVOLUTION OF THE JSE.

The JSE is the oldest and largest stock market in Africa and was formed in 1887 after the discovery of minerals (specifically gold) on the Witwatersrand (JSE, 2006). The JSE matured considerably over time and it became a member of the World Federation of Exchanges in 1963 (Mashaba, 2014).

Over the past years, the South African stock market has been affected by political changes (Levy, 1999). Levy (1999) also noted that Indian, African and Coloured South Africans were excluded from participating in financial and government structures and from contributing to the country`s economy. In reaction to apartheid, various nations imposed financial and trade sanctions on South Africa, leading to vast amounts in foreign investment being withdrawn from South Africa (Muller, 2009). As observed by Lowenberg (1997), South Africa suffered economic difficulties until 1994 when Nelson Mandela was elected president. Furthermore, as noted by Waldmeier (1997), the new government embarked on a privatisation programme that helped boost foreign investment and, post 1995, the JSE unlocked its doors to foreign investments.

According to a report by the International Monetary Fund (IMF) (2015), the JSE is mature capital markets that serve the South African economy and most parts of Africa. For over 125 years the JSE has operated as a market place by tying sellers and buyers in derivatives, equity and debt markets (JSE, 2006). In addition, Muller (2009) suggested that the JSE has evolved into one of the top 20 stock markets worldwide when stock markets are ranked in terms of market capitalization, and it strives to offer efficient and secure primary and secondary capital markets.

By directing capital from investors to those in need of it, financial markets play a pivotal role in mobilising the rate of investments in businesses and the government and in sustaining economic development and growth (IMF, 2015). Muller (2009) mentioned that the JSE capital market plays a critical role in apportioning domestic and foreign savings to South African investment requirements. South Africa invests R5 trillion of its savings in JSE listed bonds and equities, thereby sustaining economic growth (JSE, 2013).

Helleiner (2011) noted that the 2007/2008 financial crisis revealed the shortcomings of the failed regulatory management of financial markets, providing exploiters of financial systems, called “insider traders”, the opportunity to enrich themselves. This was one of the factors that severely weakened the entire financial system. Realising the need for regulatory reform of the financial market (JSE), in 2008 President Jacob Zuma committed South Africa to a global regulatory reform agenda that entailed improved resolution, enhancement of accountability and more effective supervision (Muller, 2009). The JSE had been stricken by international chaos, losing approximately half its market cap value in 2008 but by January 2011 the JSE All Share Index had recuperated from the pre-crisis state (Financial Market Bill (FMB), 2011). The history of the development and advancement of the JSE is shown in table 2.2:

Table 2.2: Full JSE development and advancement history.

Year	Major developments and events on the JSE
1886	Minerals (gold) discovered on the Witwatersrand at Langlaagte.
1887	On the 8th of November, Benjamin founded the JSE.
1890	The second JSE house was built.
1895	The oldest firm (DRDGold Limited) was listed on JSE.
1897	The second oldest firm (SABMiller) was listed on the stock exchange.
1899	As a result of the Boer War, the JSE was closed.
1901	After the Boer War, the exchange was re-opened.
1903	JSE’s third building was built.
1914	With the outbreak of the First World War, the exchange was closed.
1915	JSE was re-opened.
1937	A crash of the JSE on Black Friday was caused by the Great Depression; investors lost £40 million.
1945	Largest gold boom.
1947	Formulation of the Stock Exchange Control Act.
1948	Official enforcement of Apartheid after elections in May.
1960	Incident at Sharpeville made international investors disinvest.

Table 2.2: Continued	
1963	The World Federation of Exchange accepted the JSE.
1964	Federation International Bourses de Valerurs accepted JSE as a board member.
1984	The development capital market was launched.
1985	JSE appointed its first independent businessman as chief executive officer.
1987	On the 8th of November, the JSE celebrated its 100th year.
1990	The first government policy was announced by President F.W. de Klerk to end the apartheid regime.
1991	A reduction in the securities tax from 1.5% to 1% with the intention of abolishing tax was announced in March.
1993	The JSE joined the African Stock Exchanges Association and removed exchange controls.
1994	In May, a report on JSE structure was published.
1995	An alignment to international trends was made on the JSE.
1996	An introduction of dual capacity trading to resolve issues brought about by single capacity trading.
1997	Introduction of the Stock Exchange News Service.
1998	Emerging Enterprise Zone established to acquire capital from small to medium-sized firms.
1999	Shares Transactions Totally Electronic (STRATE) (a new trading act) replaces the JET System.
2000	Reintroduction of dual listing
2001	JSED reached the highest number of delisting. SAFEX listed on the JSE.
2002	SETS replaced the JET on the 13 May. The FTSE/JSE Index series was introduced.
2003	AltX was launched on the 1 October.
2004	Introduction of the social responsibility index (SRI) in May with the intention of evaluating company policies.
2005	On the 1 January, the International Financial Reporting System (IFRS) was officially adopted.

Table 2.2: Continued	
2006	On the 5 June, the Main board listed JSE Ltd.
2009	Single Stock Futures on Google and Microsoft were listed on the JSE, permitting investors to trade making use of their R2mill foreign allowance.
2012	On the 30 March, Phase 1 of BRICS members was launched providing a benchmark equity index derivate in local currency.
2013	A virtual trading game was launched in June.

Source: Alli *et al.* (2010) and Sher (2006).

2.5.2 REQUIREMENTS FOR LISTING ON THE JSE.

The JSE comprises of the main board division and the alternative exchange (AltX) division (JSE, 2013). The AltX division was initiated in 2003 for the purpose of accommodating small to medium-sized growth companies while the main board is suitable for well-established firms that want to advance their business (Mashaba, 2014). The JSE has an obligation to ensure that firms that have listed uphold certain financial targets and adhere to strict corporate governance practices (Govindjee, 2012). Lattimer (2006) explained that these two divisions have different requirements for listing; the listing requirements for the AltX have a lighter financial burden on a company that wishes to go public. JSE (2013) also noted that costs such as taxation and administration for a firm that wishes to go public through the AltX are far lower than the requirements of the main board. Table 2.3 shows the comparison of costs and requirements for listing on the JSE Main board and the AltX.

Table 2.3: Requirements and costs of listing on the JSE Main Board and AltX.

Listing Requirements	**Main Board**	**AltX**
Share capital	R25 million	R2 million
Profit history	Three years	None
Pre-tax profit	R8 million	Not applicable
Shareholder`s spread	20%	10%
Number of shareholders	300	100
Publication in the press	Compulsory	Voluntary
Category transaction	Two (threshold 25%)	Two (threshold 50%)
Listing fee	0.04% of average market capitalisation with minimum of R33 545 and a maximum of R170 440.55 (incl. VAT)	R27 189.25

Source: JSE website (2013).

2.6 THE DYNAMICS AND TRANSFORMATION OF THE NIGERIAN CAPITAL MARKET

This section addresses the evolution and dynamics of the NSE. Section 2.6.1 presents the full history of the development and advancement of the NSE. Section 2.6.2 presents the requirement of listing on the NSE.

2.6.1 EVOLUTION OF THE NSE.

The origins of the NSE date back to colonial times when Nigeria was ruled by the British government who provided funds from agriculture, marketing and mining of minerals for local government administration (Osaze, 2007). The British government decided to increase the revenue base by introducing the revenue mobilisation system, a tax system and other payment systems upon discovering that revenue from agriculture and mining could not adequately cater for its growing financial obligations (Osaze, 2007). Thus a financial system with basic infrastructure was established. Table 2.4 shows the evolution and history of the NSE.

The Nigerian Stock Exchange was founded in 1960 as the Lagos Stock Exchange and later was named the Nigerian Stock Exchange in 1977 (Fagbeminiyi, Olusegun and

Oluwatoyin, 2011). NSE (2018) mentioned that the stock exchange market commenced its operations in 1961 with a total of 19 securities listed for trading and it has over 270 securities listed to date. Currently the NSE has more than 169 securities listed companies having market capitalisation of over 13 trillion Naira (NSE, 2018).

Table 2.4: Full JSE development and advancement history.

Year	**Major developments and events on the NSE**
1957	Introduction of the government and other securities Act.
1958	Central Bank of Nigeria was formed making use of the Central Bank of Nigeria Act of 1958.
1959	Statutory Corporations Act was introduced.
1960	On 15 September, the Nigerian Stock Exchange was formed.
1961	Establishment of the National Provident Fund as a mandatory saving scheme intended to protect the old and the unemployed.
1962	The Exchange Control Act was introduced.
1966	The Borrowings by Public Bodies Act was established.
1968	Companies Decree and Banking Decree Act was enacted.
1972	Formation of the Nigerian Enterprises Promotion Decree.
1977	Lagos Stock Exchange was renamed the Nigerian Stock Exchange by the Indigenisation Decree.
1978	New NSE was built in Kaduna.
1980	New NSE was built in Port Harcourt.
1989	Companies and Allied Matters Act was introduced to monitor corporations of all bodies in Nigeria. New NSE was built in Kano.
1991	The discontinuation of official pricing was a recommendation of the Interministerial Committee on the NSE.
1992	The first municipal bond was listed.
1992	Establishment of the Chartered Institute of Stockbrokers Decree.

Table 2.4: Continued	
1993	Official pricing, allotment and timing of shares was ended by the government, using budget presentations.
1995	Formation of the Nigerian Investment Promotion Act.
1996	A panel of the Federation Government was appointed.
1998	On 17 June, the Abuja Stock Exchange was recognised as a Public Limited Liability Company, the NSE's second bourse.
1999	Automatic Trading System replaced the open outcry system on the NSE.
2000	The Ogba Riverside Housing Project was financed by the N1billion seven year floating rate bond by the Edo State Government.
2001	10 000 point base mark noted on the NSE All Share index.

Source: Osaze, 2007.

2.6.2 REQUIREMENTS FOR LISTING ON THE NSE.

The NSE comprises the main board and the Alternative Securities Market (ASeM). The ASeM assists the growth and development of small and mid-sized businesses at a low cost, providing such firms with the opportunity to raise long-term capital from the capital market, allowing them to institutionalise. The main board provides companies with a platform to raise capital from the public since access to both local and international investors through listing shares on the NSE to the general public has been made possible (Udenka, 2012). Adeyami and Fagbemi (2010) explained that a company that wishes to list on the NSE should adhere to the policies and requirements such as disclosure, corporate governance and internal regulations set out by the NSE. Table 2.5 displays the cost and requirements associated with listing a company on the NSE main board and on the ASeM.

Table 2.5: Requirements and costs of listing on the NSE Main Board and ASeM.

Listing Requirements	**Main Board**	**ASeM**
Share capital	At least N4bn (R162m)	Capital to be raised and anticipated market capitalisation.
Profit history	Three years	At least two years
Pre-tax profit	Cumulative consolidated pre-tax profit of at least N600m (R24m) within one or two years.	Cumulative consolidated pre-tax profit of at least N600m (R24m) within one or two years
Shareholders' spread	20%	15%
Number of shareholders	300	At least 51 shareholders
Publication in the press	Compulsory	Voluntary
Category transaction	Two (threshold 25%)	Two (threshold 50%)
Listing fee	Annual listing fees for equities are generated based on market capitalisation to a maximum of N4.2m	Subject to board fee schedule

Source: NSE Website, 2018

2.7 EXPLANATION OF UNDER-PRICING OF INITIAL PUBLIC OFFERINGS

Ruud (1993) explained that under-pricing of IPOs is undertaken rationally (deliberately). Various theories (Alagidede, 2010; Dzimiri and Radikoko, 2015; Achua, 2011; Ritter, 2003; Ivanauskas, 2015) have been advanced in an attempt to explain the issue of IPO performance. In addition, in the institutional, economic and financial literature, various authors (Ritter, 1997; Omran, 2005; Mwendwa, 2014; Dzimiri and Radikoko, 2015) have proposed reasons for the mispricing and under-pricing of IPOs in particular. Although not mutually exclusive, IPO theories pay more attention to the behaviour of different IPO participants such as issuing houses, issuers and investors (Blum, 2011). This section discusses under-pricing theories such as signalling, market feedback, winner`s curse, lawsuit avoidance, bandwagon and agency.

2.7.1 SIGNALLING THEORY

Welch (1989) first proposed the signalling theory and noted that, in this hypothesis, high performing firms set their IPO offer price low so as to isolate themselves from poorly performing firms and to benefit from the seasoned equity offerings thereafter. The stimulus for signalling is based on the hypothesis that the present value benefit of under-pricing an IPO is higher than the immediate loss (Rust, 2015). High quality companies can afford to signal their IPOs through under-pricing while poor quality companies cannot do this as they are unable to recover the cost of the signalling (Rudd, 1993). In addition, the issuing firms are wealth focused and consider only the chances of future equity offerings in making IPO price decisions explicitly (Ritter, 2003).

In terms of criticism, Agathee, Brooks and Sannassee, (2012) argued that the signalling model cannot explain why IPOs are under-priced because firms that have a higher rate of under-pricing return to the reissue market less frequently and for a lower amount compared to firms that have a low rate of under-pricing. Furthermore, firms that are less inclined to under-price pay higher dividends and retain higher earnings (Ritter, 2003).

Moreover, Ritter and Welch (2002) noted that under-pricing produces publicity and publicity prompts additional investor interest. Jegadessh, Weinstein and Welch (1993) observed that although there may be a correlation between the level of IPO under-pricing and the likelihood of the volume of seasoned equity offerings that may occur at a later stage, the economic relevance of this relationship is weak. Instead, Jegadessh, Weinstein and Welch (1993) formulated an alternative hypothesis (market feedback hypothesis) which has a stronger explanatory power

2.7.2 MARKET FEEDBACK HYPOTHESIS

Hovakimian and Hutton (2010) explained that market feedback refers to the hypothesis that issue returns offer information on profitability of the firm`s projects that might not be available to its managers. Hovakimian and Hutton (2010) also noted that the market feedback hypothesis was developed when Jegadessh, Weinstein and Welch (1993) found that the signaling hypothesis was not a strong enough name to

describe the relationship between the size of future seasoned equities and IPO under-pricing as the economic significance of the relationship was weak.

At times, investment banks under-price issues in order to lure existing investors into revealing information during the pre-selling period (Ritter, 1998). Ritter (1998) noted that, from their interactions in the market place, an information advantage is gained by investment banks over investors, as long as investors have reliable information and can be persuaded to be truthful about their interest in the marketing phase. Welch (1989) hypothesised that investment banks compensate investors for providing truthful valuation information by under-pricing. In other words, if investors supply relevant information, they are rewarded by IPOs being under-priced.

Bal and Gentry (2006) argued that the validity of the market hypothesis is heavily determined by the concept that investors possess important information that the issuer or underwriter does not have. Reservation information is important to the underwriter when pricing the offering but this information is only known by the investor (Cornelli and Goldreich, 2003). However, Ritter (2003) suggested that the market feedback theory is not likely to carry much validity if underwriters can easily estimate the range of the reservation prices among potential investors.

During the marketing phase, investors tend to bid lower because there is a trade-off between selling out all the available shares and leaving money on the table (Ivanauskas, 2015). Ultimately, this leads to partial adjustments, where the leading issuing house is made aware that the value of the share consists of other additions that are not contained in the initial prospectus (Helwege and Liang, 2004). It is worth noting that this theory breaches section 159 of the South African Companies Act 2008, which states that no company may change the terms of any contract within a year of the date of registration of the prospectus. Therefore, Ritter (2003) argued that market feedback cannot describe initial under-pricing.

