



UNIVERSITEIT VAN PRETORIA  
UNIVERSITY OF PRETORIA  
YUNIBESITHI YA PRETORIA

**Gordon Institute  
of Business Science**  
University of Pretoria

**The impact of return on equity and dividend payout ratios on stock returns in  
emerging financial markets in South Africa and Nigeria**

**Sunil Ramkillawan**

Student number: 13397665

A research project submitted to the Gordon Institute of Business Science, University of Pretoria, in partial fulfilment of the requirements for the degree of Master of Business Administration.

**9 November 2014**

## **ABSTRACT**

The field of stock returns and assessing stock returns utilising financial ratios has attracted substantial interest from various stakeholders. In terms of previous research, the role of financial ratios on stock returns has been based on studies in developed markets, with limited research in emerging markets. This research study provides an understanding of two specific financial ratios, namely the Return on Equity (ROE) and Dividend Payout (DPO) ratios and their impact on annual stock returns (ASR) in emerging stock markets in South Africa and Nigeria. A longitudinal analysis was performed from 2000 to 2013 for companies listed on the JSE Top 40 Index and from 2006 to 2013 for companies listed on the NSE 50 Index.

The tests between the mean ROE and the mean ASR for companies listed on the JSE Top 40 Index revealed a significant positive correlation. The conclusions drawn from the relationship between the mean ROE and the mean ASR for companies listed on the NSE 50 Index and both the relationships between the mean DPO and the Mean ASR for both companies listed on the JSE top 40 Index and the NSE 50 Index was inconclusive.

## **KEYWORDS**

Return on equity, dividend payout ratios, stock returns, emerging markets, JSE Top 40 Index, NSE 50 Index

# DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to perform this research.

---

**Sunil Ramkillawan**

**9 November 2014**

# ACKNOWLEDGEMENTS

It is with a deep sense of gratitude and appreciation that I would like to acknowledge the following people for contributing to my success and to the success of this research study:

- I. To my wife, Vashnie: Your selfless sacrifice, guidance, support and love in all my endeavours, and for always encouraging me to be the best that I can be. These words cannot express the appreciation and love that I have for you;
- II. To my two daughters, Shresta and Sreya: Thank you for your understanding and patience during my long periods of absence during the past two years. I love the both of you very much. God has really blessed me;
- III. To my parents: Thank you for your love and guidance and for giving me the opportunity to further my studies. You've taught me anyone can take certain things away from you, but no-one can take away your education;
- IV. To my supervisor, Wanya Du Preez: Thank you for your assistance, insight and attention to detail in the drafting of this research report;
- V. To my fellow MBA colleague's and the management and staff of GIBS: Thank you for the camaraderie and for sharing your wealth of knowledge with me;
- VI. Last but not least, I would like to thank the Lord for guiding me and keeping me safe in all of life's journeys. I am truly blessed, and I am eternally grateful.

# TABLE OF CONTENTS

<b>ABSTRACT .....</b>	<b>I</b>
<b>KEYWORDS .....</b>	<b>I</b>
<b>DECLARATION .....</b>	<b>II</b>
<b>ACKNOWLEDGEMENTS .....</b>	<b>III</b>
<b>LIST OF TABLES .....</b>	<b>VI</b>
<b>LIST OF FIGURES.....</b>	<b>VII</b>
<b>CHAPTER 1: INTRODUCTION TO THE RESEARCH PROBLEM .....</b>	<b>1</b>
1.1 Research Title .....	1
1.2 Definitions.....	1
1.3 Introduction.....	1
1.4 Research Problem .....	6
1.5 Research Aim .....	7
<b>CHAPTER 2: LITERATURE REVIEW .....</b>	<b>9</b>
2.1 Introduction.....	9
2.2 General Factors Affecting Stock Returns .....	9
2.2.1 Financial Performance .....	10
2.2.2 Country popularity and sentiment .....	10
2.2.3 Institutional ownership.....	10
2.2.4 Foreign shareholders .....	11
2.3 The Impact of Return on Equity (ROE) Ratios on Stock Returns .....	11
2.3.1 Description of the DPI formula .....	12
2.3.2 Description of the formula for EPS and NAVPS.....	12
2.3.3 Profit Margin .....	12
2.3.4 Total Asset Turnover .....	13
2.3.5 Equity Multiplier .....	14
2.4 The Impact of Dividend Payout Ratios (DPO) on Stock Returns .....	15
2.5 Share Price Returns .....	17
2.6 Emerging Financial Markets in Africa.....	17
2.7 Conclusion.....	19
<b>CHAPTER 3: RESEARCH HYPOTHESES.....</b>	<b>20</b>
3.1 Hypotheses.....	20
3.2 Hypothesis 1.....	20
3.3 Hypothesis 2.....	21
3.4 Hypothesis 3.....	21
3.5 Hypothesis 4.....	21

<b>CHAPTER 4: RESEARCH METHODOLOGY.....</b>	<b>22</b>
4.1 Research Design and Approach .....	22
4.2 Unit of Analysis .....	24
4.3 Population.....	24
4.4 Sampling method.....	25
4.5 Data collection .....	26
4.6 Data Analysis.....	26
4.7 Research Limitations .....	29
4.8 Conclusion.....	29
<b>CHAPTER 5: RESULTS .....</b>	<b>31</b>
5.1 Overview .....	31
5.2 Selected Indices .....	32
5.2.1 JSE Top 40 Index.....	32
5.2.2 NSE 50 Index .....	34
5.3 Descriptive Statistics.....	35
5.3.1 JSE Top 40 Index.....	35
5.3.2 NSE 50 Index .....	36
5.4 Annual Stock Returns (ASRs) for the selected samples.....	37
5.4.1 JSE Top 40 Index: Selected Sample (excluding outliers).....	37
5.4.2 NSE 50 Index: Selected Sample (excluding outliers) .....	38
5.5 Hypothesis 1.....	39
5.6 Hypothesis 2.....	43
5.7 Hypothesis 3.....	47
5.8 Hypothesis 4.....	50
5.9 Conclusion of findings presented .....	54
<b>CHAPTER 6: DISCUSSION OF RESULTS .....</b>	<b>55</b>
6.1 Overview .....	55
6.2 Hypothesis 1.....	55
6.3 Hypothesis 2.....	57
6.4 Hypothesis 3.....	59
6.5 Hypothesis 4.....	61
6.6 Conclusion.....	62
<b>CHAPTER 7: CONCLUSION.....</b>	<b>64</b>
7.1 Concluding remarks.....	64
7.1.1 Hypothesis 1.....	65
7.1.2 Hypothesis 2.....	65
7.1.3 Hypothesis 3.....	66

7.1.4	Hypothesis 4.....	66
7.2	Limitations of the research study .....	67
7.3	Recommendations.....	67
<b>REFERENCES.....</b>		<b>69</b>
<b>APPENDICES.....</b>		<b>74</b>

## LIST OF TABLES

Table 1:	Lists of major African stock exchanges.....	2
Table 2:	Overview of the data collection and analysis process.....	32
Table 3:	The 29 companies that were selected from the full base of 40 companies of the JSE Top 40 Index.....	33
Table 4:	10 companies were selected from the full base of 50 companies of the NSE 34	
Table 5:	Summary of descriptive statistics for the 29 selected companies on the JSE Top 40 Index .....	35
Table 6:	Summary of descriptive statistics for the 10 selected companies on the NSE 50 Index .....	36

# LIST OF FIGURES

Figure 1: Graphical representation of the respective country weightings according to the MSCI Emerging Frontier Markets Africa Index (2014).....	3
Figure 2: Graphical representation of the respective country weightings according to the MSCI World Index (2014) .....	4
Figure 3: Annual market capitalisation of the world compared to the market capitalisation of the South African JSE according to The World Bank (2013) market capitalisation report .....	5
Figure 4: Annual market capitalisation of the world compared to the market capitalisation of the Nigerian Stock Exchange according to The World Bank (2013) market capitalisation report .....	6
Figure 5: Autocorrelation test: Mean ASR's of the selected sample from the JSE Top 40 Index .....	38
Figure 6 Autocorrelation test: Mean ASRs of the selected sample from the NSE 50 Index .....	39
Figure 7: Mean DPOs and mean ASRs for the selected sample from the JSE Top 40 Index .....	40
Figure 8: Autocorrelation test: Mean DPOs of the selected sample from the JSE Top 40 Index .....	41
Figure 9: Cross-correlation test: Mean DPOs with the Mean ASRs of the selected sample from the JSE Top 40 Index.....	42
Figure 10: Mean ROEs and mean ASRs for the selected sample from the JSE Top 40 Index .....	43
Figure 11: Autocorrelation test: Mean ROEs of the selected sample from the JSE Top 40 Index .....	44
Figure 12: Differenced autocorrelation test: Mean ROEs of the selected sample from the JSE Top 40 Index.....	45
Figure 13: Cross-correlation test: Mean ROEs with the Mean ASRs of the selected sample from the JSE Top 40 Index.....	46
Figure 14: Mean DPOs and mean ASRs for the selected sample from the NSE 50 Index .....	48
Figure 15: Autocorrelation test: Mean DPOs of the selected sample from the NSE 50 Index .....	49
Figure 16: Cross-correlation test: Mean DPOs with the mean ASRs of the selected sample from the NSE 50 Index.....	50



Figure 17: Mean ROEs and mean ASRs for the selected sample from the NSE 50 Index .....	51
Figure 18: Autocorrelation test: Mean ROEs of the selected sample from the NSE 50 Index .....	52
Figure 19: Cross-correlation test: Mean ROEs with the mean ASRs of the selected sample from the NSE 50 Index.....	53

# **CHAPTER 1: INTRODUCTION TO THE RESEARCH PROBLEM**

## **1.1 Research Title**

The impact of return on equity and dividend payout ratios on stock returns in emerging financial markets in South Africa and Nigeria.

## **1.2 Definitions**

In this research study, the terms *stock* and *share* are used interchangeably and have the same meaning, unless otherwise stated.

## **1.3 Introduction**

The uncertainty in the global economy after the 2008/2009 Global Economic Crisis has created challenges for the sustained recovery of the economies of developed countries, including the potential stock market returns for the future. As such, there is a fresh focus on earning enhanced stock market returns for potential investors who are considering investments in emerging financial markets.

The African Securities Exchanges Association (2014) yearbook includes 20 African stock exchanges. Table 1, below, lists the major stock exchanges in Africa, and includes the number of listed companies per stock exchange that have a market capitalisation in excess of USD50billion in 2013, according to the African Securities Exchanges Association (2014) yearbook.

**Table 1: Lists of major African stock exchanges**

Stock Exchange	Market Cap USD billions	Percentage Market Cap	Number of listed companies	Percentage of listed companies
<b>Johannesburg Stock Exchange</b>	<b>1 102</b>	<b>76%</b>	<b>386</b>	<b>26%</b>
Egyptian Exchange	62	4%	212	15%
<b>Nigerian Stock Exchange</b>	<b>83</b>	<b>6%</b>	<b>190</b>	<b>13%</b>
Botswana Stock Exchange	48	3%	35	2%
Casablanca Stock Exchange	55	4%	76	5%
Other exchanges	109	7%	536	39%
<b>Total</b>	<b>1 459</b>	<b>100%</b>	<b>1 435</b>	<b>100%</b>

Source: *The African Securities Exchanges Association yearbook (2014)*

In terms of the Morgan Stanley Capital International (MSCI) Emerging Frontier Markets Africa Index (2014), the largest emerging market country and the largest new emerging market or frontier market country were selected by market capitalisation per the MSCI Emerging Frontier Markets Africa Index (2014). Respectively, these countries are South Africa and Nigeria and specifically include companies listed on the Johannesburg Stock Exchange (JSE) and the Nigerian Stock Exchange (NSE).

According to the African Securities Exchanges Association (2014) yearbook, the JSE and the NSE comprise 82% of the total market capitalisation of all listed exchanges in Africa. According to the Financial Times (2014), Nigeria's economy is now estimated at \$510bn and is \$163bn larger than South Africa's economy, illustrating Nigeria's rivalry with South Africa, which further serves as a positive story for African countries in terms of growth and investment.

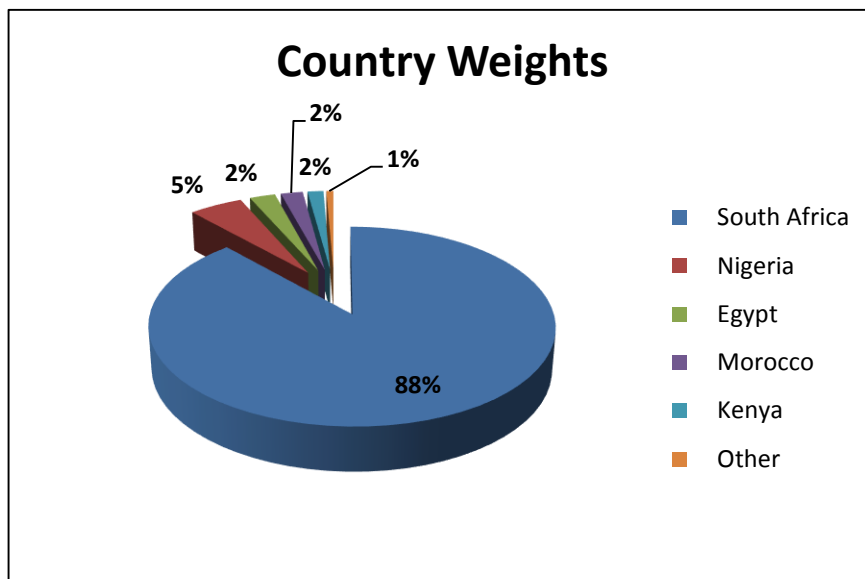
According to the MSCI Emerging Market Index (2014) that includes 21 emerging market countries in the world, only two countries are from Africa, namely South Africa and Egypt.

In comparison to the MSCI Emerging Market Index (2014), the MSCI Emerging Frontier Markets Africa Index (2014) includes seven countries from Africa, namely South Africa, Egypt, Nigeria, Mauritius, Kenya, Morocco and Tunisia. According to the MSCI Emerging Frontier Markets Africa Index (2014), Egypt and South Africa are classified

as emerging markets and the remaining five countries are classified as new emerging markets or frontier markets.

In terms of the definitions of emerging markets and frontier markets, Chan-Lau's (2012) definition and the description provided by the MSCI Frontier Markets Index (2014) are consistent when explaining the differences between emerging markets and frontier markets, in that they concur that frontier markets have limited market accessibility, small company size and low liquidity while emerging markets provide higher levels of openness, investability and operational efficiency of frameworks.