2.7.3 WINNER`S CURSE

The theory of the winner`s curse was developed by three Atlantic Richfield engineers, Capen, Campbell and Clapp in 1971, when observations of the oil tracts were made

(Thaler, 1988). The winner`s curse theory was intended to explain scenarios related to the auctioning of shares; when a firm sells shares on auction and it is obvious that there is a highest bidder and a lowest bidder, the winner`s curse explains that although it is obvious that the highest bidder is the winner, the highest bidder is also likely to be the loser and cursed because the bid amount to be paid will far exceed the value of the shares that have been auctioned (Ritter, 1988). Rock (1986) observed that auctions that allow the determination of market value for idiosyncratic stocks also have the effect of increasing competition between the parties involved in a manner that normal demand and supply market pricing does not.

In a winner's curse situation, the kind of information one possesses is important (Welch, 1992). Rock (1986) suggested that in an auction bid, some investors are better informed than others about the quality and prospects of the firm that places its stock on financial markets. Koch and Penczynski (2017) observed that less informed bidders may be faced with the problem of adverse selection. Therefore, if the offering price is lower than the expected value of stock, the less informed bidders will be limited. On the other hand, if the offering price is more than the expected value of the shares, the less informed bidders will win all requested shares.

Crawford and Iriberri (2007) argued that if a greater or lower fixed number of stocks is sold at a fixed offering price, rationing will result if the demand is unexpectedly strong. Rationing in itself does not result in under-pricing; however, in an auction, if some bidders are at an informational disadvantage relative to others, the loss is higher. If some investors are interested in buying shares when shares are under-priced, then the amount of the excess demand will be greater when there is more under-pricing (Charness and Levin, 2005).

Rudd (1993), however, discovered that some of the concepts of the winner's curse theory are difficult to reconcile with rational issuers' preferences: the motivation for issuers to offer their shares at a price lower than their market value to attract uninformed investors is not obvious. In addition, Rudd (1993) observed that it is unnecessary to attract uninformed investors through under-pricing. Furthermore, Chowdhry and Sherman (1996) argued that a higher information leakage and the charges associated with bidding for issues in advance makes it less attractive than a

book building mechanism, where a proper road map is followed. Crawford and Iriberri (2007) argued that the statements underpinning the winner's curse are somehow incorrect as they pose several challenges to the economist's paradigm, as the winner's curse suggests that winners make systematic errors. Thaler (1988) suggested that the economic theory precludes such errors and, in addition, that in economics rationality is an assumption and not a demonstration.

2.7.4 LAWSUIT AVOIDANCE

The relationship between IPO pricing and litigation risk was first proposed by Jaffe and Ibboston (1975). In 1988, Tinic developed the theoretical framework and noted that under-pricing of IPOs minimised the probability and magnitude of future legal claims against underwriters and issuers and hence served as a form of litigation insurance for these two parties. Rust (2015), reported that the lawsuit avoidance hypothesis states that firms that are exposed to higher litigation risk, under-price their IPOs more in order to reduce the probability of being sued. Investors have the right to sue underwriters, accountants and issuers for misleading them or for omitting some information from the IPO prospectus that might have helped the investor to make accurate decisions (Ritter, 2003).

Arguments for lawsuit avoidance date back to Jaffe and Ibbotson (1975) and Logue (1973). The Securities Act of 2004 of South Africa reported that during the marketing and selling of a new equity issue, investors have the right to bring a lawsuit against any participant who has misled them. Ritter (1998) argued that under-pricing was therefore one of the ways of reducing the severity and the frequency of future legal liabilities. Nevertheless, Ritter (1998) observed that Finland had a great deal of under-pricing although no known records of securities lawsuit cases were found on file. Ardekani, Hashemijoo and Younesi (2012) also noted that the lawsuit avoidance hypothesis, contending that the plaintiff pursues legal actions for reasons that are determined in the post-IPO market. Remaining equity, wealth loss and other counterparties' obligations were all determinants of legal risk that an investor should make provision for (Ardekani, Hashemijoo and Younesi, 2012).

2.7.5 BANDWAGON HYPOTHESIS

Information cascades are also known as the bandwagon hypothesis (Achua, 2011). Achua (2011) noted that potential investors make their decisions based not only on the information that they possess about the issue, but also on whether or not other investors are interested in buying the shares. Ritter (1998) explored the IPO markets and found that IPOs could be subject to bandwagon effects. If an investor notices that no one else is interested in buying a particular share, the investor may also decide not to buy, even if there is favourable information about this share (Depken, 2001).

Ritter (2003) hypothesised that information cascades can be manipulated to explain interesting empirical evidence in financial markets. Investors who were interested in the issues before other investors are usually assumed to have an informational advantage over other investors and this serves as the benchmark against which the performance of the offer will be judged outstanding, as younger stocks react asymmetrically to good news (Achua, 2011). Consequently, if one important investor defects, others may follow blindly and the issues may be mispriced because the stock market reacts more quickly to bad news than it does to good (Walker and Yost, 2008).

2.7.6 BARON`S HYPOTHESIS

Bowman (1983) first addressed the agency theory (Baron`s hypothesis). The underwriter is better informed than the issuer; therefore it is more difficult for the issuer of the stock to monitor the underwriter's activities without incurring costs (Kotalawala, Liyanage, Perera and Wasantha, 2014). The issuers are in possession of very little information regarding market demand for IPOs, and monitoring the marketing and distribution activities of the investment banks becomes more daunting (Brau and Fawcett, 2006). Ritter (1998) noted that issuers are focused mainly on maximising IPO revenue by seeking a higher placing price for the issue, while investment banks focus on reducing their underwriting expenditures through seeking a lower placing price. According to Katti and Phani (2016), it is in the best interest of the issuing firm to attract both informed and uninformed investors as uninformed investors are regarded as strategic investor because their investment is perceived to be for a longer period.

Contrary to this theory, Muscarella and Vetsuypens (1989) observed that when underwriters list the shares on the stock market, their issues are also under-priced, regardless of whether the monitoring problem exists or not. Loughran and Ritter (2004) mentioned that the agency problem that exists between the issuing firms and other pre-issue shareholders contributes to a disposition to hire underwriters that have a history of leaving a substantial amount of money on the table.

2.8 A REVIEW OF INITIAL PUBLIC OFFERINGS' PERFORMANCE – EMPIRICAL EVIDENCE.

Various evidence (Mehta and Sweety, 2016; Ivanauskas, 2015; Neneh and Smit, 2013) has been accumulated in both developed and emerging markets that suggests that on average IPOs are under-priced. The consistency with which previous studies' findings have provided empirical evidence of under-pricing across markets and time periods has spurred extensive examination of, and investigation into, the causes of this phenomenon (Ljungqvist, Wilhelm and William, 2005). Neneh and Smit (2013) believed that under-pricing is the most common phenomenon in stock markets globally but there is a considerable degree of difference in under-pricing across various regions. Therefore, under-pricing is one of the most prominent anomalies to emerge in almost all financial markets, regardless of the period under investigation and the economic conditions (Neneh and Smit, 2013).

2.8.1 OVERVIEW EMPIRICAL EVIDENCE FROM DEVELOPED AND EMERGING MARKETS

Extensive under-pricing has been detected in developed countries (Ritter, 2003). Table 2.6 shows evidence, obtained from various studies, of under-pricing in developed and emerging markets (Ardekani and Hashemijoo and Younesi, 2012; Neneh and Smit, 2013). The table reveals that the level of under-pricing varies across countries. Taiwan has the highest level of under-pricing and Belgium has the lowest. Based on the evidence in table 2.6, it appears that IPOs in developed countries tend to be under-priced less frequently than those in emerging markets. It is also clear that there are differences in the level of under-pricing in European countries. Under-pricing is lower in Belgium (6.4%) than in France (10.5%). The variance in under-pricing levels may be caused by differences in institutional rules and regulations in these countries

(Neneh and Smit, 2013). Evidence from table 2.6 indicates that under-pricing is an unavoidable phenomenon in financial markets worldwide, regardless of period or country.

Table 2.6: Average under-pricing in developed and emerging markets.

Country	Period	Sample Size	Average Initial Returns
Developed Markets			
Australia	1976–2011	1562	21.8%
Belgium	1971–2013	103	6.4%
Canada	1971–2013	720	6.5%
Germany	1978–2011	736	24.2%
France	1983–2010	697	10.5%
Spain	1986–2013	143	10.3%
Sweden	1980–2011	374	27.2%
Taiwan	1980–2013	1620	38.1%
UK	1959–2012	4932	16.0%
USA	1960–2014	12702	16.9%
Emerging Markets			
Country	Period	Sample Size	Average Initial Returns
South Africa	1980–2013	316	17.4%
Nigeria	1989–2013	122	13.1%
Morocco	2000–2011	33	33.3%
Sri Lanka	1987–2008	105	33.5%
Egypt	1990–-2010	62	10.4%
Thailand	1990–2013	500	35.1%
Turkey	1990–2013	399	9.7%
Iran	1991–2004	279	22.4%
Pakistan	2000–2013	80	22.1%
Mauritius	1989–2005	40	15.2%
Mexico	1987–2012	123	11.6%

Source: Author`s compilation.

2.8.2 EMPIRICAL EVIDENCE – INTERNATIONAL PERSPECTIVE.

Ball and Gentry (2006) studied the theory and the role of Dutch auctions of IPOs in a multi-billion dollar market anomaly and found that the IPO price at which a firm sold its stock was on average lower than the price of the share at the close of its first day of trade. Ball and Gentry (2006) also provided possible explanations for the persistence of IPO under-pricing by making use of auctioned IPOs and the results showed that under-pricing was a result of two main causes: either the supposed importance of institutional investors in the firms selling shares, or investments banks or the issuer's fear that the value of the share might decline at the end of the first day of trade, obstructing the momentum of the stock. The latter motivated both investment banks and issuers to under-price their offerings intentionally.

Ivanauskas (2015) analysed IPO under-pricing and the aftermarket performance, as well as factors influencing this type of behaviour, of new equity issues on the NASDAQ Baltic for the period of 2004–2014. Ivanauskas (2015) found that new equities listed on the NASDAQ Baltic tended to be under-priced by an average of 7.54%; there was a positive relationship between IPO under-pricing and factors affecting this behaviour. Proceeds raised during the issue of new shares proved to be the strongest negative factor affecting IPO under-pricing (Ritter, 1997). Ivanauskas (2015) also reported that the size of underperforming IPOs after a high first day return matched equally weighted benchmark portfolios by -3.62% during the one-year period and -0.08% during a three-year period.

Alanazi and Liu (2013) investigated the financial and operating performance of 52 IPOs that were listed in the Gulf Cooperation Council (GCC) (Saudi Arabia, Kuwait, the United Arab Emirates, Bahrain, Oman and Qatar) region in the period from 2003 to 2010. The empirical results from their study revealed that the performance of initial public offerings deteriorated after they have been listed, and that post-IPO, the average Return on Assets (ROA) and Return on Sales (ROS) declined by 47% and 25% respectively. Alanazi and Liu (2013) argued that the reason for this decline in performance was associated with an increase in agency costs. In addition, their evidence supported the hypothesis that because of the firms' growth in CAPEX and sales, the lack of opportunity theory was weaker in the post-IPO period than in the pre-IPO period (Ritter, 2003).

In addition, equity offerings in developing countries have experienced a rapid growth in interest in recent years (Mashaba, 2014). Using a sample of 113 IPOs that were listed on the National Stock Exchange (NSE) in India during the period 2010 to 2014, Mehta (2015) observed an average positive return on the first day of listing. A market adjusted abnormal return (MAAR) of 7.19% was recorded for all the IPOs listed. Overall, IPOs listed during that period were initially under-priced. Durukan (2002) argued that companies issuing stock knowingly under-price IPOs so as to motivate a wider subscription. Using the behavioural argument, Bansal and Khanna (2012) observed that over-enthusiastic investors bid the IPO price that was beyond its true value on the day of listing.

Ardekani, Hashemijoo and Younesi (2012) analysed the performance of Malaysian IPOs during the period 2007 to 2010. Under-pricing was recorded on the first day of trade although the results showed that the extent to which IPOs were under-priced decreased dramatically when compared to previous studies such as that done by Datar and Mao (2006). Ardekani, Hashemijoo and Younesi (2012) found that return determinants such as total unit offered, offering price, size and age of the firm did not influence IPO initial returns. The performance of IPOs listed during the years 2007 to 2010 on the Kuala Lumpur Stock Exchange was significantly affected by the global crisis of 2007 and 2008 since a negative return was recorded.

Khodaparati, Mirbagherijam and Zamanian (2013) surveyed some effective factors in short-term and long-term returns of IPOs on the Tehran Stock Exchange. A panel data approach was used to compare and construct determinants of IPO returns. The findings showed that Price Earnings ratio, the volume of transactions and the size of the company were the main determinants of abnormal long-run IPO returns. In the short run, size and volume of issues were the main determinants of IPO returns. The conclusion was that corporate ownership has no influence on IPO returns in the short or the long run.

In their recent study on securities listed on the Karachi Stock Exchange, Raheman and Sohail (2010) explored a sample of 73 IPOs, using data from 2000 to 2009. The performance of the IPOs was observed according to different states of the economy

(normal, boom and recession). The findings indicated that IPOs on the Pakistan (Karachi) stock market provided positive abnormal returns to investors on a short-run basis. Under normal economic conditions, the results showed that the average raw return of the first day was 43% and the market adjusted first day return was 36.75%. In addition to these findings, investors could earn a market adjusted return of 95.6% on the very first day in 2008 under boom conditions.

Trigueiros and Vong (2010) studied over 480 IPOs listed on the Hong Kong Stock Exchange during the period 1994 to 2005. Based on the set of observations, the study puts together a comprehensive approach to the short-term price performance of IPOs in the light of theoretical hypotheses about IPO under-pricing. The findings clearly indicate the signaling effect of an underwriter`s reputation.

In an investigation of the model specification and IPO performance, Moshirian and Ng (2010) showed that the existence of long-run underperformance for IPOs in Asia depended on the research design used. Likewise, Kirkulak (2008) provided evidence from Japanese venture capital that long-run stock performance results are very sensitive to the models used to measure average abnormal returns.

In contrast, in smaller emerging markets such as those in Africa, IPO performance behaviour is still unsatisfactorily scrutinised as a result of a lack of historical data. Dzimiri and Radikoko (2015) investigated IPO under-pricing and the short-run performance of IPO listings on the Zimbabwean Stock Exchange (ZSE). They noted that at the end of 2003, only four companies were listed on the stock exchange, far fewer than those listed before 2003. Dzimiri and Radikoko (2015) examined whether this decline in listings on the stock exchange was the result of the poor performance and under-pricing of firms listed in previous years and found that IPOs on the ZSE were under-priced on average in the short run but had positive returns. However, the findings of the study also showed that short-run performance and under-pricing were not the only reasons for the decline in the number of firms listed on the ZSE after 2003 (Dzimiri and Radikoko, 2015). A lack of investment opportunities, the size of the listing companies, market conditions and a lack of rating agencies were all found to be major determinants and causes of IPO under-pricing.

Guyo, Kibet, Kipkoskey and Kipngetich, (2011) examined the determinants of IPO pricing in Kenya. Guyo, Kibet, Kipkoskey and Kipngetich, (2011) investigated the degree to which investor sentiment, post-IPO ownership retention, firm size and age of the firm influenced the IPO pricing of firms listed on the Nairobi Stock Market. The study employed secondary data using multiple regressions. In addition, Guyo, Kibet, Kipkoskey and Kipngetich, (2011) an average under-pricing of 49.44% was found in Kenyan IPOs for the period 2004 to 2008. At 5% level of significance, no variables were found to significantly influence the IPO offer price.

The conclusion was that public information disclosed in the prospectus was not mirrored in IPO offer prices, and that rational strategies or hypothesis theories could not expound on the effect of investor sentiment on the IPO market in Kenya, given the negative relationship between IPO offer price and investor sentiment and board prestige (Guyo, Kibet, Kipkoskey and Kipngetich, 2011). Public information that is available in the prospectus may fail to reflect all the facts required to inform sound investment decisions. Thus, further study is needed on the role of policy makers, especially with regard to adherence to disclosure requirements to ensure that potential investors are protected.

2.9 IPO PRICE PERFORMANCE IN SOUTH AFRICA AND NIGERIA

The phenomenon of economic significance and positive initial returns exists on the JSE in South Africa. Alagidede and Van Heerden and (2012) investigated the behaviour of IPOs that were listed from 2006 to 2010. Short-run under-pricing was observed using a sample of 138 IPOs listed on the JSE, with the financial sector being most prone to IPO under-pricing (Van Heerden and Alagidede, 2012). The study found evidence of short-run under-pricing, with the highest return recorded only on day 15.

Mashaba (2014) contributed to the study of IPO performance on the JSE for the period April 2006 to December 2012. An average initial return of 21% was recorded and there was evidence that there were positive abnormal initial returns on the JSE AltX (Mashaba, 2014). Mashaba (2014) also discussed post-IPO performance and found that in the development of small to medium-sized firms whose IPOs were listed only on the JSE AltX IPOs were under-priced. In addition to the evidence from the JSE, Correia and Holman (2008) analysed post-issue performance on the Alternative

Exchange. An analysis of the period October 2003 to September 2007 was conducted and evidence of an under-pricing average of 29% was recorded. The AltX is a small division of the JSE that deals with registration of very small numbers of IPOs.

A significantly higher percentage of IPO initial return of 32.70% was observed in the period leading up to the abolition of Apartheid (Moodley, 2009). Moodley (2009) observed the price of the premiums offered by initial public offerings at the end of the first day of trade. During the period 1998 to 2007, Moodley (2009) reported that an average of 28.39% was found in initial returns and this was significantly different from zero. A negative correlation of -10.51% was observed between one year aftermarket performance and initial returns.

Muller (2009) found evidence of IPO under-pricing on the JSE during the period 2000 to 2008 that on average IPO under-pricing was 17.1%. Muller (2009) also tested for persistence of hot and cold issue time periods and found evidence that initial returns from hot periods (2006 to 2008) were higher than returns observed in cold periods (2000 to 2005). Ritter and Welch (2002) explain a hot market as a period with severe under-pricing, abnormally high offering volume, optimistic investors and high rates of oversubscription of offerings. Cold market periods on the other hand have less under-pricing, low rates of oversubscription and larger offerings (Ritter and Welch, 2002). A small sample size and a concentration of IPOs indicated that the results of the study should be interpreted with caution as it made use of over 100 IPOs as its sample (Muller, 2009).

Achua (2011) analysed IPOs listed on the Nigerian capital market during the period 1989 to 1993 and the result was that the Nigerian Stock Exchange recorded an average initial return of 4.9%. Achua (2011) found that for every IPO issued, an average of 4.9% of the expected returns was left on the table for investors. Although this study provided concrete arguments, it was based on old data and was published in 2011.

Udenka (2012) investigated the performance of IPOs that were listed on the NSE from the period 2003 to 2010 with a sample of 950 IPOs that were undervalued on average by 40% at offer price. Udenka (2012) focused mainly on the methods used to

determine whether IPOs were under-priced or overpriced, and did not take into consideration which sector contributed to the overall under-pricing that was detected. In addition, Udenka (2012) ignored other variables that affect the performance of IPOs, such as the age and the size of the company and market conditions. Achua (2011) argued that these variables accounted for almost 53% of the total IPO influences.

2.10 FACTORS INFLUENCING INITIAL PERFORMANCE OF PUBLIC OFFERINGS

Neneh and Smit (2013) observed that literature covering factors affecting the performance of IPOs highlighting different trends in different markets over different periods has been documented. IPOs behave differently depending on factors that include but are not limited to the market they are listed on, the size of the firm, price discounts and oversubscriptions (Durukan, 2002). This section discusses the impact of such factors on IPO performance.

2.9.1 MACROECONOMICS

According to Pagano, Panetta and Zingales (1998), there are internal and external factors that affect IPO performance. In consonance to Ross (1976), variations in macroeconomics can impact IPO performance. Macroeconomics influence economic climate there by impacting the industrial productivity, which will ultimately influence the decision of going public (Angelini and Fogolia, 2018). Ameer (2012) noted there is a negative relationship between IPO performance and interest rates and a positive relationship between industrial production and IPO performance. Macroeconomic factors such as GDP, interest rates, inflation, monetary policy and unemployment variables impact on IPO performance differs from industry to industry (Angelini and Fogolia, 2018).

2.9.2 AGE OF THE FIRM

Bansal and Khanna (2012) explained that the age of a firm is measured as the difference between the year of incorporation of the firm and the year of IPO listing. In their recent investigation, Loderer and Waelchli (2009) observed that young firms perform best; however, their performance wanes with age as, with time, they face serious aging problems. Although not mutually exclusive, Clark (2002) investigated the relationship between firm age and post-IPO performance in different industry

sectors and found that in the technology sector, young firms performed better than older firms, while older firms in non-technological sectors outperformed the younger firms in the long run.

2.9.3 SIZE OF THE COMPANY

Durukan (2002) argued that there is a higher probability that firms that have grown large will issue their shares on public markets. Smaller firms and the size of the firm does not necessarily relate to the age of the firm as some firms increase their growth capacity at a faster rate than others (Durukan, 2002). Pagano, Panetta and Zingales (1998) noted that an explanation for the importance of size is that fixed flotation costs can be recouped and recovered only by companies above a particular threshold, since the liquidity benefits offered by issuing firms on public markets only accrue above a certain level of the trading volume. In addition, Suchard (2009) observed that the liquidity of the firm issuing shares is an increasing function of its trading volume and one that can only be reaped by large firms. Therefore, there is more reason to expect a positive relationship between the size of the firm and the performance of the IPO (Clark, 2002).

2.9.4 OVERSUBSCRIPTION

Oversubscription of an IPO refers to the number of times an IPO has been subscribed to by numerous investor categories during the offer period (Mehta and Sweety, 2016). Jotwani and Singh (2011) argued that the greater the oversubscription of an issue, the greater the demand for that issue, resulting in higher returns. In addition, Bansal and Khanna (2012) observed that an oversubscription of an issue is considered a good indication of a decent return on the day of listing. Empirical evidence by Mehta and Sweety, (2016) on the Indian stock market proved a positive relationship between the level of under-pricing and IPO subscription.

2.9.5 UNDERWRITERS

Underwriters are agents responsible for acting as liaison between the issuer and the investor (Ritter, 1998). Price discounts applied by underwriters when calculating the offer price of shares affect the ultimate price of shares (Lowery, 2004). Sun (2015) suggested that underwriters purposely discount the fair value estimate when setting

offer prices as their aim is to encourage investor participation in the auction process. Rock (1986) noted that this behaviour results in higher price updates on offer prices, which may ultimately recover the discount.

2.11 CHAPTER SUMMARY

Incentives for and barriers to IPO listing on stock exchanges were discussed in this chapter. The benefits of listing IPOs on public markets include raising funds, and enhancing the reputation, stature and credibility of corporate governance in the eyes of investors and business partners (Sher, 2006). On the other hand, drawbacks of IPO listings on stock exchanges are loss of confidentiality, loss of control and administrative fees and costs (JSE, 2013).

Evidence from empirical literature on IPO performance from various countries in developed, developing and emerging markets was discussed. In general, under-pricing has been detected on IPOs after they have been listed on stock markets. Various hypotheses and theories such as the winner's curse and market feedback were addressed in this chapter to explain under-pricing.

IPO pricing processes and methods were also discussed, namely fixed pricing, book building and the auction mechanism. Dynamics and transformations of the JSE and the NSE and their historical frameworks were explained. Factors influencing IPO price performance were addressed. Finally, the gap in the literature was identified in the lack of recent studies on emerging markets and the unresolved debate on explanations of underperformance.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 CHAPTER INTRODUCTION

3.1.1 AN INTRODUCTION TO IPO METHODOLODY.

Subsequent to the literature review, this chapter discusses the methodology used in this study to assess IPO price performance and the impact of macroeconomics on the JSE and the NSE in the period under study. The second section of this chapter, section 3.2, explains the sampling procedures used to select the markets and the sample, the time period and the countries under study. Section 3.3 deals with data and data sources. Methodologies used in previous studies on similar topics are discussed in section 3.4 while section 3.5 explains the estimation technique used in the current study. Section 3.6 summarises the chapter.

3.2 SAMPLE AND SAMPLING PROCEDURES

The study relied on a set of companies randomly selected from the JSE and NSE. During the period of January 2005 to December 2015, there were also companies listed on both the NSE and the JSE by means of acquisitions and mergers, and not by means of IPOs. Since the current study focuses only on firms that were listed through IPOs, companies that were listed by other means were excluded. In addition, those companies whose shares did not have a corresponding market price on the selected database were also excluded from the sample. Despite this streamlining of the sample to achieve the research objectives, the qualifying companies were randomly selected. Furthermore, the data generated was random since the study utilised random data on the performance of these companies and no observations were removed. The randomly selected sample and the results obtained were a representation of the population parameters as it is not feasible and practical to make use of the entire population. Annexure A and B list IPOs listed on the JSE and NSE respectively in the period 2005 to 2015.

South Africa and Nigeria were selected for this study since the South African and Nigerian stock markets are the only two stock markets actively showing results of increasing growth (PWC, 2015). In 2014, based on GDP, the Nigerian economy was named the largest economy in Africa (Adeoje, 2016). Achua (2011) observed that foreign Investors are attracted to investing in Nigeria as it produces vast amounts of

oil. South Africa, on the other hand, has the most stable economy, active stock markets and prior to 2015, a strong currency that closely matched the United States Dollar (US Dollar) when compared to the rest of Africa (Adjasi and Yartey, 2007).

The study considers the first day, week and month of IPO performance. The closing price of the first day of trade marks the commencement of the event time period while the end event time is indicated by the IPO closing price after 36 months (Ritter, 1991). Fama (1998) noted that a comparison of IPO price performance can easily be made, regardless of the time they were listed on the stock market, as all firms have the same event time period. In order to obtain a sample of the JSE and the NSE`s large market data, a 10-year period was chosen. This period covers major chronological economic events such as the global financial crisis in 2007 and 2008, the collapse of Lehman Brothers in 2008, the decline of the South African Rand to the US dollar in 2015 and the rise of China and India in the trading market in 2005, which enhanced international trading across countries.

3.3 DATA AND DATA SOURCES

This section discusses the data and data sources used for IPO and macroeconomic analysis. The section also identifies the software used to analyse data.

3.3.1 DATA COLLECTION

The daily, weekly and monthly price data of IPOs were gathered from the NSE, JSE, IRESS and Bloomberg. Muller (2009) confirmed that these databases are credible and provide a more accurate estimate of share values than other sources. The data include the following variables: the offering price of shares, the number of IPOs that were listed on the JSE and NSE from 2005 to 2015, closing day prices and market index prices, for which the JSE All Share Index (JALSI) and the NSE All Share Index (NGSE) were used as the benchmark index to calculate the abnormal returns from these listings.

Collecting data on IPOs can present a challenge in that if a share price is listed on the JSE, it might not have a corresponding market price on Bloomberg or IRESS and this might undermine the reliability of the study significantly as a result of the inclusion of questionable data (Neneh and Smit, 2013). For this reason, only shares whose data could be crosschecked on the Bloomberg were considered. The verification of data

across different databases maintains the integrity of the data obtained, which results in reliable output (Gonvindjee, 2012).

This study reviewed IPOs that were listed on the JSE and the NSE during the period between January 2005 to December 2015, in order to identify initial returns or performance of these IPOs. In addition, the study focused only on IPOs that were listed on the JSE main board and hence all listings on the AltX were excluded from the sample data. On the other hand, 91 IPOs were listed on the NSE during the period 2005–2015, and 19 of these Nigerian IPOs were considered for the study.

According to Rust (2015), it is important to note that there are a variety of factors that affect stock performance, and these largely consist of the macroeconomic environment[3]. The data for GDP, inflation and interest rates were gathered from the World Bank`s African Development Indicators. Economic activity might be seasonal, thus by introducing the month as a categorical variable it is possible to smooth out some of that seasonality. The year fixed effects (Fes) is a categorical variable that captures any yearly events or effects that may confound post-IPO price changes. The 2008 year dummy captures the effect of the global financial crisis. Post-IPO price changes may be affected by differences across sectors.

Consistent with Adjasi, Fiawoyife and Osei (2012), geography is important in determining economic activity and IPO performance is no exception and there are a number of unobservable factors (such as culture that is difficult to measure) that have an impact on economic performance. Country fixed effects is a categorical variable that captures the confounding country effects in Nigeria and South Africa country (Adjasi, Fiawoyife and Osei, 2012).

Consumers and investors have different levels of liquidity and Marginal Propensity to Invest (MPI) (Luetticke, 2018). Time of month is a categorical variable taking the value of 1 (beginning of month – Days 1–10), 2 (middle of the month – Days 11–20) and 3 (end of the month – Days 21–30). IPO performance may be different across these three time periods in the month.

[3] Inflation, GDP growth, exchange rates, interest rates etc.

Share prices are to a great extent also affected by events that may occur within or outside the business (Rust, 2015). These events may include boardroom scandals as well as other announcements and pronouncements by policy makers. The reaction by investors is usually reflected in share prices in the immediate aftermath of the event (Lowry and Schwert, 2004). The day fixed effects attempt to capture that since we do not have data on events.

3.3.2 DATA ANALYSIS

IPO data were gathered and analysed, making use of figures and tables. Stata software version 14 was used to run regressions. In addition, Excel ANOVA was used to calculate descriptive statistics. Mean market adjusted return and wealth relative were calculated using Excel version 2016.

3.4 TESTING STATISTICS

In statistical analysis, only variables that are statistically significant are interpreted; t-statistics or p-values are used to evaluate whether or not the coefficient of a variable is significant (Brooks, 2014). However, the p-value is the most standard, popular and easiest to interpret. Therefore, p-values were used to interpret coefficients in this study. The p-value is the minimum probability that the null hypothesis is rejected. Therefore, if the p-value is less than 10%, the hypothesis that the $\beta=0$ (the coefficient=0) is rejected and an alternative hypothesis that the coefficient is not zero statistically is chosen. Therefore, as long as the p-value is <0.1, the variable is statistically significant. If $p>0$, it is not useful interpreting the variable because there is statistical doubt (Brooks, 2014). In this study`s regression model, only GDP growth and inflation were continuous variables. The rest were categorical (dummy variables). The study tested the following hypotheses:

Hypothesis 1:

There is a relationship between the geographical location and the overall performance of IPOs.

Hypothesis 2:

Macroeconomic variables determine IPO performance.

Hypothesis 3:

There is a relationship between the industry of listing and the overall performance of IPOs.

3.5 METHODOLOGIES USED IN PREVIOUS STUDIES TO DESCRIBE IPO PERFORMANCE

Empirical studies (Mwendwa, 2013; Ritter, 2017; Mashaba, 2014; Neneh and Smit, 2013) of IPO performance have employed methodologies such as event study methodology, the capital asset pricing model (CAPM), the arbitrage pricing model, multiple index model adjusted returns and cumulative abnormal returns (CAR). These methodologies are discussed below.

3.5.1 Multiple index model adjusted returns

The model attempts to describe asset returns and their covariance matrix as a function of a small number of risk attributes (Mashaba, 2014). The multiple factor model has been applied mainly in investment practice in applications based on portfolio risk, as it permits a differentiated risk-return analysis (Rosenberg, 2003). Mauerer and Stephan (1998) explained that the model is based on the basic financial theory that says ‘without risk, no reward’. The multiple index model also provides valuable insights, especially with regard to risk attribution and share performance (Rosenberg, 2003).