The MSCI Emerging Frontier Markets Africa Index (2014) includes large and midcap companies. South Africa and Nigeria comprise 88% and 5% respectively of the MSCI Emerging Frontier Markets Africa Index (2014) and hold a combined weighting of 93% of the entire MSCI Emerging Frontier Markets Africa Index (2014). In terms of the weightings of the MSCI Emerging Frontier Markets Africa Index (2014), South Africa and Nigeria are the two main emerging market countries within the index.

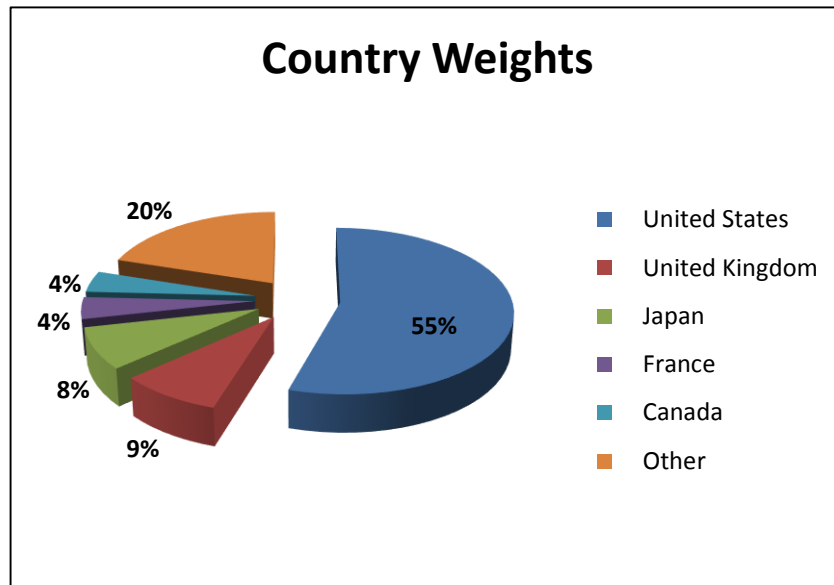


**Figure 1: Graphical representation of the respective country weightings according to the MSCI Emerging Frontier Markets Africa Index (2014).**

According to the MSCI Emerging Frontier Markets Africa Index (2014), the index returned annually for the last ten years, up to 31 March 2014 an average annualised return of 11.9% in USD terms.

In comparison, the MSCI World Index (2014) returned an average annualised return of 7.4% in USD terms over the same period. The MSCI World Index (2014) includes 23 countries from developed markets around the world. The MSCI World Index (2014)

includes large and midcap companies from 23 developed markets The United States (US), the United Kingdom (UK) and Japan constitutes 72% of the MSCI World Index (2014). The MSCI World Index (2014) excludes all emerging market countries and all countries from Africa.



**Figure 2: Graphical representation of the respective country weightings according to the MSCI World Index (2014)**

These indices emphasise the need for assessing stock returns in African stock markets as investors could potentially earn higher yields in these markets. Financial ratios can be utilised as one of the methods available to investors to assess stock returns in financial markets and to enable investors to make informed investment decisions in this regard.

Africa provides the final frontier for investors who seek to earn superior returns. This is supported by the fundamental themes prescribed in the Ernst and Young (2013) survey in that Africa's rise is real and that the foreign direct investment (FDI) numbers do not fully reflect the positive growth story. Essentially, there is great potential for growth and investment on the African continent that is waiting to be unlocked.

According to the Organisation for Economic Co-operation and Development (OECD) (2013), FDI is a crucial element in international economic integration and also serves as a funding source for investments. The requirement of FDI is supported by research from the United Nations Conference on Trade and Development (UNCTAD) (2013), and was confirmed by the fact that FDI to Africa increased by five percent (5%) to \$50 billion in 2012, even as global FDI decreased by 18% in the same year. An increase in

FDI results in an increase in economic activity and economic growth with the potential increase in profitability for companies in Africa. South Africa and Nigeria were amongst the top five recipients in Africa of FDI inflows in 2012 according to the United Nations Conference on Trade and Development (2013). The increased profitability of companies operating in Africa should translate to an increase in the respective companies' stock prices and stock returns from these companies.

It can be deduced that Africa is an investment hub and provides the final frontier for investors to earn superior returns by acquiring interests in listed stocks on the stock exchanges on the African continent. In order to assess and evaluate which stocks to invest in, investors could utilise financial ratios as one of the indicators to assess the impact of financial ratios on stock returns in emerging financial markets in Africa.

It is important to consider the effect of the 2008/2009 Global Financial Crisis on the market capitalisation of the listed exchanges of the world compared to the JSE and the NSE. The figures below present the world market capitalisation compared to the market capitalisation of the JSE and the NSE from 2000 to 2013 according to The World Bank (2013) market capitalisation report.



**Figure 3: Annual market capitalisation of the world compared to the market capitalisation of the South African JSE according to The World Bank (2013) market capitalisation report**

The JSE market capitalisation reached its peak in 2007 of approximately \$833bn compared to the world peak of approximately \$64 471bn. The 2008/2009 Global Financial Crisis had a severe impact on the market capitalisation of listed companies in the world. There was a marked decrease in the market capitalisation from 2007 to 2008

by approximately 46% and 41% for the world capitalisation and the market capitalisation of the JSE respectively.



**Figure 4: Annual market capitalisation of the world compared to the market capitalisation of the Nigerian Stock Exchange according to The World Bank (2013) market capitalisation report**

The NSE market capitalisation reached its peak in 2007 of approximately \$86bn. The 2008/2009 Global Financial Crisis had a severe impact on the market capitalisation of listed companies in Nigeria with a marked decrease in the market capitalisation from 2007 to 2008 of approximately 42%.

The impact and assessment of the financial crisis on the earnings, dividends and market capitalisation of listed companies is important as the financial crisis occurred during the period of our longitudinal study.

## 1.4 Research Problem

The field of stock returns and assessing stock returns utilising financial ratios has attracted substantial interest from corporates, investment banks, stockbrokers, asset management companies, the media and investors. Kheradyar, Ebrahim, and Nor (2011) noted that previous research on the role of financial ratios on stock returns has been based on studies in the United States and the United Kingdom, which are developed markets in the world and that the predictive power of the financial ratios on stock returns is still unknown in emerging markets. Menike and Prabath (2014)

supported the views of Kheradyar *et al.* (2011) in that there are few studies of financial ratios on stock price reactions in emerging markets.

Kheradyar *et al.* (2011) stated that it is appropriate to consider and appreciate that there are significant variations between emerging and developed markets in the world and that further studies in this regard would assist in understanding emerging markets. Blitz, Pang and van Vliet (2013) explained that in the context of the world, emerging markets are now becoming significant due to the high growth rates achieved by emerging market economies. In view of this; further investigation is required into the predictive power of the financial ratios in emerging markets.

Karami and Talaei's (2013) and Kheradyar *et al.*'s (2011) research is based on stock return predictability based on financial ratios, specifically the book-to-market ratio, dividend yield and earnings yield financial ratios. All of the above ratios utilise the share price in the calculation of the ratios resulting in statistical multicollinearity in terms of the research. The proposed financial ratios of return on equity (ROE) and dividend payout (DPO) ratios do not include the share price in the calculation of the ratios, which should increase the confidence levels of the results of this research and decrease the risk of multicollinearity affecting the results.

The results of Menike and Prabath's (2014) research revealed that there are substantial positive impacts of accounting variables on the stock price in terms of dividends per share and earnings per share. In contrast, Baker, Chang, Dutta and Saadi's (2012) results were not definitive with regard to the association between a company's dividend policy and the stock prices of a company. Baker *et al.* (2012) posited that additional studies are required that consider country specific characteristics to explain the rationale that companies use to pay dividends and by inference, the effect on the stock prices as a result.

In summary, there is a convincing proposal to study the impact of return on equity and dividend payout ratios on stock returns in emerging financial markets in Africa.

## **1.5 Research Aim**

The aim of this research was to determine the impact of ROE and DPO ratios on stock returns in emerging financial markets in South Africa and Nigeria, as these are important indicators for potential returns to investors.



The rationale behind this research is that ROE is unique in that it comprises of three different measures and not just profitability or earnings per share, which results in a holistic view of a company's financial performance and any subsequent stock returns as a result thereof. The three different measures of ROE are noted in Section 2.3 of this report. The DPO ratio is important to determine the potential return to the investors and to assess management's ability to effectively utilise the capital of the business to increase the returns to the shareholders.

This study attempts to obtain an enhanced understanding of the two financial ratios of ROE and DPO and their impact on stock returns in emerging financial markets in South Africa and Nigeria.

## **CHAPTER 2: LITERATURE REVIEW**

### **2.1 Introduction**

Both Kheradyar *et al.* (2011) and Menike and Prabath (2014) shared the same views that there are few studies of financial ratios on stock price reactions in emerging markets when compared to studies performed in developed markets. De Groot, Pang and Swinkels (2012) also stated that research on frontier emerging markets is scarce. This research would provide a more profound understanding of two specific financial ratios namely, the ROE and DPO ratios and their impact on stock returns in emerging stock markets in South Africa and Nigeria.

The literature review discusses the most recent and current debates regarding the factors that affect stock returns in financial markets, although there are numerous factors that can affect stock returns in financial markets. Menike and Prabath (2014) stated that there are many factors that can affect stock prices, namely macro-economic conditions, political situations, governments' industrial policies and technical aspects within companies. In contrast, Bai (2014) stated that there is mixed evidence on stock returns due to investor sentiment.

Kheradyar *et al.* (2011) stated that financial ratios represent a unique and complementary role when determining stock price predictability. In this regard, one of the pertinent factors affecting stock returns is the financial results of companies as measured by financial ratios. The literature review concentrates on the two specific financial ratios of ROE and DPO due to the uniqueness of the ROE ratio and the importance of the DPO ratio to potential investors, as mentioned in Chapter 1 of this research study. The literature also approaches stock returns, emerging markets and emerging market countries, particularly those in Africa.

### **2.2 General Factors Affecting Stock Returns**

This section of the research report delineates selected current research reports that relate to factors affecting stock prices that have been published recently. This discussion illustrates and confirms that numerous studies have been performed recently in order to improve the understanding of the factors that affect stock prices.

The following paragraphs summarise a few current academic debates regarding the general factors affecting stock returns:

### **2.2.1 Financial Performance**

The financial performance of a company is measured by various financial ratios. The research of both Karami and Talaei (2013) and Kheradyar *et al.* (2011) is based on stock return predictability as formulated according to financial ratios, specifically the book-to-market ratio, dividend yield and earnings yield financial ratios. Their research findings revealed evidence that financial ratios are able to predict stock returns but the authors noted that there is limited research for emerging markets in this regard.

The ratios listed above utilise the stock prices in their calculation resulting in statistical multicollinearity in terms of the research, whereas this research study aims to reduce the risk of multicollinearity in the results of this research. As a result, this research study focussed on two different financial ratios, namely ROE and DPO ratios, which are calculated independently of the stock prices.

### **2.2.2 Country popularity and sentiment**

Hwang (2010) stated that investors' demands for stocks are affected by a country's popularity. Hwang's (2010) research related specifically to US investors. He found that a country's popularity affects stock prices and the demand of stocks by US investors. Investors have a bias to invest in countries that prove to be popular.

Baker, Wurgler and Yuan (2012) concurred with Hwang (2010) that global and local sentiment affects stock prices. This is important because country-specific sentiment affects stock prices either positively or negatively. It can be inferred that a country's general popularity can cause stock prices to deviate from their fundamentals.

### **2.2.3 Institutional ownership**

Following from Hwang (2010), Fernando, Gatchev and Spindt (2012) empirically demonstrated that share prices and institutional ownership and investments are positively related; thereby suggesting that cross-border mergers and acquisitions activity results in institutional ownership and has a positive effect on stock prices.

Jiang, Kim, and Zhou (2011) agreed with both Hwang (2010) and Fernando *et al.* (2012) that share prices and institutional ownership are positively related by illustrating that institutional ownership affects stock prices.

#### **2.2.4 Foreign shareholders**

Abreu, Mendes and Santos (2011) stated that individuals can improve on their stock returns if they diversify their stock holdings on an international basis instead of only being invested in their home country. This further promotes investment in foreign stocks by individuals and increases the potential for elevated stock returns that could be achieved from a diversified investment portfolio.

Christelis and Georgarakos (2013) explained that foreign shareholders consider the costs of acquiring equity investments as an important factor when determining whether or not to invest abroad. Foreign shareholders are therefore cognisant of the effect of these costs on the stock returns of investments in foreign markets.

In addition to assessing the impact of financial ratios on stock returns, there are many other factors, some of which have been mentioned above, that affects stock returns, and these are currently being debated and researched. Investors consider a multitude of factors before making the decision to investment in stocks. In particular, potential investors are required to perform an assessment of the financial markets and the investment environment in general. An assessment of the effects of financial ratios on stock returns are one of the indicators that potential investors could utilise to determine the stocks which they invest in. This research study focusses on two financial ratios of ROE and DPO, as explained below.

### **2.3 The Impact of Return on Equity (ROE) Ratios on Stock Returns**

Firer, Ross, Westerfield and Jordan (2012) posited that “the Du Pont system is a financial analysis and planning tool that is designed to provide an understanding of the factors that drive the return on equity of the company”. According to Firer *et al.* (2012), “the Du Pont Identity” or DPI illustrates that ROE comprises of three measures:

- a) Operational efficiency which is measured by profit margin (PM),
- b) Asset use efficiency which is measured by total asset turnover (TAT) and

c) Financial leverage which is measured by the equity multiplier (EM).

### **2.3.1 Description of the DPI formula**

According to Firer *et al.* (2012) the formula for the DPI is as follows:

$$\text{ROE} = \text{PM} \times \text{TAT} \times \text{EM}$$

Or

$$\text{ROE} = \text{Earnings per share (EPS)} \div \text{Net Asset Value per share (NAVPS)}$$

### **2.3.2 Description of the formula for EPS and NAVPS**

$\text{EPS} = \text{Net Profit after Tax for the year (NPAT)} \div \text{Number of issued shares at the end of the year (Issued Shares)}$

$\text{NAVPS} = \text{Ordinary Shareholders Equity [the average Ordinary Shareholders Equity balances for the year]} \div \text{Issued Shares}$

Soliman (2008) and Chang, Chichernea and HassabElnaby (2014) stated that the DuPont analysis disaggregates companies' returns on net operating assets into profit margin and asset turnover.

Lim's (2014) research concluded that Profitability Margins (PM) determined by operating activities has a stronger association with annual stock returns when compared to financing activities. Chang *et al.*'s (2014) research concluded that the DuPont components are useful for investors and analysts and that profit margin is generally more important than asset turnover.

In summary, the financial measure of ROE includes the operating and financing aspects of the business and illustrates management's performance in terms of managing a business. The ROE to shareholders is essential from an investment perspective for analysts and potential investors, however previous research concurs that profit margin is generally more important.

The literature review includes an analysis of each of the components of the ROE ratio:

### **2.3.3 Profit Margin**

Chang *et al.* (2014) stated that profit margin (PM) is generally more important to investors and analysts when compared to the total asset turnover (TAT). Firer *et al.* (2012) explained that when these two components are considered, a high PM is most desirable for a business. The ratio for the profit margin is as follows:

$$\text{NPAT} \div \text{Sales}$$

Novy-Marx (2013) stated that there are various profitability strategies that a company can employ such as financing the acquisition of new productive assets by disposing of unproductive assets. Profit margins and EPS are indicators of companies' profitability. Novy-Marx (2013) also postulated that profitability dramatically increases the performance of value strategies for a company. When companies manage and control their profitability this should result in increased stock returns to the investors.

Listed companies issue earnings announcements when they are in a position to do so. Barber, George, Lehavy and Trueman (2012) stated that stock returns are higher during the period of earnings announcements. This confirms that earnings announcement premiums exist. In summary, this provides evidence that positive earnings announcements result in higher stock returns for investors. Barber *et al.*'s (2012) research concurred with Savor's (2011) findings that future earnings announcements are strongly correlated with share price movements.

Da and Warachka (2010) opined that investor's long-term future earnings' expectations are essential when determining the value of stocks. In contrast, Da and Warachka's (2010) research concluded that investors concentrate on medium-term earnings growth as compared to long-term growth forecasts. These findings infer that investors prefer to have visibility of medium-term forecasts in conjunction with the historic earnings and profitability of companies when determining the value of stocks and by implication, their assessment of the potential returns on the stocks. The ROE and DPO ratios are based on historical results and can assist prospective investors in their assessment of potential stock acquisitions.

#### **2.3.4 Total Asset Turnover**

According to Firer *et al.* (2012), the total asset turnover (TAT) reflects the amount of sales generated for each rand invested in total assets.

The ratio for TAT is as follows:

Sales ÷ Total Assets

Innocent, Mary and Matthew (2013) stated that management should utilise its assets efficiently in order to generate more income. The author's research was conducted in Nigeria based on companies listed on the Nigeria Pharmaceutical sector of the NSE. Firer *et al.* (2012) explained that the asset turnover ratio essentially measures the efficiency with which a business uses its assets, including how efficiently it uses its working capital. Minimising the total assets utilised or minimising capital used is vital in the creation of growth and value for investors and subsequently stock returns to investors.

Cooper, Gulen, and Schill (2008) revealed that asset growth rates are strong predictors of future abnormal returns. They found that annual asset growth rates are a significant predictor of stock returns. In contrast to Cooper *et al.*'s (2008) findings, Yao, Yu, Zhang and Chen (2011) found that there is a negative relationship between asset growth and subsequent stock returns.

In terms of the formula to calculate TAT as described above, and its constituent part of the ROE formula in Section 2.3, the TAT formula concurs with the findings of Yao *et al.* (2011) in that in order to obtain a higher TAT and subsequently a higher ROE ratio, the total assets should be minimised to reflect the negative relationship between asset growth and stock returns.

### **2.3.5 Equity Multiplier**

According to Firer *et al.* (2012), the equity multiplier (EM) is a measure of a company's financial leverage. Firer *et al.* (2012) also stated that "financial leverage is the extent to which a company relies on debt and the more debt financing a company uses in its capital structure, the more financial leverage it employs".

Firer *et al.* (2012) further mentioned that financial leverage can dramatically alter the returns to shareholders in the company. The ratio for the EM is as follows:

Total Assets ÷ Equity

In terms of the EM and financial leverage, Modigliani and Miller's (1958) and Modigliani and Miller's (1963) seminal work proposed "that the value of the company is independent of the companies' capital structure" without taking taxes into consideration. Firer *et al.* (2012) noted that this proposition is known as ("MM1") and

that the “proposition states that it is completely irrelevant how a company chooses to arrange its finances”.

Firer *et al.* (2012) explained that when taxes are considered, interest expenses are tax deductible and debt financing is highly advantageous. The companies Weighted Average Cost of Capital (WACC) decreases as the company increases its level of debt in its capital structure. This has a direct effect on the value of a company as the value of a company potentially increases as the level of debt increases until the optimum capital structure is attained. An increase in the companies' value results in an increase in stock returns to investors.

Hussainey, Mgbame and Chijoke-Mgbame (2011) also examined the relationship between debt and the volatility of stock prices. Their research illustrated that debt exhibited a significant positive relationship with price volatility, signifying that the more debt that a company has, the more volatile the companies' stock price will be. This confirms that a company needs to operate at its optimal capital structure to maximise the companies' value and the stock returns to investors.

Cai and Zhang (2010) stated that a variation in a companies' leverage ratio has a negative effect on its stock price. They further explained that the negative effect is higher for companies that have greater leverage ratios and that these companies have a greater likelihood of default.

Cai *et al.* (2010) also found that companies with higher leverage tend to invest less in terms of future investments for the company. Cai *et al.*'s. (2010) findings are consistent with the debt overhang theory in that an increase in leverage may lead to future underinvestment for a company, thereby decreasing the value of a company and by implication decreasing the stock return to investors.

Management therefore needs to assess the optimal capital structure for their companies in order to maximise the value of their companies and stock returns to investors.

## **2.4 The Impact of Dividend Payout Ratios (DPO) on Stock Returns**



According to Firer *et al.* (2012), “The dividend payout ratio is the amount of cash paid out to shareholders divided by net profit after tax”. The formula for the dividend payout ratio is as follows:

$$\text{DPO} = \text{Cash dividends} \div \text{Net Profit after Tax} \times 100\%$$

Or

$$\text{DPO} = \text{Dividends per share} \div \text{Earnings per share} \times 100\%$$

Bergeron (2011) clarified that the steady state price of a stock is a result of a combination of its current dividend; its future dividend growth rate and its long-term beta. Dividends and the dividend payout ratio are therefore essential in determining the value of the stock and the stock returns to investors.

Hussainey *et al.* (2011) studied the relationship between companies’ dividend policies (dividend yield and dividend pay-out) and the volatility of stock prices. The authors found that there is a negative relationship between dividend yield and the volatility of stock prices. They concluded that if companies’ dividend pay-out ratios are high, the companies’ stock prices are less volatile. They argued that the dividend payout ratio is one of the pertinent determinants of the volatility of companies’ stock prices and by implication the stock returns to investors.

The research performed by Baker *et al.* (2012) studied the trend in the tendency of companies to pay dividends. They stated that cash constraints, growth opportunities and low profitability are the main reasons attributed to why companies do not declare dividends. They also explained that their research is not definitive on management’s understanding of the effect of dividend policies on stock prices. This research study endeavoured to establish the impact of dividend payout ratios on stock returns, because Baker *et al.*’s (2012) research proved to be inconclusive.

Fatemi and Bildik (2011) confirmed Baker *et al.*’s (2012) research in that firms do pay dividends. The difference between the two studies confirmed that there is a world-wide decrease in the tendency for companies to pay dividends in terms of the research conducted by Fatemi and Bildik (2011). The DPO ratios of these companies studied were lower. The authors attributed the decrease to smaller companies with varying dividend payout policies and companies that are less profitable although these companies have additional investment opportunities. Fatemi and Bildik (2011) also found “that larger companies with higher profitability and companies with low growth

opportunities have a greater propensity to pay dividends". This research study sought to establish the impact of dividend payout ratios on stock returns.

## 2.5 Share Price Returns

The research performed by De Groot *et al.* (2012) asserted that the total return for a stock is the sum of the stock price movement and the dividend that was paid to the stock holders relating to that particular stock. Karami and Talaeei (2013) agreed that the total stock return is represented by the return on investment of the stock, which includes the capital gain/ (loss) and the dividend received relating to that stock for the period.

Based on De Groot *et al.*'s (2012) definition of total stock return, the formula for the Annual Stock Return (ASR) is as follows:

ASR = the Sum of [the Closing Stock Price in period 1 – the Opening Stock Price in period 1 + The Dividends per Share (DPS) in period 1]

Divided by

[The Opening Stock Price in period 1]

As an explanation, potential investors assess the returns on their portfolios on a total return basis. This includes the dividends received and the capital appreciation gained on the value of the stock. The calculation of the ASR is therefore pivotal in the assessment of the returns of their investment portfolios.

## 2.6 Emerging Financial Markets in Africa

Kearney (2012) asserted that the term *emerging market* is commonly used, but that there is no general consensus regarding the definition of emerging market. He stated that the classification of countries as emerging markets is subjective and several international financial institutions use different categories and methodologies to determine the classification of countries and regions as emerging markets.

Emerging markets are divided between emerging markets and frontier emerging markets. In this regard, both Chan-Lau (2012) and the definitions incorporated in the MSCI Frontier Markets Index (2014) are consistent in the explanation of the differences

between emerging markets and frontier emerging markets, as noted in Section 1.3 of this research study.

In terms of identifying emerging markets in the world, Kearney (2012) provided an example where the Financial Times Stock Exchange (“FTSE”) uses its country classification review process to identify emerging markets. In terms of the FTSE, South Africa is included as an emerging market. Kearney (2012) provides a second example of Bloomberg's Morgan Stanley Capital International, MSCI Emerging Market Index (2014). The MSCI Emerging Market Index (2014) also includes South Africa as an emerging market. The research is consistent in that both the FTSE and the MSCI Emerging Market Index (2014) includes South Africa as an emerging market.

The significance of emerging markets in the world is emphasised by Blitz *et al.* (2013) where the authors discussed that emerging markets have become more significant to investors due to the high growth rates experienced by these economies and this is reflected in the composition of the MSCI All Countries Index. Emerging markets comprised approximately 15% of this Index in 2012, compared to emerging markets constituting approximately 1% of the MSCI All Countries Index in 1988.

In fact, Blitz *et al.* (2013) were in agreement with De Groot *et al.* (2012) Blitz in that traditional emerging markets have developed rapidly over the past decades both economically and financially. De Groot *et al.* (2012) stated that a group of countries less developed than emerging markets with established stock exchanges have also found favour from global investors, and these new emerging markets as a group are classified as frontier emerging markets, or in short, frontier markets. De Groot *et al.* (2012) also stated that investors are attracted to these frontier emerging markets and that studies on these frontier emerging economies are scarce. This research study sought to address the paucity of research available on frontier markets by selecting a frontier emerging market country for the study, namely; Nigeria. In terms of the MSCI Emerging Frontier Markets Africa Index (2014), Nigeria is classified as a frontier emerging market.

The research performed by Youssef and Galloppo (2013) stated that more studies are required for emerging stock markets in Asia and Africa in particular. These markets were the least affected by the global financial crisis and potential investors could be attracted to these markets as a result their resiliency in the face of the debilitating effects of the 2008/2009 Global Financial Crisis. It can therefore be inferred that these stock markets are good markets for earning superior stock returns into the future.

## **2.7 Conclusion**

South Africa and Nigeria are considered to be part of the broader classification of emerging markets and frontier emerging markets of the world. This research study aimed to determine the impact of ROE and DPO ratios on stock returns in emerging financial markets in South Africa and Nigeria as there is limited research in this area, especially when the frontier market of Nigeria is considered. An understanding of the ROE and DPO ratios are important because these serve as potential indicators for earning superior returns to investors.

## CHAPTER 3: RESEARCH HYPOTHESES

The objective of the research was to determine whether there is a relationship between the selected two financial variables namely, ROE and DPO and the ASR of companies listed on the JSE Top 40 Index and the NSE 50 Index.

### 3.1 Hypotheses

There are four hypotheses that were examined in this research study with reference to the relationship between the financial variables, namely: ROE and DPO and the ASR of companies listed on the JSE Top 40 Index and the NSE 50 Index.

Johnson and Wichern (1997) stated that due to sample-to-sample variability, a high probability, typically between 90% and 99%, is utilised as a level of confidence due to the fact that this probability pertains to the interval before the sample is observed. These tests were conducted at the 95% confidence level, which is the midpoint of the range proposed by Johnson and Wichern (1997). A confidence level of 95% was considered adequate in terms of this research.

### 3.2 Hypothesis 1

H10:  $r = 0$

H1A:  $r < > 0$

The null hypothesis is: ***There is no correlation between the average DPO of the companies and the average ASR of the companies listed on the JSE Top 40 Index.***

The alternative hypothesis is: ***There is a correlation between the average DPO of the companies and the average ASR of the companies listed on the JSE Top 40 Index.***

### 3.3 Hypothesis 2

H20:  $r = 0$

H2A:  $r < > 0$

The null hypothesis is: ***There is no correlation between the average ROE of the companies and the average ASR of the companies listed on the JSE Top 40 Index.***

The alternative hypothesis is: ***There is a correlation between the average ROE of the companies and the average ASR of the companies listed on the JSE Top 40 Index.***

### 3.4 Hypothesis 3

H30:  $r = 0$

H3A:  $r < > 0$

The null hypothesis is: ***There is no correlation between the average DPO of the companies and the average ASR of the companies listed on the NSE 50 Index.***

The alternative hypothesis is: ***There is a correlation between the average DPO of the companies and the average ASR of the companies listed on the NSE 50 Index.***

### 3.5 Hypothesis 4

H40:  $r = 0$

H4A:  $r < > 0$

The null hypothesis is: ***There is no correlation between the average ROE of the companies and the average ASR of the companies listed on the NSE 50 Index.***

The alternative hypothesis is: ***There is a correlation between the average ROE of the companies and the average ASR of the companies listed on the NSE 50 Index.***

## CHAPTER 4: RESEARCH METHODOLOGY

### 4.1 Research Design and Approach

This research report aimed to determine the impact of ROE and DPO ratios on stock returns in emerging financial markets in South Africa and Nigeria as there is currently limited research in this area, especially concerning Nigeria as a frontier market.