Albrecht, Maurer and Mayser (1996) used the multiple index model and reported that it allowed a differential risk-return analysis that provided valuable insights into performance and risk attribution of IPOs. The multiple index model presents assumptions for share price performance (Ross, 1976). These assumptions include (1) the relationship between the return of two different IPOs is solely dependent on random variables, (2) the anticipated return is 0. However, Fama and French (1969) observed that these assumptions were not realistic in the real world.

3.5.2 Capital Asset Pricing Model

The second method used to evaluate the performance of IPOs is the Capital Asset Pricing Model or CAPM, developed by William Sharpe and John Linter (1964). This model provides powerful and pleasing predictions with regard to the measure of risk and its relation to return (Linter and Sharpe, 1964). Markowitz (1952) explained that in the CAPM, the investor chooses a portfolio that produces a return in the future on the assumption that investors are risk averse and that the focus of investors is only on the mean and variance of their one-period investment portfolios. Conforming to the model has offered the financial industry numerous benefits over other methods. Sharpe and Linter (1964) noted that the CAPM model provides a theoretically-derived relationship between systematic risk and required return, which has been used in various empirical studies and tests. Secondly, CAPM is used in several financial applications such as the valuation of a firm's common stock, capital budgeting, valuation of warrants and convertible securities and lastly, merger and acquisition analysis.

The model provides powerful positive predictions regarding the measure of risk and its relation to return (Linter, 1964). However, Fama and French (2004) reported that the CAPM was a poor model to use as it reflected theoretical failings as a result of several assumptions. The first assumption is that all investors available lend and borrow funds at a risk-free rate. Secondly, the model works on the assumption that investors have the same estimates of mean, variances and covariance in all securities. Fama and French (2004) argued that the third assumption was that the market for financial instruments is perfectly competitive and every investor is a price taker. Otieno (2009) noted that these assumptions are unreliable and that the main implication of CAPM concerns expected return, which cannot be directly observed.

3.5.3 Arbitrage Pricing Model

The arbitrage pricing model was developed by Ross (1976). Chen (1983) argued that this model theorises that the return expected from a financial instrument can be interpreted as a linear function of several macroeconomic factors and that the derived return can be used to price the asset accurately. Ross (1976) agreed that this derived return should be equal to the expected price at the end of the period, which is discounted at the rate inferred by the model. The arbitrage pricing model should be able to reconcile any variances.

Huberman and Wang (2005) reported that this is a one period model in which every investor believes that the returns issues are consistent with a factor structure and are a measure of determining asset values based on the law of one price and no arbitrage. Ross (1976) proposed that if stock prices offered no arbitrage opportunities then the expected returns would be linearly related to the factor loadings. Huberman and Wang (2005) noted that benefits associated with making use of the model included but were not limited to the following: firstly, in relation to its requirements for individual portfolios and the information structure it allows, the arbitrage pricing model is less restrictive than the CAPM. Secondly, multiple sources of risk that provide explanations of the stock return movement are allowed when this model is used.

However, Fama and French (2004) believed that the arbitrage pricing theory does not preclude arbitrage opportunities over dynamic portfolios. The application of the model in the evaluation of the performance of new issues therefore contradicts the model, which obtains price restrictions by ascertaining the absence of arbitrage. Furthermore, Ross (1976) noted that this model also has drawbacks in its assumptions. These include the assumption that capital markets must be perfectly competitive, that investors always opt for more instead of less wealth and, lastly, that the returns on any asset must be linearly correlated to a set of indices. Table 3.1 summarizes previous studies that made use different methods on a similar topic

Table 3.1: Previous studies using different methods on a similar topic.

Author(s)	Country	Method	Strengths of the method
Victor Oluoch Otieno (2009)	Kenya	CAPM	The model offers powerful and accurate predictions when measuring return and risk.
Huberman and Wang (2005)	China	Arbitrage Pricing Model	The model has less restrictive requirements when assessing individual portfolios.
Mashaba (2014)	South Africa	Event Study Methodology	It allows stock market prices to be used as they prevent manipulation by managers.

Source: Author`s Compilation

3.6 ESTIMATION TECHNIQUE USED IN THE CURRENT STUDY

The current study makes use of the Event Study Method with MAAR as a unit of measurement. This is the standard measure for evaluating performance of new issues, according to Neneh and Smit (2013). The wealth relatives (WR) were used to measure the aftermarket performance of IPOs.

The model is regarded as a powerful tool and has been used by several researchers to evaluate the impact of financial instruments over different periods (McWilliams and Siegel, 1997). Ritter (1998) explained that the mean market adjusted abnormal returns method initially measures and calculates the percentage change in the offering price, up to the price at the close of trade in the aftermarket. It also takes a weighted average across the sample so as to arrive at the mean, assuming that there is no relationship between the size of the issue and the demand for allocations (Ritter, 1998). The mean market adjusted abnormal returns model was selected for the present study as it prevents errors and other computations that are associated with the estimation of stock performance. The model is a simple one that does not involve unreliable assumptions, unlike the CAPM. In this study, the mean market adjusted return model

was used to calculate and evaluate the performance of IPOs in both the JSE and the NSE for the first day, first week and first month of trade.

The methodology used in the current study was similar to that applied by Ardekani, Hashemijoo and Younesi (2012), Neneh and Smit (2013) and Dzimiri and Radikoko (2015) in their studies of IPO performance. Neneh and Smit (2013) analysed IPO performance on the JSE and this method enabled them to determine and to test their hypothesis of IPO under-pricing for stocks that were under review. Although this study used the same technique as the current study, it focused on trends of IPO under-pricing during both the cold and the hot market periods in four sectors, namely cyclical, defensive, growth and sensitive stocks. On the other hand, the current study evaluates each variable and evaluates IPO performance based on the industry each actually falls under, that is financial, telecommunications, retail or construction, to mention only a few. A similar model was adopted by Aggarwal, Hernandez and Leal (1993) in their attempt to measure the performance of IPOs on the JSE. Page and Reyneke (1997) also applied this method in their analysis of the JSE. The current study differs from the latter two in that it investigated IPOs that were listed during the period 2005 to 2015 and used the OLS regression to determine the relationship between IPO performance and macroeconomics. In addition, this study compared the two most powerful countries in Africa, something which the other two studies did not do.

The mean market adjusted abnormal returns methodology calculates whether the price set for a particular share undervalues or overvalues it. The equations 1 to 5 illustrate processes that are followed by the model. Firstly, data were collected from the data sources mentioned above in section 3.3 and a calculation of average raw return was made with a comparison of the market index on the JSE or the NSE. The mean market adjusted return was then calculated and wealth relative was measured thereafter. The wealth relative model was also used to gauge whether the selected IPOs in different markets outperformed the market (Muller, 2009). The current study also made use of the wealth relative model for evaluation purposes. Equation 6 introduces the linear OLS regression that measured the relationship between IPO performance and macroeconomic indicators.

The mean market adjusted return is calculated as follows (Mashaba, 2014):

$$\boldsymbol{R\ x, t} = \frac{\mathbf{P\ x,t - P\ x,0}}{\mathbf{P\ x,0}} \quad (1)$$

$$Where\ R_{x,t} is\ the\ market\ return\ at\ the\ close\ of\ day\ t\ trading\ period$$

$$P_{x,t}\ is\ the\ market\ index\ value\ at\ the\ end\ of\ t\ trading\ period$$

$$P_{x,0}\ is\ the\ market\ index\ value\ on\ the\ offer\ day\ of\ stock\ x$$

The initial raw discount to the investor who bought the issues at the offer price is calculated, assuming that there is no time lag between the offer and the trading of the stock. However, Suren (2015) mentioned that in Sri Lanka, the average period from subscription to the period of the offer and the day of the trade of stock on the exchange market ranges from four to eight weeks. This is similar to what this study found in South Africa and Nigeria. The measure of Initial Returns as set out above is a reflection of the IPO closing price on the first day relative to the market value (Mashaba, 2014). However, this is not a calculation of IPO share performance as it does not account for market adjustments (Neneh and Smit, 2013). In order to factor in market adjustments the following equations were employed.

The calculation of average raw return is as follows (Neneh and Smit, 2013):

$$\bar{\boldsymbol{R}}_{\boldsymbol{x,t}} = \frac{\mathbf{1}}{\boldsymbol{N}} \sum_{\boldsymbol{i=0}}^{\boldsymbol{n}} \boldsymbol{R}_{\boldsymbol{x,t}} \quad (2)$$

As noted by Fama et al. (1993), selecting a benchmark plays a vital role in the estimation of IPO performance. In order to measure the level of underperformance, if any, a calculation of the market-adjusted initial returns is made. This technique calculates the initial return by adjusting IPO performance to the appropriate benchmark performance using the two formulas. First, however, the market return is calculated following the approach used by Khrushed et al. (1999). Benchmarks are implemented as they assist in identifying abnormal returns (Gonvindjee, 2012). Hence, it is crucial to identify a benchmark accurately in order to correctly determine these abnormal returns.

The market-adjusted abnormal return for stock x after t^{th} trading period, which is the measure of IPO performance, is calculated as:

$$\boldsymbol{MAAR_{x,t}} = \mathbf{100\ x} \left\{ \frac{\mathbf{1+}\boldsymbol{R_{x,t}}}{\mathbf{1+}\boldsymbol{R_{m,t}}} - \mathbf{1} \right\} \quad (3)$$

The average market-adjusted abnormal return (MAAR) for stock x for the tth period can be calculated as follows (Dzimiri and Radikoko, 2015):

$$\overline{\boldsymbol{MAAR_{x,t}}} = \frac{\mathbf{1}}{\boldsymbol{N}} \sum_{\boldsymbol{t=0}}^{\boldsymbol{n}} \boldsymbol{MAAR_{x,t}} \quad (4)$$

There is a positive relationship between the wealth relative model and the mean market-adjusted returns model (Alagidede and Van Heerden, 2012). Ritter (1991) reported that a wealth relative of greater than 1.00 indicates that IPOs outperformed the market, while a wealth relative of less than 1.00 can be interpreted as indicating that IPOs underperformed. The wealth relative model assesses the performance of a group of IPOs and is calculated as follows:

$$\textbf{Wealth relative} = \frac{\mathbf{1}+(\frac{\mathbf{1}}{\boldsymbol{n}}) \sum_{\boldsymbol{x=1}}^{\boldsymbol{n}} (\boldsymbol{R_{x,t}})}{\mathbf{1}+(\frac{\mathbf{1}}{\boldsymbol{n}}) \sum_{\boldsymbol{m=1}}^{\boldsymbol{n}} (\boldsymbol{R_{m,t}})} \quad (5)$$

$$Where\ t\ is\ the\ trading\ period$$

$$n\ is\ the\ number\ of\ listed\ IPOs$$

In this study, the linear OLS regression was conducted to make a comparative analysis of how macroeconomic factors affected IPO performance in South Africa and Nigeria. The main analysis model is specified as shown in Equation 6.

$$\Delta P_{tj} = \propto_0 + \propto_1 C_i + \propto_2 S_i + \propto_3 M_i + \propto_4 MT_i + \propto_5 Y_i + \propto_6 GDP_t + \propto_7 INF_t + \propto_8 IR_t + \propto_9 F + \mu$$

Where ΔP_{tj} = 1 day, 1 week or 1 month change in price of IPO

C_i , S_i , M_i , MT_i and Y_i $= country, sector, month, month\ time\ and\ year\ FEs$

$GDP_t = real\ GDP\ growth$

$INF_t = inflation\ rate$

$IR_t = interest\ rate$

$F = 2008\ global\ financial\ crisis\ dummy$

$\propto_{(0,\ldots,9)} = is\ the\ set\ of\ regression\ coefficients,\ and$

$\mu = stochastic\ error\ term$ (6)

3.7 ETHICAL CONSIDERATIONS

In this study, specific ethical areas were considered.

- I sought ethical clearance from the University of South Africa before data collection process.
- Values and principles of UNISA policy on Research Ethics were adhered to in the research project.
- Any adverse circumstances in the undertaking of the research project shall be communicated to the Department of Finance, Risk Management and Banking Ethics Review Committee.
- Findings are reported in an honest manner without manipulation or misrepresentation of data.
- This study refrains from piracy, fabrication, falsification and plagiarism.

3.8 CHAPTER SUMMARY

This chapter explained in detail the data, data sources and research methodology implemented in this study. It provided justification for the selection of the two stock markets, the time period, the data and the data sources. In addition, various methods of measuring IPO performance were discussed. The Event Study Methodology and OLS regression method were introduced to measure IPOs and the relationship between macroeconomic indicators and IPO performance.

CHAPTER FOUR: ANALYSIS OF DATA AND DISCUSSION OF RESULTS

4.1 INTRODUCTION

4.1.1 AN INTRODUCTION TO RESULTS ANALYSIS.

This chapter provides a discussion of the summary statistics of the distribution of IPO returns, a comparison of IPO performance of NSE and JSE and an evaluation of the relationship between IPO performance and macroeconomics. Section 4.2 and section 4.3 explains the descriptive statistics based on JSE and NSE data respectively. A trend analysis and an evaluation of market adjusted returns are presented in section 4.4. Section 4.5 presents the regression analysis and results.

4.2 JSE DESCRIPTIVE STATISTICS

The descriptive statistics used to explain returns from IPOs listed on the JSE during the period 2005 to 2015 are presented and discussed in this section. Table 4.1 shows descriptive statistics of stock returns from the first day, week and month of trade before and after market adjustments. The descriptive statistics that are discussed and evaluated in this section are the mean, minimum, maximum, median and standard deviation.

Table 4.1: JSE Descriptive Statistics**.**

	Offer Price	1st day raw return	1st week raw return	1st month raw return
Mean	531.10	0.33	0.31	0.36
Standard Error	86.21	0.10	0.16	0.18
Median	262.50	0.02	0	0
Standard Deviation	817.82	0.99	1.50	1.72
Sample Variance	668830.11	0.98	2.25	2.96
Kurtosis	14.30	18.87	36.86	53.41
Skewness	3.34	3.99	5.95	6.92
Range	5232	7.43	11.60	15.90
Minimum	1	-1.28	-1.16	-1.44
Maximum	5233	6.15	10.44	14.46
Sum	47799	30.01	28.02	32.30
Count	90	90.00	90.00	90.00

Sources: Author`s compilation

The initial returns on the sample of 90 IPOs on the first day of trade returned an average of 33%, ranging from negative 128% to 615% with a standard deviation of 99% and a median of 2%. The average initial raw return for the first week of trade was observed as 31%, with a maximum of 1044% and minimum of negative 116%. The standard deviation and median of the first week of trade were 150% and 0% respectively. An average raw return of 36% for the first month of trade was found, based on the JSE data presented. The standard deviation and the median for the first month's trade were 172% and 0% respectively. The minimum raw return was negative 144% and the maximum, 1446%. A positively skewed result was obtained on the first day, week and month of trade, which according to Mashaba (2014) indicated that the sample mean was less than a larger ration of the returns. Exorbitant negative returns were stimulated by the market value of IPO prices on offer day that were greater than the market value of IPO price at the end of the trading period by far. Exorbitant positive returns emanated from the market value of IPO prices at the end of the trading period that were greater than the market value on the day of offer.

4.3 DESCRIPTIVE STATISTICS BASED ON NSE DATA

Descriptive statistics for IPOs listed on the NSE in the period 2005 to 2015 are presented and discussed in this section. Table 4.2 shows the descriptive statistics for stock returns of the first day, week and month before and after market adjustments. The descriptive statistics used in this section are average, minimum, maximum, median and standard deviation.

Table 4.2: NSE Descriptive Statistics**.**

	1st day Raw return	1st week Raw return	1st month Raw return
Mean	0.13	0.38	0.20
Standard Error	0.04	0.15	0.06
Median	0	0	0
Standard Deviation	0.18	0.62	0.25
Sample Variance	0.03	0.39	0.06
Kurtosis	0.79	2.38	1.02
Skewness	1.34	1.81	1.29
Range	0.53	2.07	0.88
Minimum	0.00	-0.09	-0.05
Maximum	0.53	1.98	0.83
Sum	2.38	6.90	3.53
Count	18.00	18.00	18.00

Sources: Author`s compilation

The initial returns on the sample of 18 IPOs on the first day of trade returned an average of 13%, ranging from 0% to 53% with a standard deviation of 18% and a median of 0%. The average initial raw return for the first week of trade was 38%, with a maximum of 198% and minimum of negative 9%. The standard deviation and median of the first week of trade were 62% and 0% respectively. An average raw return of 20% for the first month of trade was found, based on the NSE data. The standard deviation and the median for the first month trade were 25% and 0% respectively. The minimum raw return was negative 5% and the maximum was 83%. A positively skewed result was obtained on the first day, week and month of trade indicating that the sample mean was less than a larger ration of the returns (Mashaba, 2014).

4.4 TREND ANALYSIS OF IPO PERFORMANCE BASED ON JSE AND NSE DATA

This section provides a trend analysis of IPOs that were listed on the JSE and NSE in the period 2005 to 2015. Section 4.3.1 is an assessment of the first day, week and month initial returns together with the abnormal returns of JSE and NSE IPO performance.

4.4.1 TREND ANALYSIS OF IPO PERFORMANCE BASED ON JSE AND NSE DATA

This section provides an analysis of IPOs listed on the JSE and NSE during the period 2005–2015, using both the mean market adjusted abnormal return (MAAR) and the wealth relative model (WR). Table 4.3 below demonstrates the average abnormal returns over 10 years for IPOs that were listed on the JSE and NSE from 2005 to 2015.

Table 4.3: IPO performance on JSE and NSE

	JSE			NSE		
	Raw Return	MAAR	WR	Raw Return	MAAR	WR
1st day of trade	0.16	13.16	1.16	0.13	0	0
1st week of trade	0.18	20.88	1.18	0.20	14.30	1.16
1st month of trade	0.19	23.14	1.20	0.38	28.81	1.43

Sources: Author`s compilation.

The average raw returns for the first day, week and month of IPOs listed on the JSE for the period 2005 to 2015 were 16%, 18% and 19% respectively. The average raw return for the first day, week and month of trade for NSE IPOs were 13%, 20% and 38% respectively. The raw return for the IPOs on the NSE proved to be higher than those on the JSE, except in the case of the raw return for the first day of trade. Market adjusted abnormal returns for the first day, week and month were 13.16, 20.88 and 23.14 respectively for the JSE while the mean market adjusted returns for IPOs listed on the NSE were 0, 14.30 and 28.81 respectively. The mean market adjusted return for the JSE for the first day and week was higher than the mean market adjusted return for the NSE, except for the first month of trade. Wealth relatives of 1.16, 1.18 and 1.20 were obtained for JSE IPO performance while 0, 1.16 and 1.34 were calculated for NSE IPOs. There was no market index for IPOs listed on the NSE on the first day of trade that matched the same day the IPOs were listed.

Positive initial and abnormal returns were interpreted as under-pricing and overpricing was established when negative returns were obtained (Neneh, 2013). Based on table 4.3, IPOs listed on both the JSE and the NSE were under-priced. Based on the initial return, the first month on both the JSE and the NSE showed the highest return, followed by the first week and the first day return. These findings suggest that investors may profit by purchasing new stocks at the offer price and by selling them at the end

of the first month trading period. Moreover, the abnormal return on both the JSE and the NSE in the first month also proved to be higher than the return on the first day and the first week, indicating that there was little incentive to sell on the first day and week of the trading period. Ultimately, this suggests that investors who chose to invest in JSE shares benefitted more when they bought shares on the first day and in the first week of trade and sold them a month later. Furthermore, if investors chose to invest in an NSE IPO share, they would gain more if they bought shares on the first day or in the first week of trade and resold the shares a month later. These results are similar to findings by Sohali and Raheman (2010) and Neneh and Smit (2013).

In order to evade the downward statistical bias, the relative wealth model was calculated as an alternative measurement of long-term IPO performance (Ritter 1991). Wealth relatives for the first day and week for JSE IPOs were higher than those for IPOs on the NSE, except in the case of the first month, where IPOs on the NSE were higher than on the JSE. The wealth relatives from both the JSE and the NSE were higher than 1, which according to Ritter (1991) suggests that listed IPOs outperformed the market and index. The wealth relatives indicated that IPOs listed on the JSE and on the NSE during the period from 2005 to 2015 outperformed the market and their industry counterparts. These results are similar to those of several studies such as Van Heerden and Alagidede (2012), Loughran, Ritter and Rydqvist (2010) and Aggarwal, Leal and Hernandez (1993).

4.4.2. SECTORAL ANALYSIS OF IPO PERFORMANCE BASED ON JSE AND NSE DATA.

Sector Initial Return analysis for the JSE and the NSE for the first day, week and month was also conducted. IPOs listed on the JSE and NSE from 2005 to 2015 were evaluated with the intention of assessing their performance, and of determining which sectors had the highest level of under-pricing and overpricing.

The results indicate that the highest initial returns for the first day, week and month of trade on the JSE were recorded in the defence sector, while no IPOs were listed in the defence sector on the NSE. The highest initial returns on the first day and week of trade on the NSE were recorded in the food and beverage sector while the initial return was obtained in the professional service sector. The highest overpricing on the JSE

for the first day of trade was recorded in the computer and electronics sector; there was no record of overpricing on the NSE for the first day of trade. The holding companies sector recorded the highest overpricing for the first week of trade on the JSE; on the other hand, the construction and building sector reported the highest overpricing on the NSE in the first week of trade. In addition, the computers and electronics sector reported the highest overpricing on the JSE, with the construction and building sector recording the highest overpricing for the first day of trade. Based on these results, it was established that on average, IPOs listed under the computers and electronics sector were overpriced on the JSE while IPOs listed under the construction and building sector were overpriced on the NSE. The initial raw return for JSE and NSE is reflected in table 4.4.

Table 4.4: Initial Raw Return for JSE and NSE.

	JSE			NSE		
Sector	Initial return 1st day	Initial return 1st week	Initial return 1st month	Initial return 1st day	Initial return 1st week	Initial return 1st month
Agribusiness	5.57%	-3.09%	4.54%	0%	0%	0%
Chemicals	0.00%	0.46%	2.28%	0%	0%	0%
Computers & Electronics	-2.30%	-1.03%	-2.80%	0%	0%	0%
Construction/Building	29.82%	35.13%	36.26%	0.00%	-5.00%	-1.00%
Consumer Products	5.78%	3.72%	9.47%	0%	0%	0%
Defence	43.00%	45.00%	55.00%	0%	0%	0%
Finance	37.33%	46.36%	34.52%	26.00%	26.33%	26.00%
Food & Beverages	0.16%	-3.98%	0.95%	27.75%	43.25%	97.00%
Healthcare	12.97%	53.18%	22.50%	0.00%	0.00%	0.00%
Holding Companies	5.45%	-5.45%	1.82%	0.00%	8.00%	16.00%
Insurance	11.76%	8.24%	11.76%	0%	0%	0%
Machinery	42.50%	35.00%	39.00%	0%	0%	0%
Metal & Steel	3.75%	-3.75%	5.50%	0%	0%	0%
Mining	4.98%	0.86%	5.12%	0%	0.08	0.16
Professional Services	2.35%	-1.42%	19.68%	10.00%	33.00%	103.00%
Real Estate/Property	9.68%	8.49%	9.31%	5.00%	16.50%	12.50%
Telecommunications	18.96%	12.95%	17.83%	12.50%	13.50%	1.50%
Transportation	9.00%	5.00%	1.00%	4.00%	5.00%	78.00%
Utility & Energy	35.00%	37.45%	37.50%	0%	0%	0%

Sources: Author`s compilation

4.5 REGRESSION ANALYSIS

This section provides a discussion of the regression analysis and results. Pre-analysis data checks, correlation matrix and regression results are presented in this section.

4.5.1 PRE-ANALYSIS DATA CHECKS

Section 4.5.1 below displays correlation matrix and normality as pre-analysis data checks.

4.5.1.1 CORRELATION MATRIX

An important assumption of the classic Ordinary Least Squares (OLS) regression is that there should be no multi-collinearity amongst explanatory variables (Ameer, 2012). The rule of thumb in deciding whether or not there is multi-collinearity between explanatory variables is that the correlation coefficient (r) should be less than 0.8 (Cochrane, 2011). Table 4.5 shows that there was multi-collinearity between the Country FE variable (cntry) and the exchange rate (ex_rate). Therefore, the regression analysis included the country variable and excluded the exchange rate because of the multi-collinearity between them. The analysis retained the country FE because the main aim of the study was to conduct a comparative analysis of IPO performance in South Africa and Nigeria. There was no multi-collinearity between the remainder of the explanatory variables.

Table 4.5: Correlation Matrix

	cntry	*sector*	*month*	*monthtime*	*year*	*gdp*	*infl*	*ex_rate*	*Int_rate*	*fincris*
cntry	1									
sector	0.023	1								
month	-0.093	-0.050	1							
monthtime	-0.080	-0.250	-0.0099	1						
year	-0.181	0.098	-0.0003	0.0134	1					
gdp_growth	0.556	-0.053	0.0047	0.0717	-0.7533	1				
inflation	0.630	-0.106	-0.1591	-0.0749	-0.3033	0.2948	1			
ex_rate	0.985	0.0055	-0.124	-0.0808	-0.0893	0.502	0.6126	1		
Int_rate	0.094	0.0837	-0.1291	-0.1257	0.0214	0.0319	-0.2284	0.1063	1	
fincris	0.047	-0.1915	0.0035	0.0699	-0.7255	0.6159	0.1393	-0.028	0.1544	1

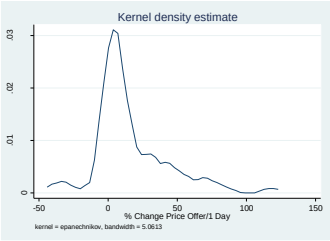
Sources: Author`s compilation

4.5.1.2 NORMALITY

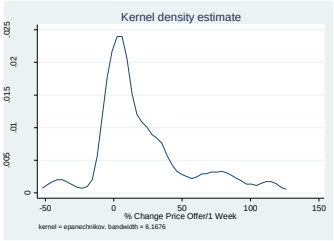
OLS regression also assumes that variables are normally distributed with a constant mean (Gali, 2008). This section presents the kernel density functions of the regression variables as a way of checking their normality. These are presented in Figure 4.1.

Figure 4.1**:** Normality of Continuous Variables

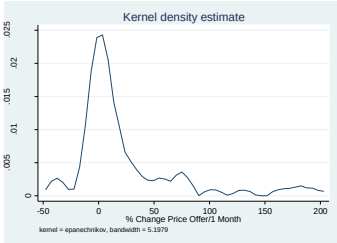
1 Day IPO change



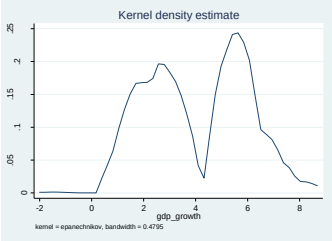
1 Week IPO change



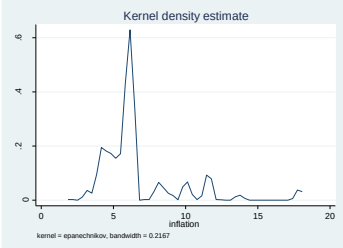
1 Month IPO change



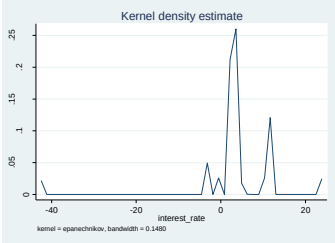
Real GDP Growth



Inflation



Interest Rate



Source: Author's Compilation.

As indicated in Figure 4.1 above, most of the continuous variables in the model specification were not exactly normally distributed – especially inflation, interest rates and Real GDP growth. One way of normalising the distribution of a variable is to conduct a variable transformation (by taking the natural logarithm of the variable). In analysis, regression results for the raw variables are shown because i) the log transformations result in the loss of data in the negative values, and ii) by taking the natural logarithm for most of the variables a normal distribution is not achieved (Gali, 2008).

4.5.2 REGRESSION RESULTS

The study conducted OLS regressions separately for the first day, first week and first month IPO price changes. In all cases, analysis started with the base regression, that is, the IPO price change was first regressed on country to reveal the country comparison.

Table 4.6 presents the results from the OLS regressions. Columns 1–4 consider the first day change in IPOs as the dependent variable, while columns 5–8 and columns 9–12 consider the first week and first month changes in IPO as dependent variables respectively. Across the dependent variables, columns 1, 5 and 9 were the baseline equations in which the change in IPO price was regressed only on country. The

coefficient for country was 0.062 and was statistically significant at the 10% level for column 5; it was 0.31 and statistically significant at the 1% level for column 9. Thus, all things being equal, IPO increased by 0.06 percentage points more and 0.3 percentage points more after the first week and first month respectively in Nigeria when compared to South Africa (the base country).

The next level of the regression analysis was to add the macroeconomic variables (GDP growth, inflation and interest rate) in columns 2, 6 and 10. After controlling for macroeconomic factors, the country variable for Nigeria remained statistically insignificant in column 2 (first day change in IPO as dependent variable). However, it increased to 0.17 and 0.54 for first week and first month changes in IPO respectively (column 6 and 10). These results still confirmed the high volatility of IPO prices on the NSE in comparison to the JSE. In column 2, all the macroeconomic indicators were statistically insignificant, meaning that country FEs and the macroeconomic indicators did not explain first day IPO price changes in Nigeria and South Africa.

In columns 6 and 10, of all the macroeconomic variables only inflation was statistically significant (at 1% level). The coefficient for inflation was -2.27 in column 6, while in column 10 it was -4.57. This implies that a 1 unit increase in inflation reduced the first week`s IPO price change by 2 percentage points, while the first month`s IPO price change dropped by 4.5 percentage points in Nigeria and South Africa. Intuitively, one would expect that the higher the inflation, the more rapidly the after IPO prices would change (in this case, increase), but it is also important to note that columns 6 and 10 did not control for other fixed effects.

Table 4.6: OLS Estimates for Nigeria and South Africa Change in IPO (2005–2015).

Dep. variable	*1 day change in IPO*				*1 week change in IPO*				*1 month change in IPO*			
	1	2	3	4	5	6	7	8	9	10	11	12
Nigeria^{+}	0.013	0.044	0.19***	0.11	0.062*	0.17***	0.48***	0.88***	0.31***	0.54***	0.77***	0.50
	(0.029)	(0.043)	(0.051)	(0.246)	(0.036)	(0.053)	(0.064)	(0.299)	(0.051)	(0.075)	(0.093)	(0.471)
GDP growth		-0.014	-1.01	5.37		-0.37	-4.66***	-19.5		-1.23	-3.83**	-6.66
		(0.702)	(0.841)	(11.518)		(0.870)	(1.063)	(14.015)		(1.222)	(1.548)	(22.062)
Inflation		-0.72	-2.23***	-16.3***		-2.27***	-4.57***	-5.58		-4.57***	-6.21***	28.6**
		(0.555)	(0.564)	(6.057)		(0.688)	(0.713)	(7.370)		(0.967)	(1.039)	(11.602)
Interest rate		0.047	0.56***	-2.16*		0.10	0.81***	0.98		0.19	0.94***	8.01***
		(0.190)	(0.183)	(1.232)		(0.236)	(0.232)	(1.499)		(0.331)	(0.337)	(2.360)
_cons	0.16***	0.20***	0.23**	2.72***	0.19***	0.33***	0.55***	1.16	0.17***	0.47***	0.52**	-5.16***
	(0.013)	(0.047)	(0.112)	(0.984)	(0.016)	(0.058)	(0.141)	(1.197)	(0.023)	(0.082)	(0.206)	(1.885)
Sector FE	N	N	Y	Y	N	N	Y	Y	N	N	Y	Y
All Fes	N	N	N	Y	N	N	N	Y	N	N	N	Y
N	537	537	537	537	537	537	537	537	537	537	537	537
R^2	0.000	0.005	0.295	0.782	0.006	0.031	0.286	0.795	0.063	0.111	0.297	0.764

NOTES: $^{+}$ Base is South Africa. Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ means statistically significant at 10%, 5% and 1% levels.