Previous studies that were conducted by Karami and Talaei (2013) and Kheradyar *et al.* (2011) were based on the correlation between financial ratios, his study is slightly different and aimed to investigate whether there is any evidence on the JSE Top 40 Index and the NSE 50 Index that the financial ratios of ROE and DPO have any impact whatsoever on ASRs of these companies specifically, be it either positive or negative.

One dependent variable, the average of the individual companies' ASR per year on the JSE Top 40 Index and NSE 50 Index, was tested against two independent variables: the average ROE and average DPO financial ratios.

According to Saunders and Lewis (2012) there are two approaches to research, the approaches of deduction or induction. Saunders and Lewis (2012) stated that "Induction is a research approach that involves the development of theory as a result of analysing data already collected" whereas "Deduction is a research approach which involves the testing of a theoretical proposition by using a research strategy specifically designed for the purpose of its testing" (p. 108-109). In the case of this research study, it would be inappropriate to use a deductive research approach as this report does not deal with theoretical propositions. An inductive approach was adopted in terms of this research, as this approach involves the development of theory as a result of analysing data already collected - commonly referred to as secondary data. According to Saunders and Lewis (2012) "secondary data is data used for a research project that were originally collected for some other purpose" (p. 99) and in terms of this research report, it is quantitative in nature. Secondary data from the JSE Top 40 Index and NSE 50 Index in terms of the stock prices and dividends per share statistics were collected. The average ASRs expressed in percentages required to be calculated based on the statistics for each listed company per year on both the JSE Top 40 Index and NSE 50 Index.

The research methodology adopted for this research report was therefore inductive or quantitative in nature with a descriptive approach including descriptive statistics to determine whether there was a correlation between the financial variables, namely the DPO and ROE and the ASR on the JSE Top 40 Index and the NSE 50 Index respectively.

In terms of the descriptive statistics that were utilised to describe the data, various definitions of statistical terms have been emphasised for reference. Albright *et al.* (2006) and Johnson and Wichern (1997) concurred that the mean is the average of all values of a variable. This describes the central tendency of the data. Albright *et al.* (2006) and Johnson and Wichern (1997) explained that the median is the “middle” observation when the data are arranged from smallest to largest and that the standard deviation is the square root of the variance. The variance is essentially the average of the squared deviations from the mean. The standard deviation described the dispersion of the data. Albright *et al.* (2006) also stated that the kurtosis and skewness indicates the relative peakedness of the distribution and its skewness.

No attempt was made to establish causality between the selected financial variables, namely DPO and ROE and the ASR, as the relationships are complex and are affected by numerous internal and external factors affecting the companies, which is beyond the scope of this research. If a causal analysis was performed, several regression tests would also need to be performed. For the purposes of this research, the aim was to determine whether there was a correlation between the financial ratios of ROE and DPO and the ASR for companies listed on the JSE Top 40 Index and NSE 50 Index respectively.

According to Saunders and Lewis (2012), “a longitudinal study is the study of a particular topic over an extended period of time” (p. 124). Saunders and Lewis (2012) stated that “the main advantage of a longitudinal study is the capacity that it has to study change and development over time” (p. 124). A longitudinal research approach was adopted for companies listed on the JSE Top 40 Index as the research was performed for a fourteen year period, from 2000 to 2013. In terms of the time periods for other research reports referred to in this report, Hussainey *et al.* (2011) researched a period between 1998 and 2007 (a period of nine years) and Baker *et al.* (2012) researched a period between 1989 and 2006 (a period of seventeen years). A period of fourteen years was considered adequate to perform the longitudinal analysis in terms of the research methodology. Similarly a longitudinal research approach was adopted for companies listed on the NSE 50 Index as the research was performed for an eight



year period, from 2006 to 2013 due to the availability of secondary data for this period in terms of the longitudinal analysis. A longitudinal research approach was adopted so that the correlation between the financial variables, namely DPO and ROE and the ASR for companies listed on the JSE Top 40 Index and the NSE 50 Index could be investigated.

## **4.2 Unit of Analysis**

Saunders and Lewis (2012) stated that a “unit of data is a predetermined piece of data” (p. 194). The unit of data or the unit of analysis for this research is a JSE Top 40 Index and NSE 50 Index listed company.

There are fourteen data points for the time series analysis from 2000 to 2013 in terms of companies listed on the JSE Top 40 Index. Each data point has an average of the twenty seven companies selected in terms of the data collection and analysis process, as explained in Section 5.1 of this research study. In total there are 378 data points (14 years multiplied by 27 companies) that were utilised to construct the time series analysis. There are 378 data points each for the ROE and DPO ratios.

Similarly, there are eight data points for the time series analysis from 2006 to 2013 in terms of companies listed on the NSE 50 Index. Each data point had an average of the nine companies selected in terms of the data collection and analysis process outlined in Section 5.1 of this research study. In total there are 72 data points (8 years multiplied by 9 companies) that have been utilised to construct the time series analysis. There are 72 data points each for the ROE and DPO ratios.

## **4.3 Population**

Saunders and Lewis (2012) described that “the population is a complete set of group members” (p. 132). The population for this research were all publicly listed companies in South Africa and Nigeria. The research could be performed on any listed company in terms of determining whether there was a correlation between the financial variables namely; DPO ratio and ROE and the ASR, if the information and data is available.

According to Saunders and Lewis (2012) “a sampling frame is a complete list of all members of the total population” (p. 133). In terms of this research a sampling frame is available as an inventory of all publicly listed companies from the JSE and NSE was

available from the following sources: the individual listed exchanges website, the World Federation of Exchanges, and the individual listed exchanges official offices. The main reason for selecting a sample from the sampling frame is that a high coverage could be obtained by utilising the relevant indices from the JSE and NSE as explained below in Section 4.4 of this research study.

#### **4.4 Sampling method**

According to Saunders and Lewis (2012) “purposive sampling is a type of non-probability sampling in which the researchers judgement is used to select the sample members based on a range of possible reasons and premises” (p. 138). This research utilised a purposive or judgemental sampling technique based on listed exchanges in emerging market countries of South Africa and Nigeria.

In terms of the sample, a judgemental sampling technique was utilised to select the largest emerging market country and the largest new emerging market or frontier market country by market capitalisation according to the MSCI Emerging Frontier Markets Africa Index (2014). In South Africa the JSE Top 40 Index and in Nigeria the NSE 50 Index were selected.

According to the African Securities Exchanges Association (2014) yearbook, the JSE and NSE have market capitalisations of USD1 102 billion and USD83 billion in 2013 respectively. The African Securities Exchanges Association (2014) yearbook explained that the JSE and the NSE comprise 82% of the total market capitalisation of all listed exchanges in Africa, which is considered to be adequate coverage of emerging markets in Africa. The coverage of the JSE 40 Index and the NSE 50 Index compared to the overall market capitalisations is noted below.

Listed companies on the JSE Top 40 Index and the NSE 50 Index constituted the sample size for this research. According to the FTSE/JSE Top 40 Index (2014), the JSE Top 40 Index is a capitalisation weighted index and includes 40 of the largest companies on the JSE by market capitalisation. According to the Nigerian Stock Exchange (2014), the NSE 50 Index is an adjusted capitalisation weighted index and includes 50 of the largest companies on the NSE by market capitalisation and liquidity.

According to the FTSE/JSE All-Share Index (2014) and the FTSE/JSE Top 40 Index (2014), the JSE Top 40 Index comprises approximately 84% of the total JSE All Share Index at 30 June 2014 and according to the Nigerian Stock Exchange (2014) the NSE

50 Index comprises approximately 91% of the total NSE All Share Index at 30 June 2014.

## 4.5 Data collection

The data that was required for this research involved the collection of secondary data. The data was collected as secondary data from the Thomson's Reuters financial databases for the last fourteen years, from 2000 to 2013 for companies listed on the JSE Top 40 Index and the last eight years, from 2006 to 2013 for companies listed on the NSE 50 Index based on closing stock prices, dividends per share and the ROE and DPO ratios at the end of the fiscal years for each company.

The Thomson's Reuters financial database is one of the leading sources of company data for companies in developed, emerging or frontier markets. This database hosts decades of collection data and is one of the most widely used databases in the world. The data required for this research included the historic financial information of companies listed on both the JSE Top 40 Index and the NSE 50 Index.

## 4.6 Data Analysis

According to Saunders and Lewis (2012) time series is a set of data recorded over time, usually at regular intervals. Kheradyar *et al.* (2011) stated that time series reflects changes within stock returns over time in each company.

The research study utilised time series data and consisted of two independent variables (the average ROE and DPO ratios, expressed as percentages) and one dependent variable (the average of the individual companies' ASR per year) observed annually for fourteen years and eight years for companies listed in the JSE Top 40 Index and NSE 50 Index respectively, hence this constitutes time series data. Any material outliers were excluded from the analysis.

The data analysis was based on the secondary data and was applied to all hypotheses that were tested. In order to determine the exact nature and extent of the correlation of the independent variables with the ASR, a statistical test for correlation was required to be performed. The SPSS statistical analysis software was utilised for the analysis of the data.

Albright, Winston and Zappe (2006) explained that time series data occurs when one or more variables are tracked through time and that time series data contains four components: the trend component, the seasonal component and/or the cyclic component and the random (noise) component. Johnson and Wichern (1997) concurred with Albright *et al.* (2006) in that a time series consists of a trend, a seasonal component and an irregular component. An irregular component is the residual or “noise”.

Albright *et al.* (2006) affirmed that two statistical tests that can be performed to investigate randomness in a time series, these being a run test and a test for autocorrelations. Albright *et al.* (2006) agreed with Johnson and Wichern (1997) in that autocorrelation is often manifested in patterns that appear in plots of times series.

In terms of this research an autocorrelation test for randomness was performed. Albright *et al.* (2006) stated that an “autocorrelation is a type of correlation used to measure whether values of a times series are related to their own past values” (p. 716). Johnson and Wichern (1997) mentioned that “the tendency for successive observations to be related is called autocorrelation” (p. 110). These statements assisted the researcher to determine whether or not the data points in the data were time sensitive. This randomness was ascertained by computing autocorrelations for data values at varying time lags.

According to Albright *et al.* (2006) autocorrelations can typically have as many lags as are deemed necessary, but it is common practice to request lags that represent no more than 25% of the number of observations due to practical considerations. In this particular research study, the SPSS Statistical software was utilised to automatically calculate the lags. The results of the testing are detailed in Section 5.4 of this report.

Albright *et al.* (2006) further stated that “the first few lags are the most important and intuitively if there is any relationship between successive observations, it is likely to be between nearby observations” (p. 718). The first few lags refer to the first *two* lags. The authors further stated that as a result of this, autocorrelations at larger lags can often be ignored as a random “blip” unless there is some obvious reason for its occurrence such as a seasonal lag. Johnson and Wichern (1997) concurred with Albright *et al.* (2006) in that autocorrelation beyond the first few lags are rarely calculated unless there is a seasonal pattern in the time series. The results of this research study are presented in Section 5 of this research report.

In terms of the analysis, if the first few lags, which are the first two lags, did not breach the 95% confidence level, it can be concluded that the time series is a random series. If the first two lags breach the 95% confidence level, it can be concluded that the time series is not a random time series.

According to Albright *et al.* (2006), the random walk model would need to be employed if the time series is not a random time series. Albright *et al.* (2006) explained that random series are sometimes building blocks for other time series models and that the random walk model is an example of this. The authors further demonstrated that “in a random walk model the time series itself is not random, however, its differences, that is, the changes from one period to the next are random” (p.727). This type of behaviour is typical of stock price data.

In terms of a differenced (or residual) time series test, both Johnson and Wichern (1997) and Albright *et al.* (2006) confirmed that in order to eliminate the autocorrelations, a differenced (or residual) time series test must be performed, which is a time series of the differences between the data values. As a result of this test the researcher was able to reduce the time dependency. The autocorrelation on the differenced time series was then performed to determine whether any autocorrelations are still present; this procedure was repeated until the autocorrelations were eliminated. Once the autocorrelation tests for randomness prove satisfactory, the time series was then tested for correlations between the financial ratios and the ASRs.

Liu, Hudak, Muller and Tiao (1992) state that cross correlation is a measure of association between the observed values (or residuals) of one series with the values of another series at current and prior time periods. To test the nature of the relationship and the correlation, the SPSS statistical software was utilised; the software includes a cross-correlation test that was performed to test each hypothesis. A cross-correlation test would reveal the strength and direction (positive or negative) of the relationship between the financial ratios and the ASRs. A cross-correlation test is preferred to regression testing as cross-correlations allow the relationship at different time lags to be observed so that peculiar times within the time series can be identified, for example the 2008/2009 Global Financial Crisis and the impact of the financial crisis on the results of the tests.

## 4.7 Research Limitations

The following list presents the research method limitations of the study:

- i. The research did not consider other internal and external factors such as macro-economic variables over the selected time period affecting the companies' performance or factors affecting the financial markets such as market sentiment and investor behaviour;
- ii. The research focussed on listed companies on the JSE top 40 Index and the NSE 50 Index; as a result inferences were not made about private or unlisted companies in South Africa or Nigeria;
- iii. The sample contained survivorship bias as companies who ceased operations during this time period were excluded from the research;
- iv. This study utilised the statistical tests of autocorrelation and cross correlation in terms of the research methodology. It is possible to replicate these tests utilising other statistical tests such as regression analyses in order to validate the results of the tests; and
- v. The research study utilised data from individual companies listed on the JSE and NSE and did not take into account that the all share indices of the JSE and NSE may be heavily skewed to one or more sectors due to the different weightings of the sectors in the all share indices.

## 4.8 Conclusion

This research study aimed to assess the impact of return on equity and dividend payout ratios on stock returns in emerging financial markets in South Africa and Nigeria. This research report adopted an inductive research approach due to the research design, which utilised secondary data from companies listed on the JSE Top 40 Index and the NSE 50 Index. A purposeful or judgemental sampling technique was utilised for purposes of the investigation.

The average of the individual companies' ROE, DPO and ASR, which has been observed annually for fourteen years and eight years for companies listed in the JSE Top 40 Index and NSE 50 Index respectively, was analysed after testing for

autocorrelations. Cross-correlation tests were utilised to test the nature of the relationship and the correlation. The findings of the research are exhaustively discussed in Chapter 5.