In analysing IPO price changes, it is important to consider sector. Different sectors and industries have different dynamics, which may affect the behaviour of stock (Neneh and Smit, 2013). Thus, for the first day, week and month`s regressions (columns 3, 7 and 11), sector FEs were introduced as an additional control variable. This increased the R^2 (coefficient of determination) from 6.3% (the highest case previously) to almost 30%. Thus, sector was an important variable in the analysis[4]. By taking sector into account in columns 3, 7 and 11, the country coefficient was 0.19, 0.48 and 0.77 for the first day, week and month IPO price change respectively.

These results indicate that the first day, first week and first month IPO price changes were higher by 0.19, 0.48 and 0.77 percentage points respectively in Nigeria in comparison to South Africa. The coefficient for inflation (-2.23) became statistically significant at 1% level for the first day price change (column 3). The coefficient remained robust for the first week (-4.57) and first month (-6.21) IPO price change, and significant at the 1% level. Hence, it appeared that IPO price changes were inversely affected by inflation in Nigeria and South Africa if only sector and country FEs and macro-level variables are considered.

The final specifications for the first day, first week and first month IPO price changes are reflected in columns 4, 8 and 12 respectively. These specifications included all the variables in the model and were the most reliable, given the higher R^2s and reduced error terms. In column 4, the country and GDP growth rate coefficients were not statistically significant. Inflation had of -16.3 while the coefficient for interest rate was -2.16, both significant at the 1% level. The R^2 for this model was 0.782, which indicates that 78% of variation in the dependent variable (first day IPO price change) was explained by the model. However, the coefficients for inflation and interest rates were negative (not exactly expected). Nevertheless, this might have been expected given that the interest rates and inflation data used in the analysis had an annual temporal frequency, thereby affecting the extent to which correlations with daily price changes could be relied upon because the latter were too short-term.

[4] For in-depth sector by sector results in comparison to agriculture (the base sector) and other FEs, refer to Appendix E.

Column 8 contains the full model specification results for the first week IPO price changes. Only the country variable coefficient (0.88) is significant at 1%, which means that the first week IPO price change was 0.88 times higher in Nigeria than in South Africa. It also means that taking all factors in the model into account, first week IPO price changes were only explained by country FEs (which would to some extent control for the macro and other factors). The R^2 was 0.795, which indicates that the model explained 79.5% variation in the dependent variable (first week IPO price change). As far as this study was concerned, column 12 was very important because it shows the macro-variables with coefficients that met the priori expectations.

The country variable was not significant, meaning that the first month IPO price change was not explained by country FEs (which could capture other unobservables) but by the macro factors. While GDP growth was not statistically significant, the coefficients for inflation and interest rate were 28.6 and 8.01 respectively, both significant at 1% level. Thus, a 1 percentage point change in inflation increased the post IPO price by 28.6%. Similarly, a 1% increase in interest rates increased the post-IPO price by 8%. R^2 was high at 0.764, indicating that the model explained 76.4% of the variation in the dependent variable first month IPO price change. The 2008 financial crisis was captured by the year FEs, but as Appendix E shows, the effect of the global financial crisis was muted.

4.5.3 CONCLUSION AND REGRESSION SUMMARY

The broader objectives of the study were to investigate and examine the performance of IPOs listed on the JSE and NSE during the period 2005 to 2015, and to determine how economic growth affected IPO performance. The research questions were:

1. What is the level of IPO performance on the Johannesburg Stock Exchange and the Nigerian Stock Exchange?
2. Can the level of IPO performance be associated with the industry, year and the country it is listed under, especially in emerging markets?
3. In there any relationship between IPO performance and macroeconomic variables in South Africa and Nigeria?

The regression analysis revealed that the macroeconomic variables were important in determining the first month post-IPO prices. The results showed that inflation and

interest rates were positively correlated with first month post price changes, whereas GDP growth was statistically insignificant. The study also established that for Nigeria and South Africa, the first week price change was influenced by the country FEs, and that the first week price change was higher in Nigeria than in South Africa. The country FEs potentially captured other unobservable factors whose data were unavailable.

To be specific, the study found the following:

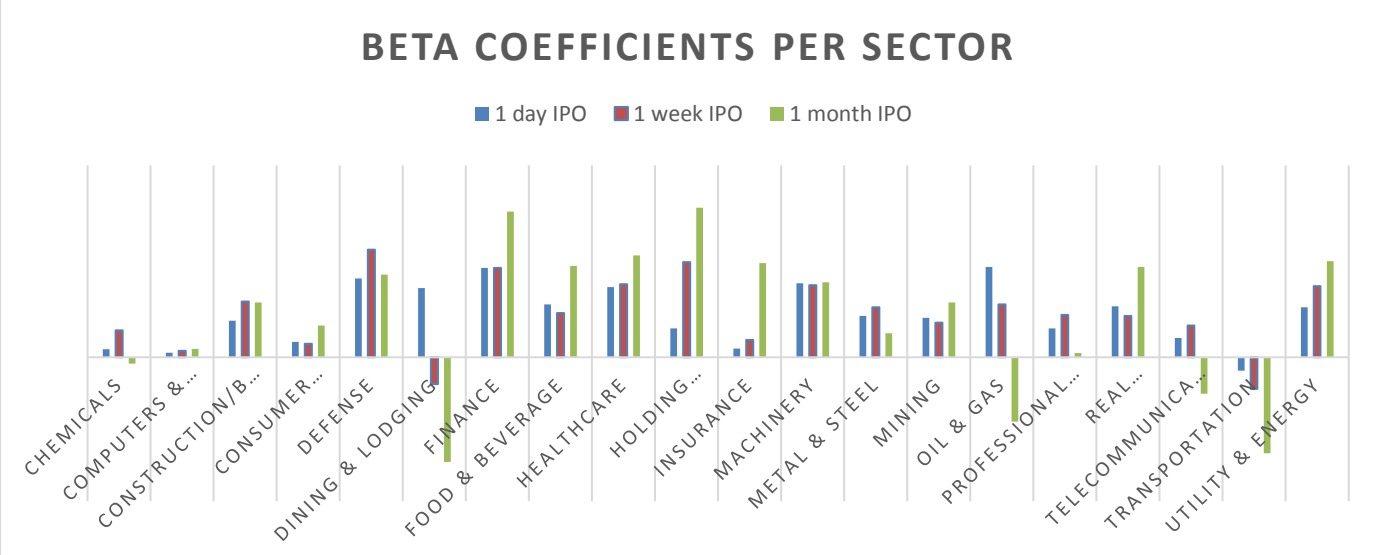
- **Level of IPO performance on the Johannesburg Stock Exchange and the Nigerian Stock Exchange**

The 1 week IPO performance was 0.88 times greater in Nigeria than in South Africa.

- **Level of IPO performance and association with the industry, year and the country**

The study found that the industry (sector), year and country FEs were important. The full results are shown in Appendix E, but here some graphs are provided to show i) the IPO performance of different sectors in comparison to agriculture, the base sector (since it takes the lowest value of 1 in the coding), and ii) IPO performance by year. The beta coefficients for columns 4, 8 and 12 for the first day, first week and first month IPO price changes respectively were used.

Figure 4.2**:** Beta coefficients for Sector.

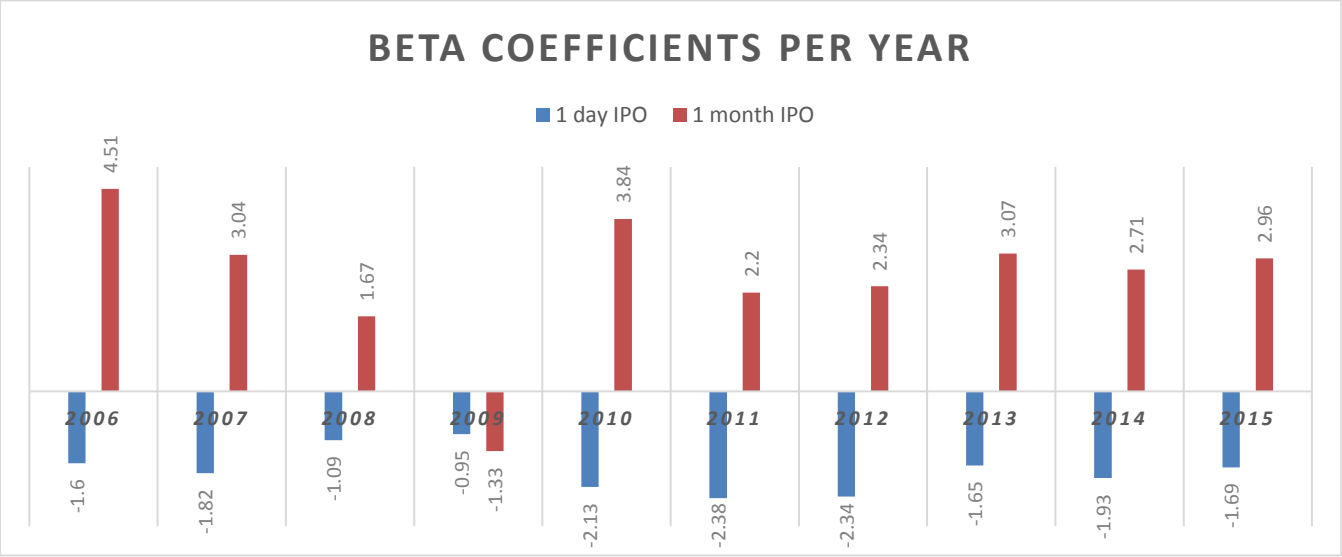


Sources: Author`s compilation

Note: For significance of coefficients refer to Appendix C.

Figure 4.2 highlights the importance of sector. Most of the sectors had higher beta coefficients (higher IPO performance) than agriculture (base sector), with the exception of the dining and lodging and transportation sectors.

Figure 4.3**:** Beta coefficients for Year



Sources: Author`s compilation

Note: For significance of coefficients refer to Appendix D: first week IPO coefficients are not shown because none were statistically significant.

Figure 4.3 shows that the first day IPO performance for all the years was persistently lower than the 2005 base performance. On the other hand, the first month IPO performance was persistently higher than base year for all the years (save for 2009). Thus, year was an important variable in determining IPO performance. In addition, based on figure 4.3, there was a gradual drop in IPO performance from the year 2007 to 2009. This was the time of the housing bubble that affected the stock market as few investors were able to trade on the stock market. The year 2009 was hit hard by economic events as the collapse of Lehman Brothers added to the financial crisis (Seshan, 2009). There was a sharp decline of IPO performance in 2009 but in 2010 IPO performance began to recover. It can therefore be assumed that economic events contributed to the level of IPO performance. After the year 2010, based on figure 4.3, a steady level in IPO performance was maintained.

- **Relationship between IPO performance and macroeconomic variables in South Africa and Nigeria**

The study established that while inflation and interest rates were positively correlated with first month post-price performance, GDP growth was statistically insignificant. It was also found that in both Nigeria and South Africa, the first week price change was influenced by the country FEs; the first week price change was higher in Nigeria than in South Africa.

4.6 CHAPTER SUMMARY

Literature review-based hypotheses and objectives set out in chapter 1 were tested in this chapter by using OLS regression model. The three hypotheses tested were:

Hypothesis 1: there is a relationship between the country of listing and the overall performance of IPOs; Hypothesis (2): macroeconomic variables determine IPO performance; and Hypothesis (3): there is a relationship between the industry of listing and the overall performance of IPOs. At the 1% significance level, inflation and interest rates were found to be significant while GDP growth was not statistically significant on either the JSE or the NSE. Most of the sectors had higher beta coefficients (higher IPO performance) than agriculture (base sector), with the exception of the dining and lodging and transportation sectors.

Chapter 5 concludes the discussion of the study findings.

CHAPTER FIVE: CONCLUSION, RECOMMENDATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

5.1 INTRODUCTION

5.1.1 AN INTRODUCTION TO SUMMARY CONCLUSION OF THE STUDY.

The key objective of this study was to evaluate the performance of IPOs on the JSE and the NSE, and to determine the impact that macroeconomics has on their performance. Using daily share price data, this was achieved by computing initial returns using the market adjusted return and regression model. The study investigated IPO performance for shares listed on the NSE and JSE during the period 2005–2015, by industry and listing year. A sample of 91 and 19 IPOs from this period listed on the JSE and NSE respectively was used to compute the initial returns after the first day, week and month of trade. This chapter provides a summary of the results of the event study model, OLS regression model and their interpretation.

Investigating the performance of JSE and NSE IPOs is relevant for theory, practice and future study. Firstly, this chapter summarises the empirical findings that were obtained, as discussed in chapter 4. These findings might also inform the monitoring and regulation of stock exchange trading. Secondly, from an investor`s perspective, the results of the study are relevant as they provide investors and researchers with information regarding the performance of IPOs in general, and on JSE and NSE in particular. Thirdly, from the issuing firm's point of view, the study findings will enlighten firms on various aspects of profit making when trading, such as timing of trading, risk, return, importance of market feedback and signalling.

Section 5.2 provides an overview of the empirical findings. Section 5.3 discusses the contribution of the study to existing knowledge and the initial performance of IPOs. Section 5.4 discusses the limitations of the study. Recommendations are provided in section 5.5 and suggestions for future study are presented in section 5.6. Section 5.7 summarises the chapter and the study.

5.2 DISCUSSION OF EMPIRICAL FINDINGS

This section discusses the outcomes of the analysis of IPO performance on the JSE and the NSE for the years 2005 to 2015, based on the mean market adjusted return

and the OLS regression model. This section also provides an interpretation of the findings.

5.2.1 UNDER-PRICING

Based on the results of the empirical study, it was established that IPOs listed on the JSE and NSE were under-priced, as observed in table 5.1.

Table 5.1: Findings from analysis of JSE and NSE.

	JSE			NSE		
	Raw Return	MAAR	WR	Raw Return	MAAR	WR
1st day of trade	0.16	13.16	1.16	0.13		
1st week of trade	0.18	20.88	1.18	0.20	14.30	1.16
1st month of trade	0.19	23.14	1.20	0.38	28.81	1.43

Using 91 IPOs listed on the JSE and 19 listed on the NSE between 2005 and 2015, the study compared IPO price performance for the first day, first week and first month of trade. The findings supported the hypothesis that IPOs were on average under-priced. These results were consistent with those of Alagidede and Van Heerden (2012), Mashaba (2014), Neneh and Smit (2013), Achua (2011) and Adjasi, Fiawoyife and Osei (2012). Therefore, this established that the under-pricing phenomenon occurred on the JSE and NSE. The interpretation of this result was that investors could earn abnormally large first month returns by investing on the JSE and on the NSE. A possible explanation for an average under-pricing could be the market feedback hypothesis, which states that companies are motivated to under-price IPOs, anticipating more market information (Ritter, 2003). In addition, there was evidence of market efficiency as there were differences between mean market adjusted returns for the first day, first week and first month of trade.

The industry analysis also showed that the highest initial return was obtained in the defence sector on the JSE and the lowest initial return was recorded for the computer and electronics sector. The results indicated that, on average, the food and beverage sector recorded the highest initial return while the lowest return was in the oil and gas sector on the NSE. From an investor’s point of view, the findings confirm that investors

or potential investors could take advantage by investing in IPOs in the defence and food and beverage sectors.