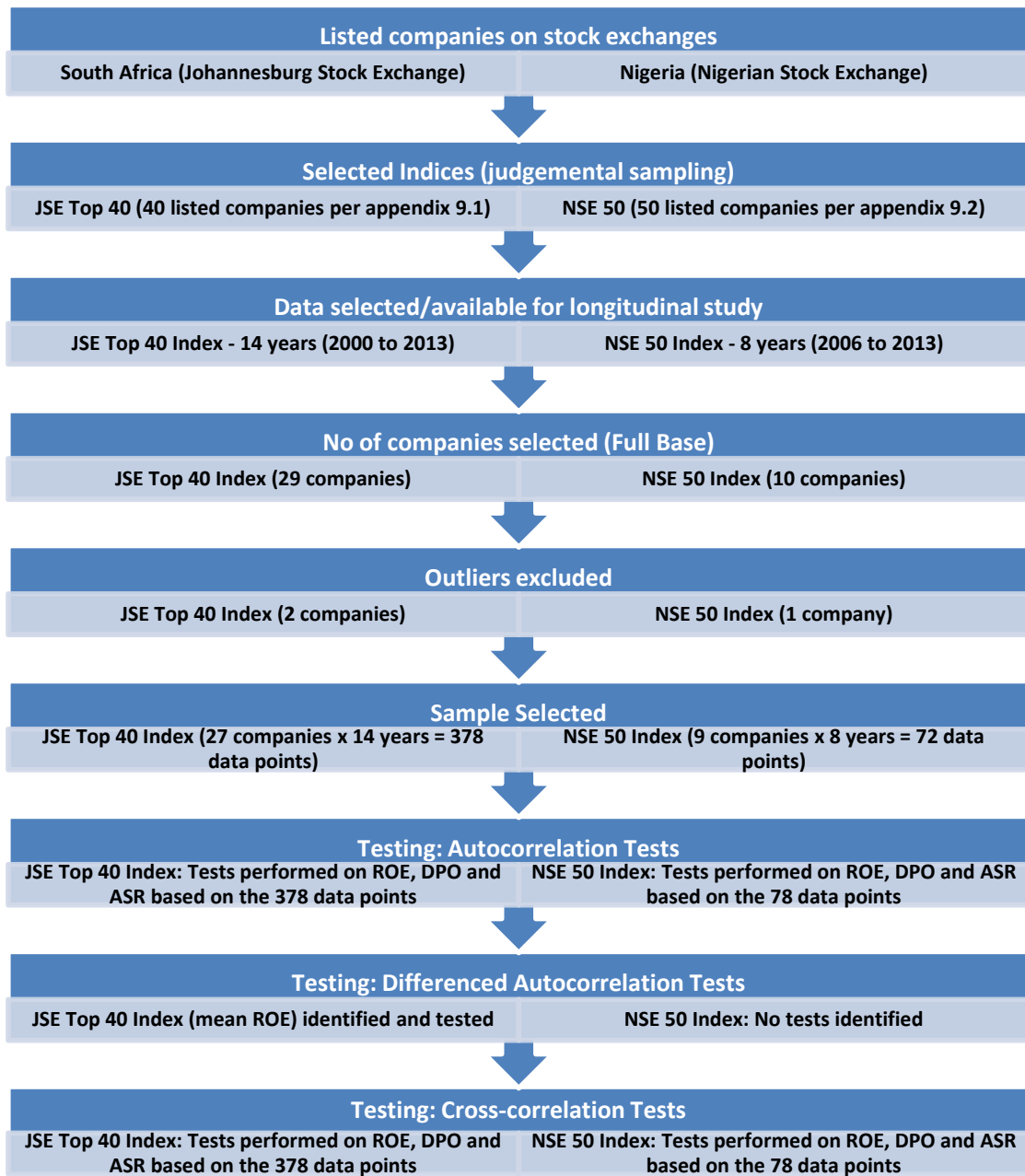
# **CHAPTER 5: RESULTS**

## **5.1 Overview**

This section of the report presents the findings of the analysis and the process that has been followed during this research. The process flow-chart below describes the steps that were followed to obtain the selected samples that were used for testing. This section of the report evaluates the research hypotheses detailed in Chapter 3 of this report and concludes whether or not the null hypotheses can be rejected. The results of the analysis are noted per hypothesis below.



**Table 2: Overview of the data collection and analysis process**



## 5.2 Selected Indices

### 5.2.1 JSE Top 40 Index

Data was obtained for all 40 companies listed on the JSE Top 40 Index as per Appendix 9.1. The data consisted of the ROE, DPO and ASR ratios and returns. Upon analysing the data in terms of the longitudinal study, the data was utilised from 2000 to 2013 (a 14 year period). Complete data for the 14 year period for 29 companies from

the original 40 companies per the JSE Top 40 Index was retrieved. A list of the 29 companies that were selected from the full base of 40 companies due to the validity of the data, survivorship bias and mergers and acquisitions is presented in Table 3 below.

**Table 3: The 29 companies that were selected from the full base of 40 companies of the JSE Top 40 Index**

1. African Rainbow Minerals Limited
2. Anglo American Plc
3. AngloGold Ashanti Limited
4. Aspen Pharmacare Holdings Limited
5. Barclays Africa Group Limited
6. BHP Billiton Plc
7. Bidvest Group Limited
8. British American Tobacco Plc
9. Compagnie Financiere Richemont SA
10. Discovery Limited
11. FirstRand Limited
12. Impala Platinum Holdings Limited
13. Imperial Holdings Limited
14. Intu Properties Plc
15. Investec Limited
16. MediClinic International Limited
17. MTN Group Limited
18. Naspers Limited
19. Nedbank Group Limited
20. Old Mutual Plc
21. RMB Holdings Limited
22. SABMiller Plc
23. Sanlam Limited
24. Sasol Limited

**Table 3: The 29 companies that were selected from the full base of 40 companies of the JSE Top 40 Index (continued)**

25. Shoprite Holdings Limited
26. Standard Bank Group Limited
27. Steinhoff International Holdings Limited
28. Tiger Brands Limited
29. Woolworths Holdings Limited

According to the FTSE/JSE All-Share Index (2014) and the FTSE/JSE Top 40 Index (2014), the JSE Top 40 Index comprised approximately 84% of the total JSE All Share Index at 30 June 2014.

### 5.2.2 NSE 50 Index

Data was obtained for all 50 companies listed on the NSE 50 Index as is listed in Appendix 9.2. The data consisted of the ROE, DPO and ASR ratios and returns. Upon analysing the data in terms of the longitudinal study, data was utilised from 2006 to 2013 (an eight year period). Complete data was retrieved for the eight year period for 10 companies from the original 50 companies due to the non-availability of information, the validity of the data and survivorship bias is presented in Table 4 below.

**Table 4: 10 companies were selected from the full base of 50 companies of the NSE**

1. Access Bank Plc
2. Diamond Bank Plc
3. Fbn Holdings Plc
4. Lafarge Cement Wapco Nigeria Plc
5. Nestle Nigeria Plc
6. Nigerian Breweries Plc
7. Skye Bank Plc
8. Stanbic IBTC Bank Plc

**Table 4: 10 companies were selected from the full base of 50 companies of the NSE (continued)**

9. United Bank For Africa Plc
10. Zenith Bank Plc.

According to the Nigerian Stock Exchange (2014), the NSE 50 Index comprises approximately 91% of the total NSE All Share Index at 30 June 2014.

### 5.3 Descriptive Statistics

Descriptive statistics simply describe the presentation of the data. These statistics provide a 'bird's eye' view of the data. The mean, median, standard deviation, skewness, kurtosis and minimum and maximum values are employed to describe the data.

#### 5.3.1 JSE Top 40 Index

The table below comprises the full data set for the 29 companies selected from the full base of 40 companies of the JSE Top 40 Index with 29 valid companies (including outliers) from 2000 (ROE00) to 2013 (ROE13), being 14 years. Similarly, data for the DPO and ASR ratios and returns from 2000 (DPO00 and ASR00) to 2013 (DPO13 and ASR13) is provided. Refer to Appendix 9.3 JSE Top 40 Index: Selected Sample, Descriptives of the full base (including outliers) for the detailed analysis.

**Table 5: Summary of descriptive statistics for the 29 selected companies on the JSE Top 40 Index**

Descriptive measure	ROE		DPO		ASR	
	Low	High	Low	High	Low	High
Mean	15%	38%	27%	259%	2%	6%
Median	14%	27%	29%	47%	2%	5%
Standard deviation	0.108	0.354	0.108	12.37	0.014	0.156
Skewness	-2.927	3.681	-3.494	5.379	0.077	5.291
Kurtosis	-0.460	14.72	-0.093	<b>28.957</b>	0.354	28.30
Minimum/maximum	-94%	277%	-213%	<b>6689%</b>	4%	86%

##### 5.3.1.1 Outliers

Based on the descriptive statistics above and in terms of the tests for normality of the data, there are no outliers relating to ROE. With regard to DPO; two severe outliers

were identified. The mean values ranged between a low of 0.266 (27%) in 2005 and a high of 2.596 (259%) in 2001. This was in vast contrast to the median values ranging between a low of 0.290 (29%) in 2005 and a high of 0.479 (47%) in 2013. In addition, standard deviation values relating to DPO from 2000 to 2013 range between a low of 0.108 in 2010 and a high of 12.370 in 2001. Similarly, the skewness in 2001 and 2011 was 5.379 and 5.070 respectively. The kurtosis in 2001 and 2011 was 28.957 and 26.657 respectively. The data sets for 2001 and 2011 were reviewed and the following companies were identified as outliers: Nedbank Group Ltd and Intu Properties Plc. These companies had a DPO of 6689% in 2001 and 511% in 2011 respectively.

### 5.3.1.2 Selected Sample

The outliers were removed from the sample and the sample size was reduced to include only 27 companies. Based on the sample size of 27 companies, these companies comprised approximately 80% of the JSE Top 40 Index at 30 June 2014 based on the full market capitalisation of the companies. Refer to Appendix 9.4 JSE Top 40 Index: Selected Sample, Descriptives of the full base (excluding outliers) for the detailed analysis.

## 5.3.2 NSE 50 Index

The table below comprises of the full data set for the 10 companies selected from the full base of 50 companies of the NSE 50 Index with 10 valid companies (including outliers) from 2006 (ROE06) to 2013 (ROE13) being 8 years. Similarly, we have data for the DPO and ASR ratios and returns from 2006 (DPO06 and ASR06) to 2013 (DPO13 and ASR13). Refer to Appendix 9.5 NSE 50 Index: Selected Sample, Descriptives of the full base (including outliers) for the detailed analysis.

**Table 6: Summary of descriptive statistics for the 10 selected companies on the NSE 50 Index**

Descriptive measure	ROE		DPO		ASR	
	Low	High	Low	High	Low	High
Mean	19%	36%	37%	681%	2%	6%
Median	8%	24%	31%	79%	0%	6%
Standard deviation	0.145	0.392	0.206	20.13	0.021	0.512
Skewness	1.531	2.425	-0.769	3.160	-0.382	0.559
Kurtosis	1.883	6.512	-0.982	<b>9.992</b>	-1.893	-0.264
Minimum/maximum	11%	139%	0%	<b>6410%</b>	2%	13%

### 5.3.2.1 *Outliers*

Based on the descriptive statistics above and in terms of the tests for normality of the data, there are no outliers relating to ROE. With regards to DPO, one outlier was identified. The mean values ranged between a low of 0.370 (37%) in 2006 and a high of 6.811 (681%) in 2009. This was in vast contrast to the median values ranging between a low of 0.315 (31%) in 2006 and a high of 0.791 (79%) in 2010. In addition, standard deviation values relating to DPO from 2006 to 2013 range between a low of 0.206 in 2012 and a high of 20.133 in 2009. Similarly, the skewness and kurtosis in 2009 was 3.160 and 9.992 respectively. The maximum percentage was 6410% in 2009. The data set for 2009 was reviewed and the following company was identified as a severe outlier: Skye Bank Plc. This company had a DPO of 6410% in 2009.

### 5.3.2.2 *Selected Sample*

The outlier was removed from the sample and the sample size was reduced to include nine companies. Based on the sample size of nine companies, these companies comprised approximately 42% of the NSE 50 Index at 30 June 2014 based on market capitalisation of the companies. Refer to Appendix 9.6 NSE 50 Index: Selected Sample, Descriptives of the full base (excluding outliers) for the detailed analysis.

## **5.4 Annual Stock Returns (ASRs) for the selected samples**

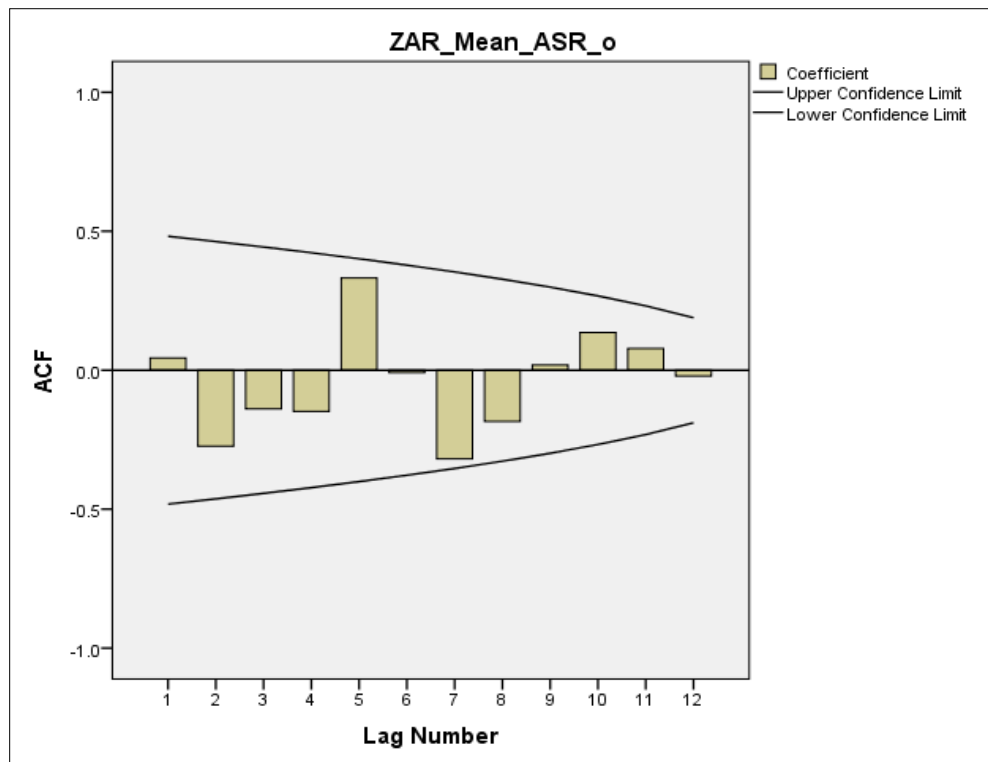
### **5.4.1 JSE Top 40 Index: Selected Sample (excluding outliers)**

In accordance with the research design as described in Chapter 4, the ASR for the selected sample of 27 companies from 2000 to 2013 were tested for randomness using the autocorrelation test. The results of the test appear in Figure 5 below. The results of the test indicate that the autocorrelations are within the confidence level of 95% and as such the results indicate that the data is random and that the data points are not time sensitive. As a result of this test and the outcome noted above, no differenced tests were performed on the data as the data has been tested and the tests confirm that the data is random.