5.2.2 IPO PERFORMANCE AND MACROECONOMICS

This study went beyond the original measurement techniques of IPO under-pricing by exploring the relationship between macroeconomic variables such as GDP growth, inflation and interest rates and IPO performance. The findings suggested that macroeconomic variables affected the first month post-IPO prices. First month post-price of IPOs were positively correlated with interest rates and inflation whereas GDP growth was statistically insignificant. IPO price changes were inversely affected by inflation in Nigeria and South Africa. However, this was to be expected given that the interest rates and inflation data used in this study had an annual temporal regularity, thus affecting the degree to which correlations with daily price changes could be relied upon because the latter were too short-term.

Based on the findings, it was determined that the first week price change was influenced by the country FEs, and that the first week price change was higher in Nigeria than South Africa. After controlling for macroeconomic factors, the country variable for Nigerian first day changes in IPO remained statistically insignificant. However, it increased to 0.17 and 0.54 for first week and first month changes in IPO respectively. These results still confirmed the high volatility of IPO prices on the NSE in comparison to the JSE. The macroeconomic indicators were statistically insignificant, meaning that country FEs and the macroeconomic indicators did not explain first day IPO price changes in Nigeria or in South Africa.

The study established that the industry (sector), year and country FEs were important. Most of the sectors had higher beta coefficients (higher IPO performance) than agriculture (the base sector), with the exception of the dining and lodging and transportation sectors. First day IPO performance for all the years was lower than the 2005 base performance, while first month IPO performance was persistently higher for all the years in comparison to the base year. Thus, year was an important variable in determining IPO performance.

5.3 CONTRIBUTION OF THE STUDY

This section discusses the contribution to existing knowledge made by the current study. It covers both the methodological and the literature-based contribution to existing knowledge.

5.3.1 METHODOLOGICAL CONTRIBUTION TO EXISTING KNOWLEDGE

Empirical studies that have analysed IPO performance in emerging markets such as those by Mashaba (2014), Neneh and Smit (2013) and Muller (2009) did not factor in the impact of market economic indicators such as GDP, CPI and the exchange rate. These researchers analysed IPO performance, making use of different frameworks but disregarding the impact of economic indicators. This study carried out a linear OLS regression to undertake a comparative analysis of how macroeconomic factors affect IPO performance in South Africa and Nigeria. The contribution to existing knowledge of this study arises from the fact that it factors in the abovementioned economic indicators, as they play a significant role in the development and improvement of IPO performance. Moreover, Mashaba (2014), Neneh and Smit (2013) and Muller (2009) did not compare any countries in any emerging market. The comparison of two or more countries in any market reveals factors that affect IPO performance. Each country has its own GDP, CPI and exchange rate to the dollar just as it has its own stock market where IPOs are traded. A factor affecting a certain stock market in an emerging country will not necessarily affect another country in the same emerging market. The current study used a comparison of two powerhouse countries in Africa, something which had not been done by other researchers.

In addition, the study used the wealth relative measure as an added technique to evaluate IPO performance. This measure indicates whether IPOs are under-performing. Studies by Lattimer (2006) and Muller (2009) evaluated IPO performance but did not embrace the use of this model. The contribution of the current study is that it made use of the wealth relative to obtain an unbiased and correct analysis of IPO performance.

5.3.2 CONTRIBUTION TO EXISTING KNOWLEDGE

In the context of the JSE and NSE, this study has made unique contributions. Firstly, it has provided a comparative analysis of IPOs listed on the JSE and NSE, which are considered to be in an emerging market. Secondly, although prior study has identified a relationship between IPO performance and economic growth, this topic has been revisited from a novel perspective and highlights the impact of macroeconomic indicators on IPO performance. This study gives insight into the dynamics and influence of economic indicators such as GDP, inflation, currency rates and interest rates on the stock market.

Thirdly, results obtained suggest that IPOs listed in different countries and industries are affected differently by the economies that they fall under, which reveals that geographic location is plays a pivotal role in IPO performance.

5.4 LIMITATIONS OF STUDY

Although the current study presents several interesting findings, possible limitations are noted in this section. The following limitations were evident during the study:

- The study only compared two stock markets in Africa, but no international stock markets that could be benchmarked.
- The only indices used in this study were the JSE All Share Index and the NSE All Share Index.
- A small number of NSE IPOs were considered. An enhanced study could be performed with more IPOs listed as OLS regression perform better given that the sample size is greater than 30.
- GDP, inflation and interest rates were the only macroeconomic variables that were used in this study and other variables such as unemployment, monetary policy and wages were disregarded.
- Previous studies on IPO performance such as those by Aggarwal and Conroy (2000) and Edwards and Hanley (2010) calculated IPO returns based on the transactions taking place at different time intervals on the first day of trade. However, the current study analysed IPO returns only for the first day, first week

and first month of trade, which provided a satisfactory but not in-depth evaluation.

5.5 RECOMMENDATIONS

The significance of investigating the performance of IPOs is that such information is relevant to theory, practice and future study. From an investor's standpoint, the outcomes of the study are relevant as they provide investors and researchers with evidence concerning the performance of IPOs in general and in South Africa and Nigeria in particular. These results not only provide an evaluation of the returns of IPOs but may also assist investors in making decisions about the timing of selling and buying shares in order to optimise the return on their investments. More investors and potential investors would be attracted to African countries if a positive return was ensured.

This study has established that stockholders and potential investors ought to purchase IPO shares at the list price before the first month of trade has ended if they are to realise initial abnormal returns when trading on the JSE. Furthermore, initial investors who wish to trade on the NSE may earn higher returns if they also trade in the first month of IPO listing. However, this tactic should not overshadow investment analysis techniques prior to decision-making.

Market economic indicator analysis can assist investors in identifying the significant determinants in IPO performance. These are most useful as they raise red flags with regard to investment strategies. In addition, investors could benefit from this study as the results obtained from the industrial sector and year analysis could assist them by providing relevant investment information on the sectors they should invest in.

In addition, the outcomes of the study may assist policy makers in the construction and execution of policies associated with share pricing as well as in monitoring and regulating stock exchange trading. These findings could also assist government in making policies, rules and regulations concerning securities trading. This would safeguard investors and attract more investments, encouraging the growth of the economy.

5.6 SUGGESTIONS FOR FURTHER RESEARCH

IPO activity has become an important element of the economy in emerging markets such as Africa. Opportunities for future study have been offered as several questions have been left unanswered. What is the relationship between IPO performance and other macroeconomic indicators that are not discussed in this study, such as unemployment, price stability, market inefficiency and monetary policy? What is the relationship between IPO price performance and economic growth?

IPO performance forecasting has received very little attention in the literature on IPOs as most studies have dwelt on historical trends. Forecasting of IPO performance is vital for all stock market stakeholders as it provides information pertaining to investment analysis and decision-making. Various approaches such as multiple regressions can be used to compute and analyse IPO performance. Further analysis of IPO forecasting is thus suggested.

An evaluation of first day returns using transaction-based returns at different time intervals such as every 10 or 20 minutes could also be performed. Such an analysis would be useful in determining whether IPO investors can take advantage of under-pricing gains on the first day of trade.

This study found that IPO market performance was sensitive to the country of listing. Therefore, an in-depth comparison of short-run and long-run IPO performance in emerging markets would be useful, making use of different estimation techniques such as Treynor and Sharpe measures. These measures take into account risk adjusted performance. An in-depth comparison of stock markets in an emerging market should include IPO price formation and issuer operating performance.

5.7 CHAPTER SUMMARY

This chapter closes this study on the comparative analysis of IPO performance on the JSE and NSE and the effects of macroeconomics. Empirical study (Chapter 4) was used to reach conclusions in this study. This chapter focused on a discussion of the empirical findings, the study's contribution to this field and its limitations, and made recommendations and suggestions for future study. Research questions and objectives stated in Chapter 1 were answered.

IPOs on the JSE and NSE were significantly under-priced in the first month of trade. Behavioural theories such as signalling, the market feedback hypothesis and the efficient market theory are possible explanations for the under-pricing of IPOs on the JSE and NSE. This chapter identified factors such as country of listing, year of listing, sector and macroeconomics as extreme indicators of IPO price performance.

When choosing investment opportunities, investors are advised to consider the factors that affect IPO performance that have been identified in this study. These factors and variables can be used to improve the IPO selection process. Factors such as geographic location, interest rates, inflation and industry should be considered prior to and during IPO investment decision-making. The identification of the impact of macroeconomics on IPO performance was the major contribution of this study.

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APPENDIX

Appendix A: JSE IPO listing 2005-2015

Announcement Date	Pricing Date	Ticker Symbol	Company	Deal General Industry Group (GIG)
23/01/2006	03/02/2006	HPAJ	Hospitality Property Fund Ltd	Real Estate/Property
10/03/2006	17/03/2006	ELDJ	Eland Platinum Holdings Ltd	Mining
19/02/2007	19/02/2007	RARJ	Rare Holdings Ltd	Machinery
21/02/2007	22/02/2007	AETJ	Alert Steel Holdings Ltd	Construction/Building
08/02/2007	28/02/2007	SOH	South Ocean Holdings Ltd	Computers & Electronics
12/03/2007	12/03/2007	TLMJ	TeleMasters Holdings Ltd	Telecommunications
02/03/2007	20/03/2007	RBXJ	Raubex Group Ltd	Construction/Building
12/03/2007	28/03/2007	KELJ	Kelly Group Ltd	Professional Services
16/04/2007	25/04/2007	CBHJ	Country Bird Holdings Ltd	Agribusiness
24/05/2007	01/06/2007	ANS	ANSYS Ltd	Defense
07/06/2007	07/06/2007	IWEJ	Interwaste Holdings Ltd	Utility & Energy
15/06/2007	15/06/2007	FPFJ	Finbond Property Finance Ltd	Finance
28/06/2007	28/06/2007	WTLJ	William Tell Holdings Proprietary Ltd	Construction/Building
27/06/2007	29/06/2007	BWIJ	BWI - B & W Instrumentation & Electrical Ltd	Construction/Building
16/07/2007	17/07/2007	KGHJ	Kagisano Group Holdings Ltd	Finance
16/07/2007	23/07/2007	IRAJ	Infrasors Holding Ltd	Construction/Building
25/07/2007	26/07/2007	SFB	Stefanutti & Bressan Holdings Ltd	Construction/Building
26/07/2007	31/07/2007	BIKJ	Brikor Ltd	Construction/Building
25/07/2007	01/08/2007	HUGJ	Huge Group Ltd	Telecommunications
26/07/2007	02/08/2007	IQG	Iquad Group Ltd	Finance
27/07/2007	06/08/2007	PKHJ	Protech Khuthele Holdings Ltd	Construction/Building
07/08/2007	08/08/2007	ABUJ	ABE Construction Chemicals (Pty) Ltd	Construction/Building
06/08/2007	13/08/2007	1TMJ	1time Holdings Ltd	Transportation
14/08/2007	21/08/2007	PLCJ	Placecol Holdings Ltd	Professional Services
28/08/2007	05/09/2007	ELIJ	Ellies Holdings Ltd	Consumer Products
11/09/2007	12/09/2007	RBAJ	RBA Holdings Ltd	Professional Services

14/09/2007	28/09/2007	HWWJ	Hardware Warehouse Ltd	Construction/Building
12/09/2007	03/10/2007	CFOJ	Country Foods Ltd	Food & Beverage
01/10/2007	04/10/2007	ABKJ	African Brick Centre (Pty) Ltd	Construction/Building
01/10/2007	16/10/2007	RACJ	RACEC Group Ltd	Construction/Building
23/10/2007	31/10/2007	SFHJ	SA French Ltd	Construction/Building
17/10/2007	31/10/2007	KWS	Kwikspace Modular Buildings Ltd	Construction/Building
27/09/2007	01/11/2007	CRND	Central Rand Gold Ltd	Mining
05/11/2007	05/11/2007	CSPJ	Chemspec - Chemical Specialities ltd	Chemicals
29/10/2007	05/11/2007	DTHJ	DVT - Dynamic Visual Technologies Holdings Ltd	Professional Services
24/10/2007	07/11/2007	ARHJ	ARB Holdings Ltd	Computers & Electronics
26/10/2007	08/11/2007	BLUJ	Blue Label Telecoms Ltd	Telecommunications
25/10/2007	14/11/2007	CGRJ	Calgro M3 Holdings	Construction/Building
07/11/2007	14/11/2007	MZRJ	Mazor Group Ltd	Metal & Steel
06/11/2007	20/11/2007	TWPJ	TWP Holdings (Pty) Ltd	Construction/Building
21/11/2007	21/11/2007	OLIJ	O-Line Holdings Ltd	Computers & Electronics
16/11/2007	22/11/2007	BWKJ	BWK - BUILDWORKS GROUP LIMITED	Construction/Building
19/11/2007	26/11/2007	CCIJ	CIC Holdings Ltd	Chemicals
29/11/2000	03/12/2007	ERBJ	Erbacon Investment Holdings Ltd	Holding Companies
28/02/2007	07/03/2008	ISBJ	Insimbi Refractory & Alloys Supplies Ltd	Metal & Steel
26/03/2008	07/04/2008	TCSJ	Total Client Services Ltd	Computers & Electronics
15/04/2008	15/04/2008	KEHJ	Keaton Energy Holdings Ltd	Mining
26/06/2008	30/06/2008	POYJ	Poynting Holdings (Pty) Ltd	Telecommunications
01/02/2010	24/03/2010	OPT	Optimum Coal Holdings Ltd	Mining
26/02/2010	01/04/2010	WIL	Wilderness Holdings Ltd	Professional Services
15/03/2010	07/04/2010	RGT	RGT Smart Market Intelligence Ltd	Professional Services
18/05/2010	04/06/2010	LHC	Life Healthcare Group Holdings Ltd	Healthcare
20/09/2010	03/11/2010	RBP	Royal Bafokeng Platinum Ltd	Mining
01/11/2010	16/11/2010	VIF	Vividend Income Fund Ltd - VIF	Real Estate/Property
17/11/2010	09/12/2010	CLR	Clover Industries Ltd	Food & Beverage

18/03/2011	06/04/2011	IPF	Investec Property Fund Ltd	Real Estate/Property
06/10/2010	12/05/2011	REB	Rebosis Property Fund Ltd	Real Estate/Property
13/06/2011	12/07/2011	HSP	Holdsport Ltd	Consumer Products
18/07/2011	05/08/2011		Vunani Property Investment Fund Ltd	Real Estate/Property
28/07/2011	12/08/2011	DIA	Dipula Income Fund Ltd	Real Estate/Property
21/05/2012	31/05/2012	TCP	Transaction Capital Pty Ltd	Finance
18/07/2012	23/07/2012	ROC	Rockcastle Global Real Estate Co Ltd	Real Estate/Property
23/10/2012	31/10/2012	DLT	Delta Property Fund Ltd	Real Estate/Property
09/12/2012	13/12/2012	MDI	Master Drilling Group Ltd	Mining
04/12/2012	14/12/2012	GAM	Global Asset Management Ltd (SA)	Finance
12/07/2013	17/07/2013	TWR	Tower Property Fund Ltd	Real Estate/Property
04/10/2013	08/10/2013	ATT	Attacq Ltd	Real Estate/Property
30/09/2013	14/10/2013	IAP	Investec Australia Property Fund Ltd	Real Estate/Property
18/10/2013	21/11/2013	ASC	Ascendis Health Ltd	Healthcare
11/02/2014	07/04/2014	SAR	Safari Investments RSA Ltd	Real Estate/Property
24/03/2014	08/04/2014	THA	Tharisa plc	Mining
27/03/2014	23/04/2014	AVL	Advanced Health Ltd	Healthcare
06/06/2014	11/06/2014	EQU	Equites Property Fund Ltd	Real Estate/Property
23/06/2014	17/07/2014	AFH	Alexander Forbes Group Holdings Ltd	Finance
01/09/2014	12/09/2014	ACG	Anchor Group Ltd	Finance
01/09/2014	26/09/2014	RFG	Rhodes Food Group Holdings Ltd	Food & Beverage
25/11/2014	02/12/2014	PIV	Pivotal Fund Ltd	Real Estate/Property
11/12/2014	11/12/2014	CTK	Cartrack Holdings Ltd	Insurance
11/02/2015	16/02/2015	LDO	Lodestone REIT Ltd	Real Estate/Property
18/02/2015	26/03/2015	NVS	Novus Holdings Ltd	Consumer Products
26/05/2015	26/05/2015	NVE	NVest Financial Holdings Ltd	Finance
02/06/2015	02/06/2015	REN	Renergen Ltd	Finance
03/06/2015	10/06/2015	ILU	Indluplace Properties Ltd	Real Estate/Property
22/09/2015	09/10/2015	BWN	Balwin Properties Ltd	Real Estate/Property
01/10/2015	09/10/2015	SYG	Sygnia Ltd	Finance
28/09/2015	12/10/2015	CTA	Capital Appreciation Ltd	Computers & Electronics
06/10/2015	23/10/2015	TRL	Trellidor Holdings Ltd	Construction/Building
12/10/2015	09/11/2015	SSS	Stor-Age Property REIT Ltd	Real Estate/Property