In terms of the lags, 12 lags were automatically selected by the SPSS Statistical software from the sample of companies listed on the JSE Top 40. The 12 lags that were automatically selected was in excess of the number of lags commonly requested in practice, which represents no more than 25% of the number of observations. For this

particular research study, approximately seven lags were calculated at 25% of 27 observations, therefore there were more lags to test if there were autocorrelations. The increase in the number of lags had no effect on the results due to the first two lags being the most important lags in the analysis, as stated by Johnson and Wichern (1997) and Albright *et al.* (2006). In terms of this research, no seasonal patterns were identified. Refer to Appendix 9.7 Detailed Autocorrelation test: Mean ASRs of the selected sample from the JSE Top 40 Index for a full presentation of these results.

**Figure 5: Autocorrelation test: Mean ASR's of the selected sample from the JSE Top 40 Index**

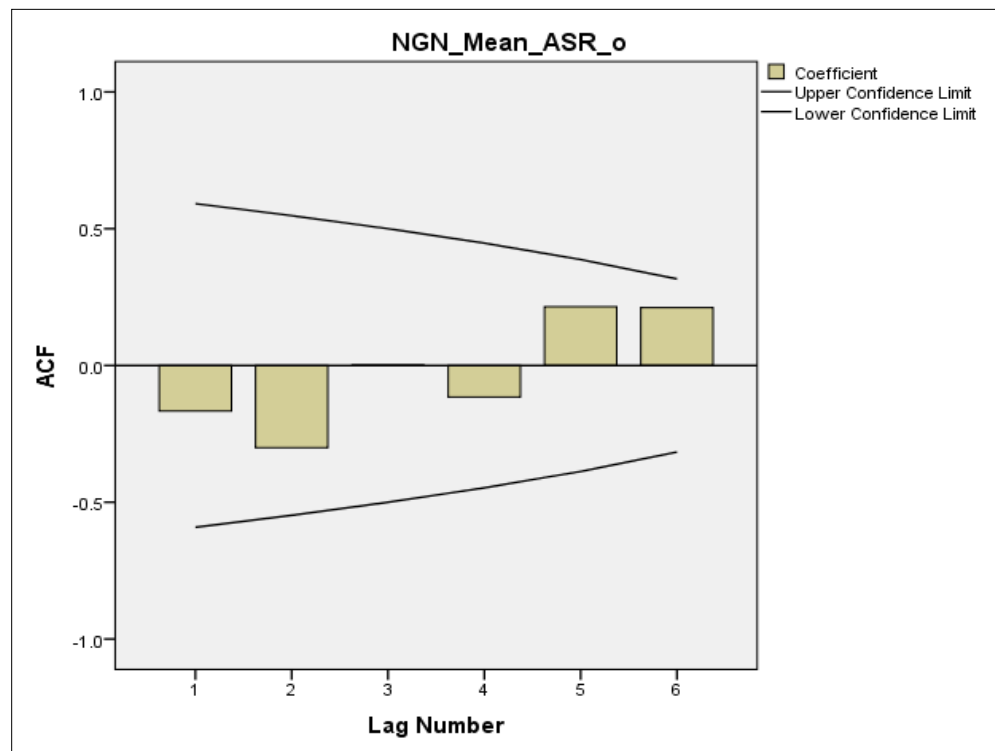


#### 5.4.2 NSE 50 Index: Selected Sample (excluding outliers)

In accordance with the research design described Chapter 4; the ASR for the selected sample of nine companies from 2006 to 2013 was tested for randomness using the autocorrelation test. The results of the test appear in Figure 6 below. The results of the test indicate that the autocorrelations are within the confidence level of 95% and as such the results indicate that the data is random and that the data points are not time sensitive. As a result of this test and the outcome noted above, no differenced tests were performed on the data as the data has been tested and the tests confirm that the data is random.

In terms of the lags, six lags were automatically selected by the SPSS Statistical software from the sample of companies listed on the NSE 50 Index. The six lags that were automatically selected were in excess of the number of lags commonly requested in practice, which represents no more than 25% of the number of observations. In this particular research study, approximately three lags were calculated at 25% of nine observations, thereby creating more lags to test if there were autocorrelations. The increase in the number of lags had no effect on the results due to the first two lags being the most important lags in the analysis, as stated by Johnson and Wichern (1997) and Albright *et al.* (2006). In terms of this research, no seasonal patterns were identified. Refer to Appendix 9.8 Detailed Autocorrelation test: Mean ASRs of the selected sample from the NSE 50 Index for a full presentation of these results.

**Figure 6 Autocorrelation test: Mean ASRs of the selected sample from the NSE 50 Index**



## 5.5 Hypothesis 1

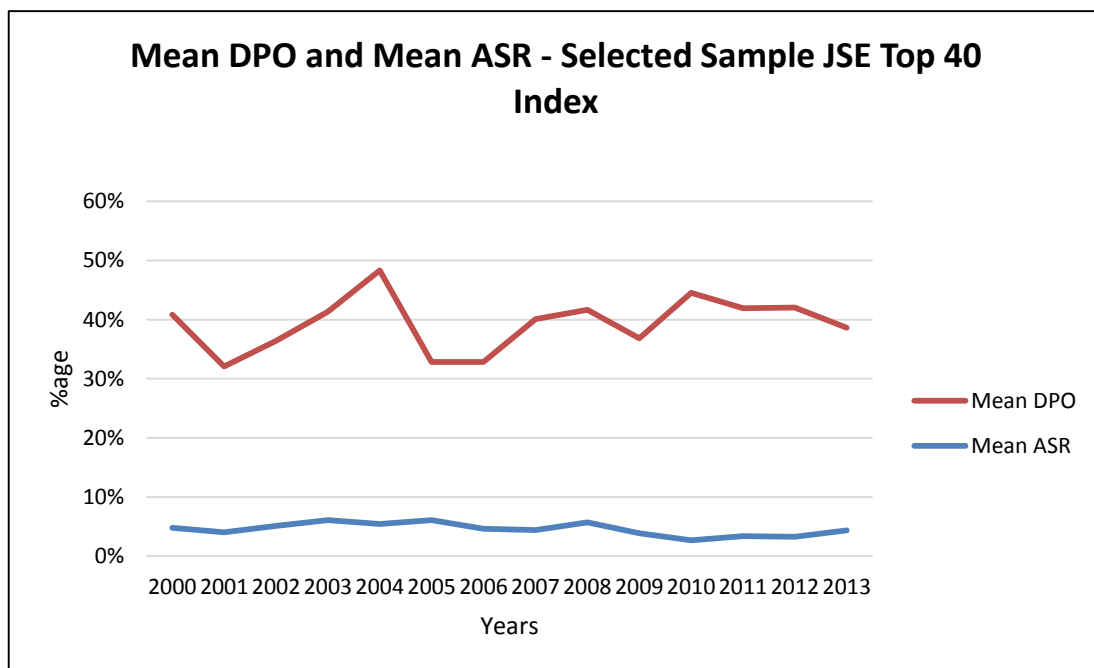
The null hypothesis states that there is no correlation between the average DPO of the companies and the average ASR of the companies listed on the JSE Top 40 Index. The alternative hypothesis stated that there is a correlation between the average DPO



of the companies and the average ASR of the companies listed on the JSE Top 40 Index.

The mean DPO and ASR percentages were calculated from inputs garnered from the data collection process for the period between 2000 and 2013. The mean DPO and mean ASRs (with the outliers excluded) were plotted on a time series chart as displayed in Figure 7 below.

**Figure 7: Mean DPOs and mean ASRs for the selected sample from the JSE Top 40 Index**

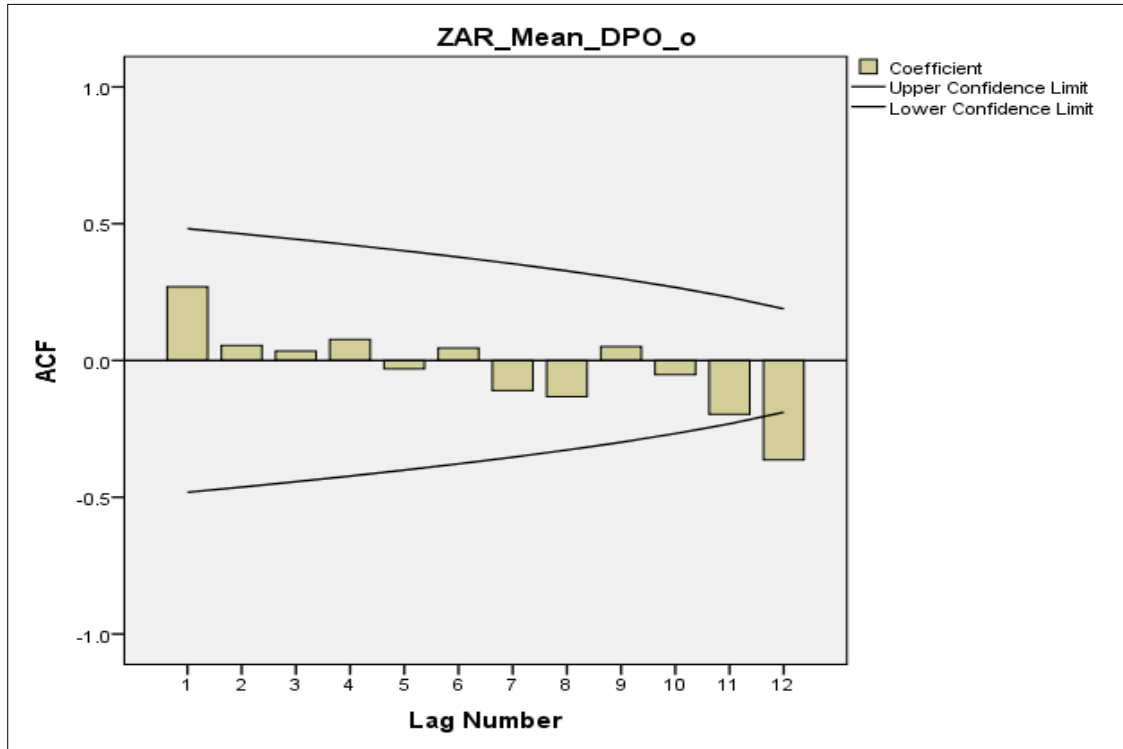


It can be observed from the chart that the mean DPO demonstrates a downward trend for the later part of the longitudinal analysis, from 2012 onwards. The mean DPO dipped in 2001, 2005 and 2011 with the highest DPO in 2004 of 43%. The mean ASR is fairly stable over the period of the study with the highest returns being achieved in 2003 and 2008. The trends between the mean DPO and the mean ASR are unclear.

Calomiris, Love and Martínez Pería (2012) stated that the Global Financial Crisis resulted in the following “crisis shocks”: the collapse of global trade, the contraction of credit supply and selling pressure on the company’s equity. The authors also stated that this applied to both emerging and developed economies. The collapse of global trade and the contraction of credit supply affected the earnings potential and profitability of the companies and ultimately its return on equity. The selling pressure on crisis shocks affected stock returns for the companies.

In accordance with the research design presented in Chapter 4, the mean DPO for the selected sample of 27 companies from 2000 to 2013 were tested for randomness using the autocorrelation test. The results of the test appear in Figure 8 below:

**Figure 8: Autocorrelation test: Mean DPOs of the selected sample from the JSE Top 40 Index**



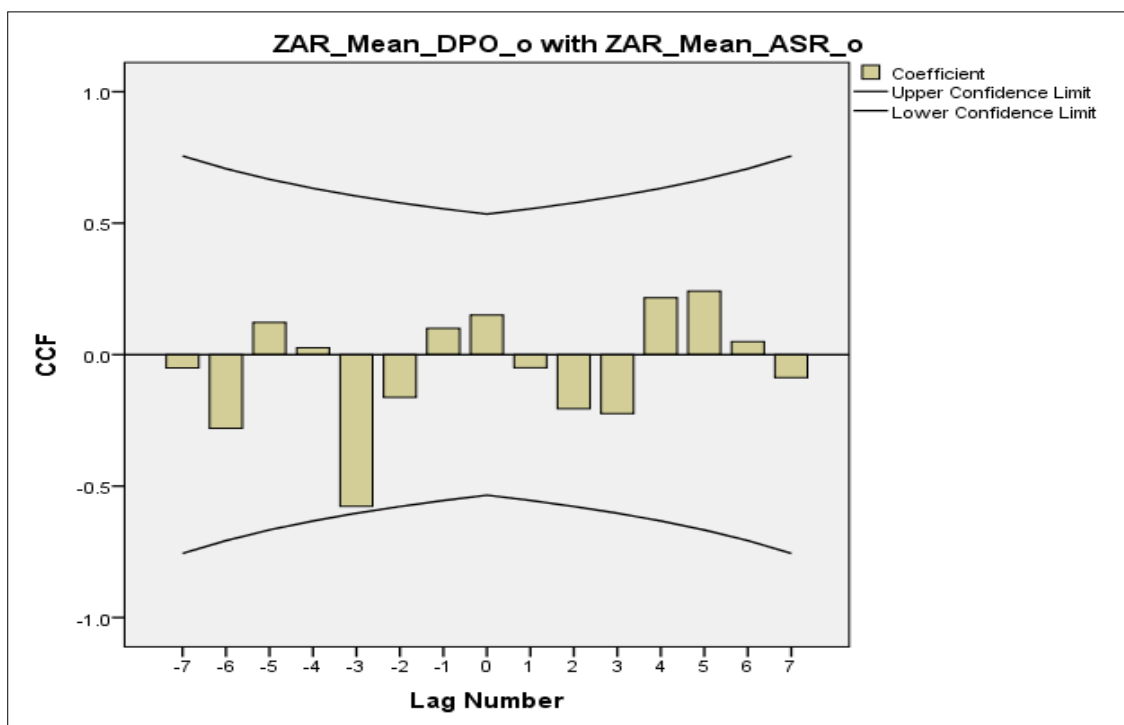
The results of the test indicate that the autocorrelations are within the confidence level of 95% except for lag 12, which is outside the confidence level limit. Albright *et al.* (2006) stated that “the first few lags are the most important and intuitively if there is any relationship between successive observations, it is likely to be between nearby observations. As a result of this autocorrelations at larger lags can often be ignored as a random “blip” unless there is some obvious reason for its occurrence”. No obvious reason for lag 12 was found.

In terms of the analysis and results, due to the fact that the first few lags do not breach the 95% confidence level, it can be concluded that the time series is a random series. The results indicate that the data is random and that the data points are not time sensitive. As a result of this test and the outcome noted above, no differenced tests were performed on the data as the data has been tested and the tests confirm that the data is random. Refer to Appendix 9.9 Detailed Autocorrelation test: Mean DPOs of the selected sample from the JSE Top 40 Index for a full presentation of these results.

The autocorrelation tests for randomness proved satisfactory. The time series was also tested for correlations between the mean DPO and the mean ASR's.

In accordance with the research design displayed in Chapter 4, the mean DPO for the selected sample of 27 companies from 2000 to 2013 was tested in terms of a cross-correlation test to determine the nature of the relationship and the correlation between the mean DPO and the ASR. A cross-correlation test is preferred to regression testing as cross-correlations allow the relationship at different time lags to be observed so that peculiar times within the time series can be identified. The results of the test appear in Figure 9 below:

**Figure 9: Cross-correlation test: Mean DPOs with the Mean ASRs of the selected sample from the JSE Top 40 Index**



The results of the cross-correlation test between the mean DPO and the mean ASR proved to be inconclusive in terms of the relationship between the variables. Based on the 95% confidence level and in terms of the research design and data analysis, none of the correlations proved to be statistically significant at this confidence level regardless of the time lags applied in the testing. The strongest negative correlation of 0.577 occurred when the mean DPO lagged the mean ASR by three years; however this observation and all the other observations are statistically insignificant. Refer to Appendix 9.10 Detailed Cross-correlation test: Mean DPOs with the Mean ASRs of the selected sample from the JSE Top 40 Index for a full presentation of these results.

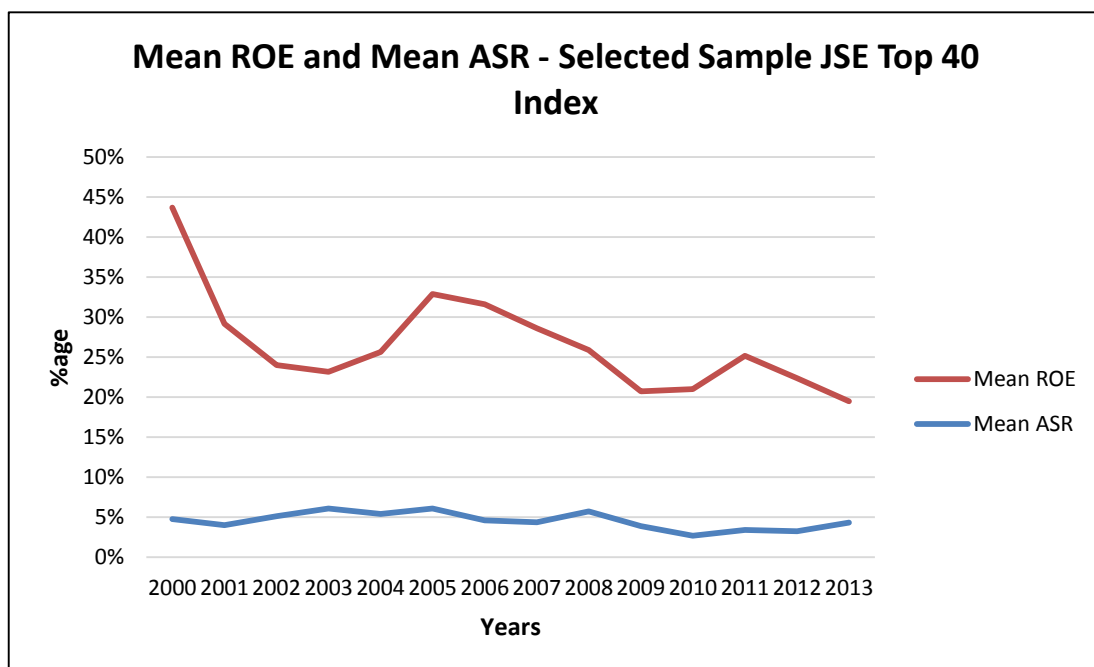
Based on this result the null hypothesis that there is no correlation between the average DPO of the companies and the average ASR of the companies listed on the JSE Top 40 Index could not be rejected.

## 5.6 Hypothesis 2

The null hypothesis stated that there is no correlation between the average ROE of the companies and the average ASR of the companies listed on the JSE Top 40 Index. The alternative hypothesis stated that there is a correlation between the average ROE of the companies and the average ASR of the companies listed on the JSE Top 40 Index.

The mean ROE and mean ASR percentages were calculated from inputs according to the data collection process for the period between 2000 and 2013. The mean ROE and mean ASRs (with the outliers excluded) were plotted on a time series chart as displayed in Figure 10 below:

**Figure 10: Mean ROEs and mean ASRs for the selected sample from the JSE Top 40 Index**



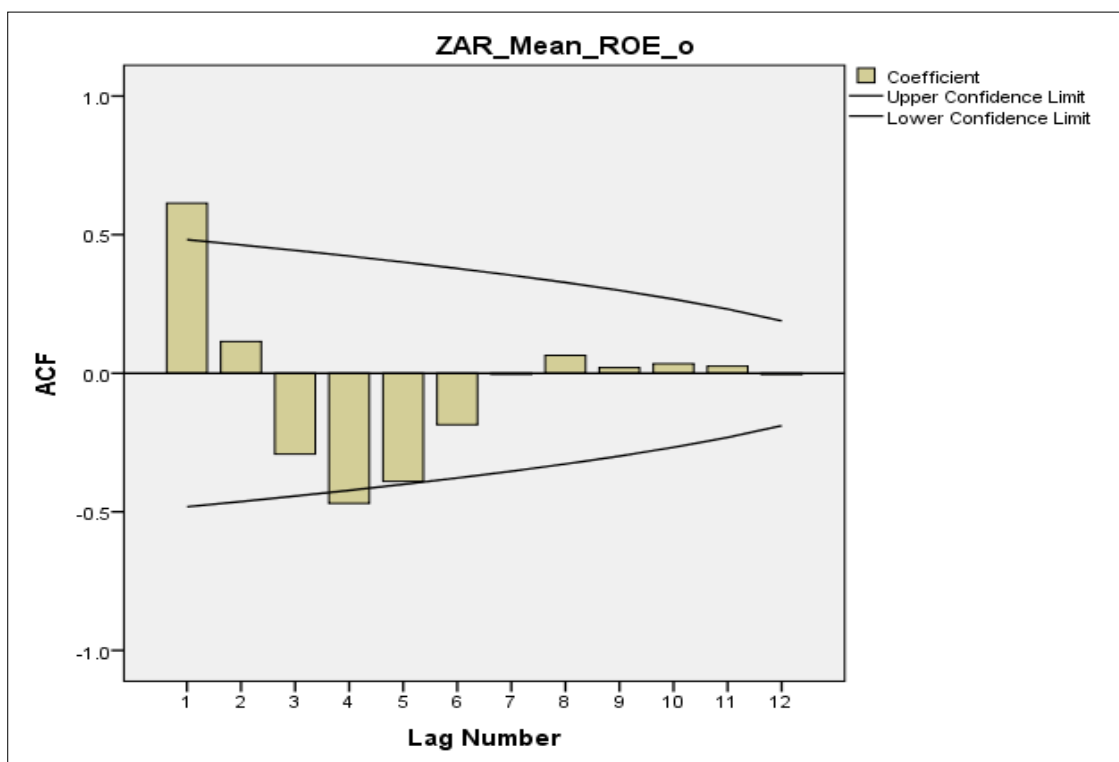
It can be observed from the chart that the mean ROE demonstrated a downward trend from 2000, bottoming out in 2003 and then increased annually until the maximum ROE was achieved in 2006. The mean ROE then decreased from 2006 and bottomed out again in 2009. The mean ROE has increased steadily since 2009 to a peak in 2011

and then decreased from 2011 to 2013. The mean ROE and mean ASR seemed to track each other, although at a lag. The mean ASR fluctuates during the period of the longitudinal study with peaks and troughs throughout the period with the peaks being achieved in 2003, 2008 and 2013.

Calomiris, Love and Martínez Pería (2012) stated that the Global Financial Crisis resulted in the following “crisis shocks”: the collapse of global trade, the contraction of credit supply and selling pressure on the company’s equity. The authors also stated that this applied to both emerging and developed economies. The collapse of global trade and the contraction of credit supply affected the earnings potential and potential dividend pay-outs from the companies due to the decreased profitability of the companies.

In accordance with the research design described in Chapter 4, the mean ROE for the selected sample of 27 companies from 2000 to 2013 were tested for randomness using the autocorrelation test. The results of the test appear in Figure 11 below.

**Figure 11: Autocorrelation test: Mean ROEs of the selected sample from the JSE Top 40 Index**



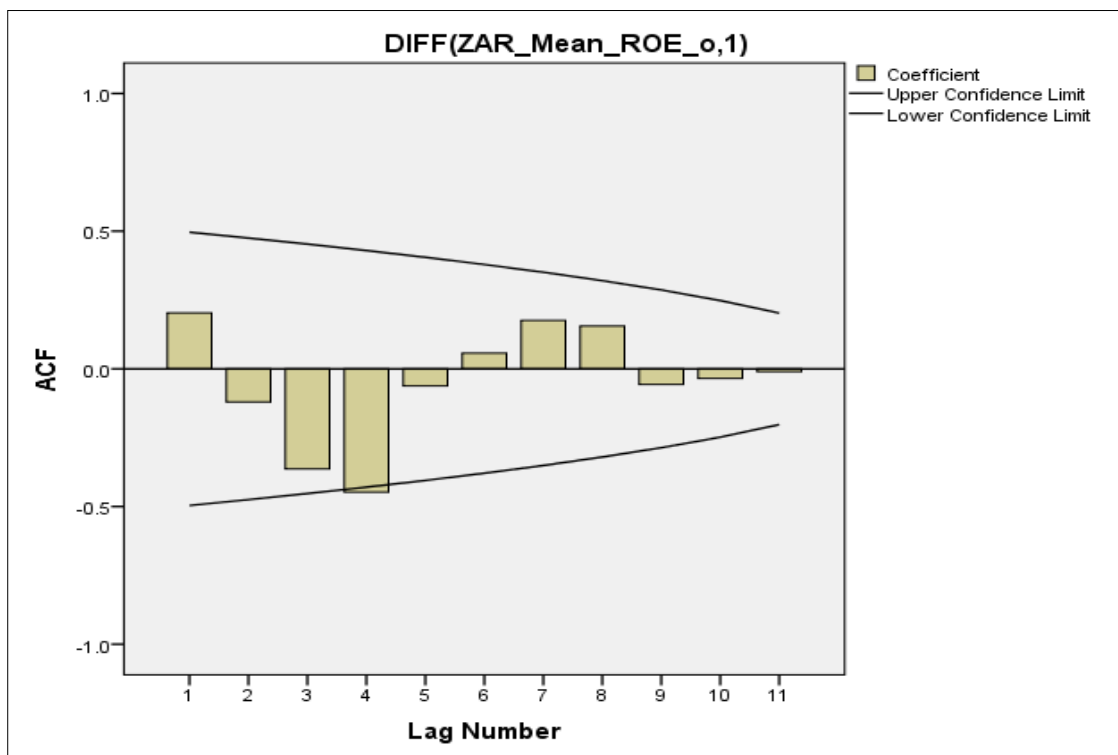
The results of the test indicate that the autocorrelations were statistically significant at the 95% confidence level. This is indicated by the bar in lag 1 breaching the 95% confidence level in Figure 11 above. Albright *et al.* (2006) stated that “the first few lags

are the most important and intuitively if there is any relationship between successive observations, it is likely to be between nearby observations”. Refer to Appendix 9.11 Detailed Autocorrelation test: Mean ROEs of the selected sample from the JSE Top 40 Index for a full presentation of these results.

According to Albright *et al.* (2006), the random walk model should be employed if the time series is not a random time series. In a random walk model the time series itself is not random, however, its differences, that is, the changes from one period to the next are random. In order to eliminate the autocorrelations, a differenced time series test needs to be performed, which is a time series of the differences between the data values. As a result of this test time dependency can be reduced.

In accordance with the research design expounded in Chapter 4, the mean ROE for the selected sample of 27 companies from 2000 to 2013 were tested utilising the differenced tests. The results of the differenced test appear in Figure 12 below.