02/11/2015	09/11/2015	GAI	Gaia Infrastructure Capital Ltd	Utility & Energy
04/11/2015	03/12/2015	SERE	Schroder European Real Estate Investment Trust plc	Real Estate/Property

Appendix B: NSE IPO listing 2005-2015

Announcement Date	Pricing Date	Ticker Symbol	Company	Deal General Industry Group (GIG)
23/03/2005	03/05/2005	PRUD	Prudent Bank	Finance
15/04/2005	03/06/2005	GEB	Guardian Express Bank	Finance
31/10/2005	27/11/2006	NAHC	Nigerian Aviation Handling Co plc - NAHCO	Transportation
01/11/2006	08/03/2007	DANG	Dangote Sugar Refinery plc	Food & Beverage
23/07/2007	03/10/2007	SYSH	Skye Shelter Fund	Real Estate/Property
30/08/2007	23/11/2007	DAFM	Dangote Flour Mills plc (pre-2015)	Food & Beverage
12/11/2007	30/11/2007	FIDS	Fidson Healthcare Ltd	Healthcare
07/11/2007	15/12/2007	FTNC	FTN Cocoa Processors Ltd	Food & Beverage
24/12/2007	26/03/2008	CHAMS	Chams Nigeria plc	Computers & Electronics
06/11/2007	10/04/2008	BGCM	BAGCO - Nigerian Bag Manufacturing Co plc	Professional Services
20/02/2008	07/07/2008	DARC	Daar Communications plc	Telecommunications
27/05/2008	14/07/2008	STCP	Starcomms plc	Telecommunications
27/11/2008	14/08/2009	HFM	Honeywell Flour Mills Ltd	Food & Beverage
25/10/2010	26/10/2010	DCP	Dangote Cement plc	Construction/Building
05/02/2013	28/03/2013	UPDC	UPDC Real Estate Investment Trust	Real Estate/Property
11/03/2014	09/04/2014	SEPL	SEPLAT Petroleum Development Co Ltd	Oil & Gas
23/10/2013	11/04/2014		Omoluabi Savings & Loans plc	Finance
08/09/2014	07/01/2015	TRANSCOHOT	Transcorp Hotels plc	Dining & Lodging

Appendix C: Significance of coefficients.

Sector	1 day IPO	1 week IPO	1 month IPO
Chemicals	0.084	0.28	-0.065
Computers & Electronics	0.048	0.067	0.087
Construction/Building	0.38	0.58	0.57
Consumer Products	0.16	0.14	0.33
Defense	0.82	1.12	0.86
Dining & Lodging	0.72	-0.28	-1.09
Finance	0.93	0.93	1.52
Food & Beverage	0.55	0.46	0.95
Healthcare	0.73	0.76	1.06
Holding Companies	0.3	0.99	1.56
Insurance	0.092	0.18	0.98
Machinery	0.77	0.75	0.78
Metal & Steel	0.43	0.52	0.25
Mining	0.41	0.36	0.57
Oil & Gas	0.94	0.55	-0.67
Professional Services	0.3	0.44	0.045
Real Estate/Property	0.53	0.43	0.94
Telecommunications	0.2	0.33	-0.38
Transportation	-0.14	-0.33	-1
Utility & Energy	0.52	0.74	1

■ $p < 0.10$, $p < 0.05$, $p < 0.01$, $p > 0.10$ means statistically significant at 10%, 5% , 1% levels and not statistically significant.

Appendix D: Significance of coefficients.

Year	1 day IPO	1 week IPO	1 month IPO
2006	-1.6	0.57	4.51
2007	-1.82	-0.054	3.04
2008	-1.09	-0.71	1.67
2009	-0.95	-0.65	-1.33
2010	-2.13	-0.072	3.84
2011	-2.38	-0.74	2.2
2012	-2.34	-1.06	2.34
2013	-1.65	-0.27	3.07
2014	-1.93	-0.74	2.71
2015	-1.69	-0.74	2.96

■ $p < 0.10$, $p < 0.05$, $p < 0.01$, $p > 0.10$ means statistically significant at 10%, 5% , 1% levels and not statistically significant.

Appendix E: Nigeria and South Africa Change in IPO

	1	2	3	4	5	6	7	8	9	10	11	12
1.country	0	0	0	0	0	0	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
2.country	0.013	0.044	0.19***	0.11	0.062*	0.17***	0.48***	0.88***	0.31***	0.54***	0.77***	0.50
	(0.029)	(0.043)	(0.051)	(0.246)	(0.036)	(0.053)	(0.064)	(0.299)	(0.051)	(0.075)	(0.093)	(0.471)
econ_growth		-0.014	-1.01	5.37		-0.37	-4.66***	-19.5		-1.23	-3.83**	-6.66
		(0.702)	(0.841)	(11.518)		(0.870)	(1.063)	(14.015)		(1.222)	(1.548)	(22.062)
inf_rate		-0.72	-2.23***	-16.3***		-2.27***	-4.57***	-5.58		-4.57***	-6.21***	28.6**
		(0.555)	(0.564)	(6.057)		(0.688)	(0.713)	(7.370)		(0.967)	(1.039)	(11.602)
int_rate		0.047	0.56***	-2.16*		0.10	0.81***	0.98		0.19	0.94***	8.01***
		(0.190)	(0.183)	(1.232)		(0.236)	(0.232)	(1.499)		(0.331)	(0.337)	(2.360)
1.sector			0	0			0	0			0	0
			(.)	(.)			(.)	(.)			(.)	(.)
2.sector			-0.056	0.084			0.000100	0.28			0.040	-0.065
			(0.244)	(0.180)			(0.308)	(0.219)			(0.449)	(0.345)
3.sector			-0.13	0.048			-0.20	0.067			-0.11	0.087
			(0.107)	(0.109)			(0.135)	(0.133)			(0.197)	(0.209)
4.sector			0.26***	0.38***			0.35***	0.58***			0.31*	0.57***
			(0.096)	(0.088)			(0.122)	(0.107)			(0.177)	(0.168)

5.sector	-0.036	0.16	-0.091	0.14	-0.069	0.33*
	(0.106)	(0.101)	(0.135)	(0.123)	(0.196)	(0.193)
6.sector	0.37***	0.82***	0.50***	1.12***	0.48*	0.86***
	(0.137)	(0.143)	(0.173)	(0.174)	(0.252)	(0.274)
7.sector	-0.27*	0.72**	-0.60***	-0.28	-0.76***	-1.09
	(0.140)	(0.358)	(0.177)	(0.436)	(0.258)	(0.686)
8.sector	0.29***	0.93***	0.18	0.93***	0.36**	1.52***
	(0.099)	(0.110)	(0.125)	(0.133)	(0.182)	(0.210)
9.sector	-0.040	0.55***	-0.12	0.46***	0.063	0.95***
	(0.104)	(0.112)	(0.131)	(0.136)	(0.191)	(0.214)
10.sector	0.036	0.73***	0.024	0.76***	0.43**	1.06***
	(0.107)	(0.095)	(0.135)	(0.115)	(0.197)	(0.182)
11.sector	-0.012	0.30***	-0.027	0.99***	-0.024	1.56***
	(0.130)	(0.111)	(0.165)	(0.135)	(0.240)	(0.213)
12.sector	0.029	0.092	-0.089	0.18	-0.019	0.98***
	(0.129)	(0.120)	(0.163)	(0.146)	(0.238)	(0.230)
13.sector	0.37***	0.77***	0.34**	0.75***	0.38	0.78**
	(0.126)	(0.157)	(0.159)	(0.192)	(0.231)	(0.302)

14.sector	0.0057	0.43***	0.040	0.52***	0.065	0.25
	(0.116)	(0.126)	(0.146)	(0.154)	(0.213)	(0.242)
15.sector	-0.086	0.41***	-0.15	0.36***	-0.090	0.57***
	(0.101)	(0.102)	(0.128)	(0.124)	(0.186)	(0.196)
16.sector	-0.23*	0.94***	-0.37**	0.55	-0.50**	-0.67
	(0.129)	(0.330)	(0.164)	(0.402)	(0.238)	(0.633)
17.sector	-0.070	0.30***	0.12	0.44***	0.076	0.045
	(0.099)	(0.093)	(0.125)	(0.113)	(0.183)	(0.178)
18.sector	0.031	0.53***	-0.10	0.43***	-0.079	0.94***
	(0.099)	(0.104)	(0.125)	(0.127)	(0.182)	(0.199)
19.sector	0.075	0.20*	0.030	0.33**	-0.064	-0.38*
	(0.102)	(0.114)	(0.129)	(0.139)	(0.188)	(0.218)
20.sector	-0.045	-0.14	-0.14	-0.33	0.22	-1.00***
	(0.112)	(0.188)	(0.142)	(0.229)	(0.206)	(0.360)
21.sector	-0.081	0.52***	-0.24	0.74***	-0.12	1.00***
	(0.130)	(0.124)	(0.164)	(0.151)	(0.239)	(0.238)
2005.year		0		0		0
		(.)		(.)		(.)

2006.year	-1.60	0.57	4.51**
	(1.004)	(1.222)	(1.923)
2007.year	-1.82**	-0.054	3.04*
	(0.843)	(1.026)	(1.615)
2008.year	-1.09**	-0.71	1.67*
	(0.482)	(0.587)	(0.924)
2009.year	-0.95	-0.65	-1.33
	(0.590)	(0.718)	(1.130)
2010.year	-2.13***	-0.072	3.84**
	(0.796)	(0.969)	(1.525)
2011.year	-2.38***	-0.74	2.20
	(0.753)	(0.916)	(1.442)
2012.year	-2.34***	-1.06	2.34*
	(0.654)	(0.795)	(1.252)
2013.year	-1.65**	-0.27	3.07**
	(0.673)	(0.819)	(1.289)
2014.year	-1.93***	-0.74	2.71**

	(0.616)	(0.750)	(1.180)
2015.year	-1.69**	-0.74	2.96**
	(0.679)	(0.826)	(1.300)
1.month	0	0	0
	(.)	(.)	(.)
2.month	-0.38***	0.10	0.35**
	(0.084)	(0.102)	(0.161)
3.month	-0.23***	0.29***	0.81***
	(0.065)	(0.079)	(0.125)
4.month	-0.012	0.55***	0.81***
	(0.062)	(0.075)	(0.119)
5.month	-0.25***	0.052	0.29**
	(0.070)	(0.086)	(0.135)
6.month	-0.48***	-0.33***	-0.0099
	(0.060)	(0.073)	(0.115)
7.month	0.099	0.47***	0.80***
	(0.072)	(0.088)	(0.138)
8.month	-0.09	0.16	0.83***

	8		
	(0.079)	(0.096)	(0.151)
9.month	-0.24***	0.17**	0.12
	(0.062)	(0.076)	(0.120)
10.month	-0.20***	0.31***	0.40***
	(0.062)	(0.075)	(0.118)
11.month	-0.13**	0.077	0.59***
	(0.058)	(0.070)	(0.111)
12.month	0	0	0
	(.)	(.)	(.)
1.month_time	0	0	0
	(.)	(.)	(.)
2.month_time	-0.060	-0.21	-0.38
	(0.139)	(0.169)	(0.267)
3.month_time	-0.024	-0.26**	-0.44**
	(0.101)	(0.123)	(0.193)
1.day	0	0	0
	(.)	(.)	(.)
2.day	-0.21**	-0.043	-0.37*
	(0.099)	(0.120)	(0.189)

3.day	-0.34***	-0.73***	-1.22***
	(0.098)	(0.119)	(0.187)
4.day	-0.16	-0.54***	-0.75***
	(0.102)	(0.124)	(0.195)
5.day	-0.047	-0.063	-0.12
	(0.088)	(0.106)	(0.168)
6.day	0.43***	0.36*	0.19
	(0.161)	(0.196)	(0.308)
7.day	-0.23**	-0.14	-0.70***
	(0.101)	(0.123)	(0.194)
8.day	-0.37***	-0.71***	-0.68***
	(0.090)	(0.109)	(0.172)
9.day	-0.59***	-0.74***	-0.82***
	(0.105)	(0.127)	(0.200)
10.day	-0.29*	-0.14	-0.067
	(0.149)	(0.181)	(0.286)
11.day	0.28**	0.40***	0.037

	(0.126)	(0.153)	(0.241)
12.day	0.15	0.17	0.79***
	(0.123)	(0.150)	(0.236)
13.day	0.30	0.64***	0.99***
	(0.183)	(0.222)	(0.350)
14.day	-0.26**	-0.027	-0.15
	(0.115)	(0.140)	(0.221)
15.day	-0.29**	0.011	-0.69***
	(0.120)	(0.146)	(0.229)
16.day	0.13	0.29**	0.19
	(0.108)	(0.132)	(0.208)
17.day	-0.78***	-0.81***	-1.24***
	(0.127)	(0.154)	(0.243)
19.day	0	0	0
	(.)	(.)	(.)
20.day	0	0	0
	(.)	(.)	(.)
21.day	-0.67***	-0.57***	-0.54***
	(0.080)	(0.097)	(0.153)
22.day	0.22***	0.38***	0.39***

				(0.067)				(0.082)				(0.129)
23.day				-0.32***				-0.40***				0.31***
				(0.056)				(0.069)				(0.108)
24.day				-0.19**				-0.72***				-0.85***
				(0.095)				(0.115)				(0.182)
25.day				0				0				0
				(.)				(.)				(.)
26.day				0.041				0.050				0.19
				(0.075)				(0.091)				(0.144)
27.day				0				0				0
				(.)				(.)				(.)
28.day				-0.065				-0.16*				0.10
				(0.070)				(0.085)				(0.134)
29.day				0.89***				1.34***				1.05***
				(0.085)				(0.103)				(0.163)
30.day				0.47***				0.97***				1.07***
				(0.128)				(0.156)				(0.245)
31.day				0				0				0
				(.)				(.)				(.)
_cons	0.16***	0.20***	0.23**	2.72***	0.19***	0.33***	0.55***	1.16	0.17***	0.47***	0.52**	-5.16***
	(0.013)	(0.047)	(0.112)	(0.984)	(0.016)	(0.058)	(0.141)	(1.197)	(0.023)	(0.082)	(0.206)	(1.885)

N	537	537	537	537	537	537	537	537	537	537	537	537
R^2	0.000	0.005	0.295	0.782	0.006	0.031	0.286	0.795	0.063	0.111	0.297	0.764

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$