**Figure 12: Differenced autocorrelation test: Mean ROEs of the selected sample from the JSE Top 40 Index**



In terms of the analysis and results of the differenced tests, the results of the test indicate that the autocorrelations are within the confidence level of 95% except for lag 4 that is outside the confidence level limit. Albright *et al.* (2006) stated that “the first few lags are the most important and intuitively if there is any relationship between

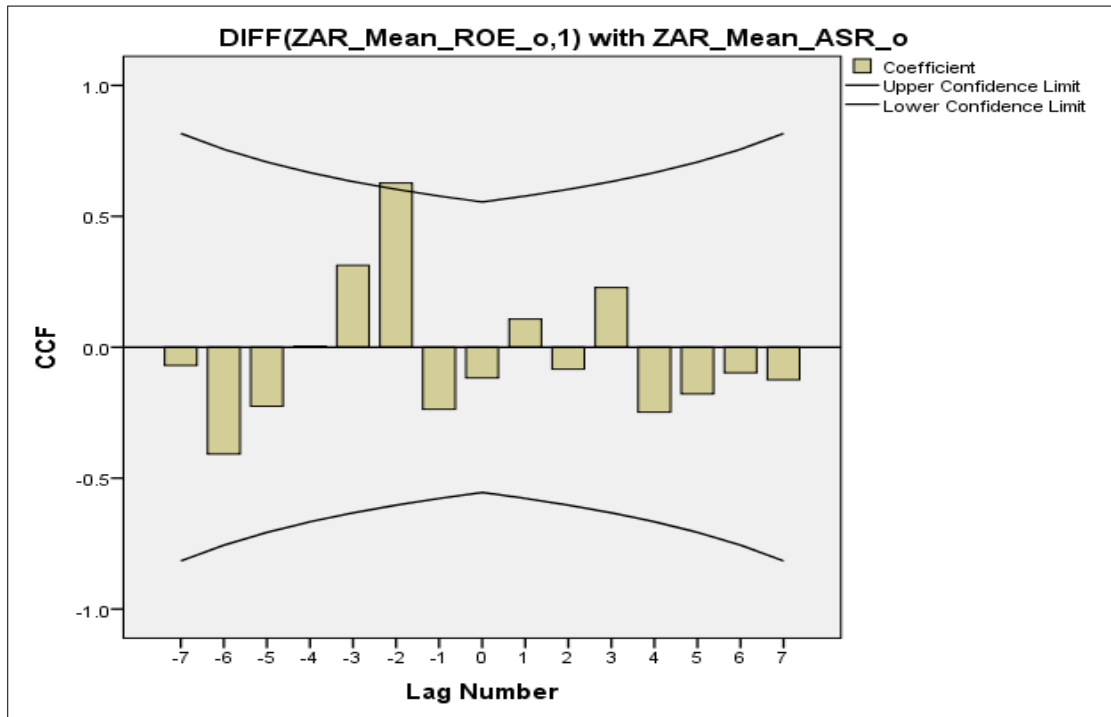
successive observations, it is likely to be between nearby observations. As a result of this; autocorrelations at larger lags can often be ignored as a random “blip” unless there is some obvious reason for its occurrence”. No obvious reason for this occurrence was identified.

In terms of the analysis and results, due to the fact that the first two lags do not breach the 95% confidence level, it can be concluded that the differenced time series is a random series. The results indicate that the data is random and that the data points are not time sensitive. Refer to Appendix 9.12 Detailed Differenced Autocorrelation test: Mean ROEs of the selected sample from the JSE Top 40 Index for a full presentation of these results.

The differenced autocorrelation tests for randomness proved satisfactory. The time series was tested for correlations between the mean ROE and the mean ASRs.

In accordance with the research design presented in Chapter 4, the mean ROE for the selected sample of 27 companies from 2000 to 2013 was tested in terms of a cross-correlation test to determine the nature of the relationship and the correlation between the mean ROE and the mean ASR. A cross-correlation test is preferred to regression testing as cross-correlations allow the relationship at different time lags to be observed so that peculiar times within the time series can be identified. The results of the test appear in Figure 13 below.

**Figure 13: Cross-correlation test: Mean ROEs with the Mean ASRs of the selected sample from the JSE Top 40 Index**



The results of the cross-correlation test between the mean ROE and the mean ASR revealed a significant positive correlation between the mean ROE and the mean ASR by 2 years. This is identified by the bar graph in lag -2 breaching the confidence limit in Figure 13 above. There is a statistically positive correlation between the two variables of 0.627. Refer to Appendix 9.13 Detailed Cross-correlation test: Mean ROEs with the Mean ASRs of the selected sample from the JSE Top 40 Index for a full presentation of these results.

Based on the 95% confidence level and in terms of the research design and data analysis, the correlations proved to be statistically significant at this confidence level.

Based on this result the null hypothesis was rejected and the conclusion that has been reached is that there is a correlation between the average ROE of the companies and the average ASR of the companies listed on the JSE Top 40 Index.

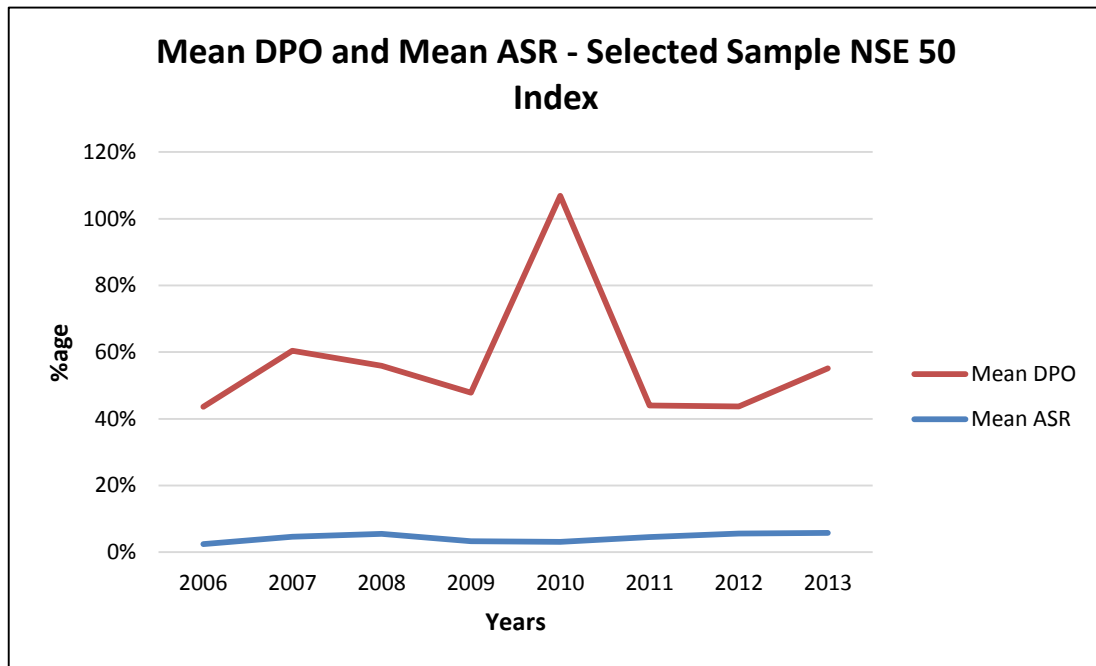
### 5.7 Hypothesis 3

The null hypothesis stated that there is no correlation between the average DPO of the companies and the average ASR of the companies listed on the NSE 50 Index. The alternative hypothesis stated that there is a correlation between the average DPO of the companies and the average ASR of the companies listed on the NSE 50 Index.



The mean DPO and ASR percentages were calculated from inputs garnered from the data collection process for the period 2006 to 2013. The mean DPO and mean ASRs (with the outliers excluded) were plotted on a time series chart as displayed in Figure 14 below:

**Figure 14: Mean DPOs and mean ASRs for the selected sample from the NSE 50 Index**

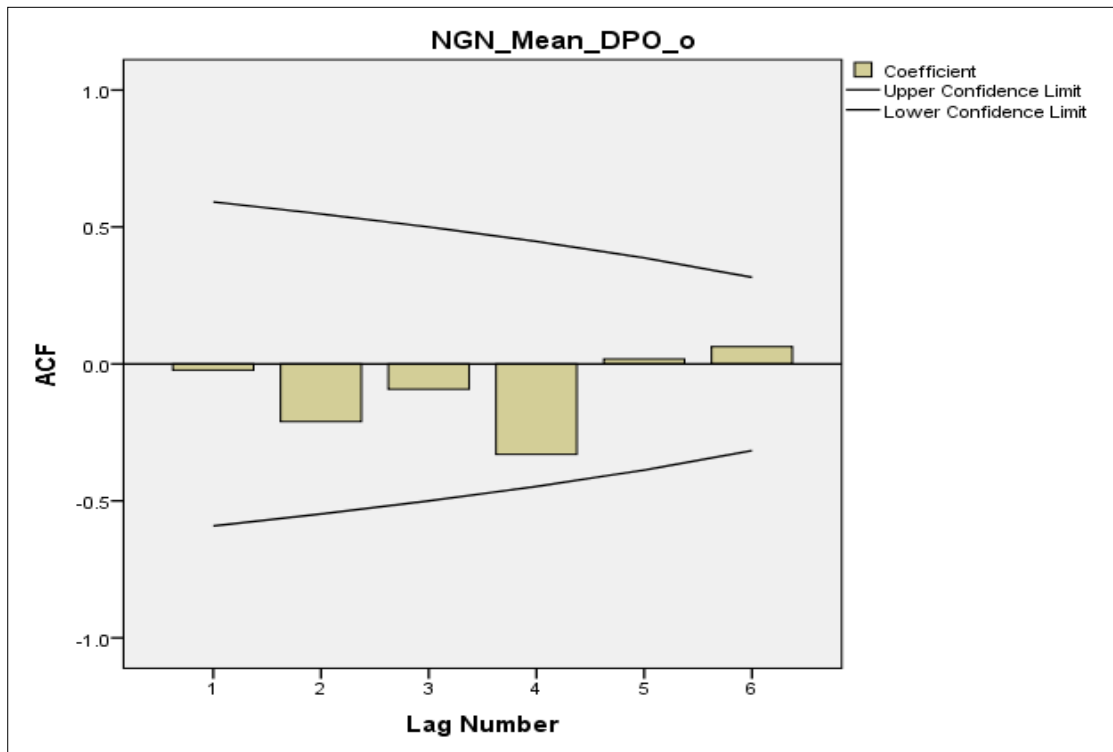


It can be observed from the chart that the mean DPO is at its' maximum in 2010 of 104% and demonstrates a downward trend from 2010 with a trough of 38% in 2012, then increasing to 49% in 2013. The mean DPO and mean ASR do not seem to track each other in any particular pattern or trend. The mean DPO dipped in 2008 and 2009 and rose to a maximum of 104% in 2010. The mean ASR does not fluctuate significantly during the period of the longitudinal study with the highest returns being achieved in 2008 and 2013. The trends between the mean DPO and the mean ASR are unclear.

The effect of the Global Financial Crisis is elaborated in Chapter 1 and Hypothesis 1 of this research study.

In accordance with the research design presented in Chapter 4, the mean DPO for the selected sample of nine companies from 2006 to 2013 were tested for randomness using the autocorrelation test. The results of the test appear in Figure 15 below.

**Figure 15: Autocorrelation test: Mean DPOs of the selected sample from the NSE 50 Index**

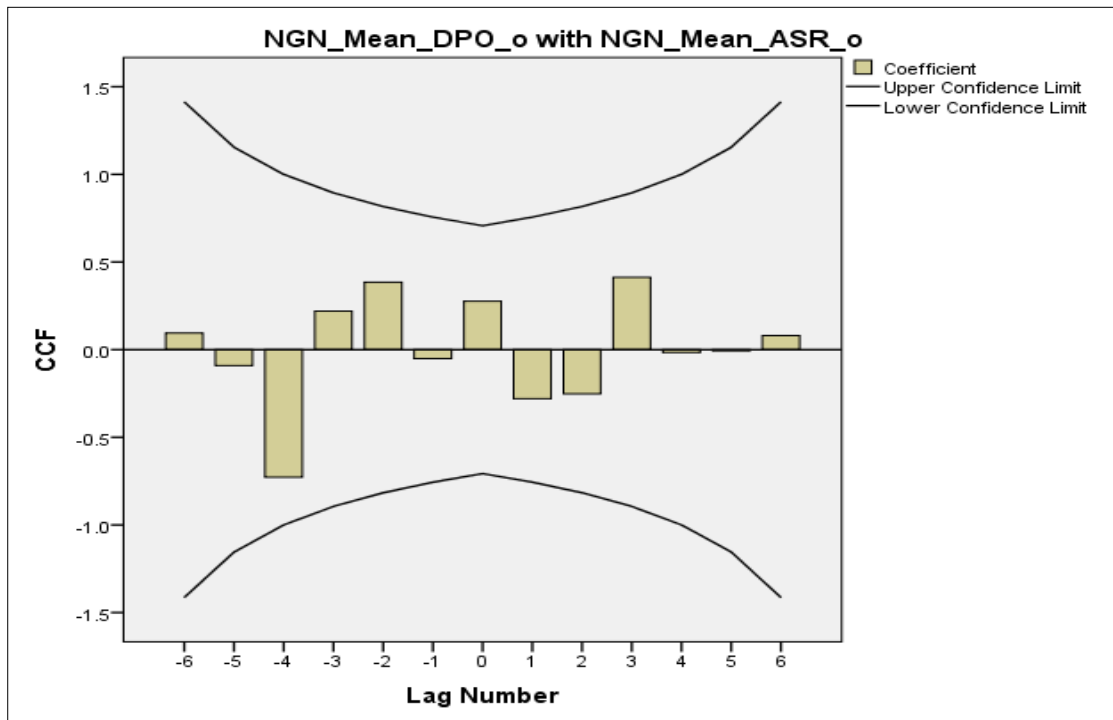


The results of the test indicate that the autocorrelations are within the confidence level of 95%. In terms of the analysis and results, due to the fact that the lags do not breach the 95% confidence level, it can be concluded that the time series is a random series. The results indicate that the data is random and that the data points are not time sensitive. As a result of this test and the outcome noted above, no differenced tests were performed on the data as the data was tested and the tests confirm that the data is random. Refer to Appendix 9.14 Detailed Autocorrelation test: Mean DPOs of the selected sample from the NSE 50 Index for a full presentation of these results.

The autocorrelation tests for randomness proved satisfactory. The time series was tested for correlations between the mean DPO and the mean ASR's.

In accordance with the research design described in Chapter 4, the mean DPO for the selected sample of nine companies from 2006 to 2013 was tested in terms of a cross-correlation test to determine the nature of the relationship and the correlation between the mean DPO and the mean ASR. A cross-correlation test is preferred to regression testing as cross-correlations allow the relationship at different time lags to be observed so that peculiar times within the time series can be identified. The results of the test appear in Figure 16 below.

**Figure 16: Cross-correlation test: Mean DPOs with the mean ASRs of the selected sample from the NSE 50 Index**



The results of the cross-correlation test between the mean DPO and the mean ASR proved to be inconclusive in terms of the relationship between the variables. Based on the 95% confidence level and in terms of the research design and data analysis, none of the correlations proved to be statistically significant at this confidence level regardless of the time lags applied in the testing. The strongest negative correlation of 0.728 occurred when the mean DPO lagged the mean ASR by four years; however this observation and all the other observations are statistically insignificant. Refer to Appendix 9.15 Detailed Cross-correlation test: Mean DPOs with the Mean ASR's of the selected sample from the NSE 50 Index for a full presentation of these results.

Based on this result the null hypothesis that there is no correlation between the average DPO of the companies and the average ASR of the companies listed on the NSE 50 Index could not be rejected.

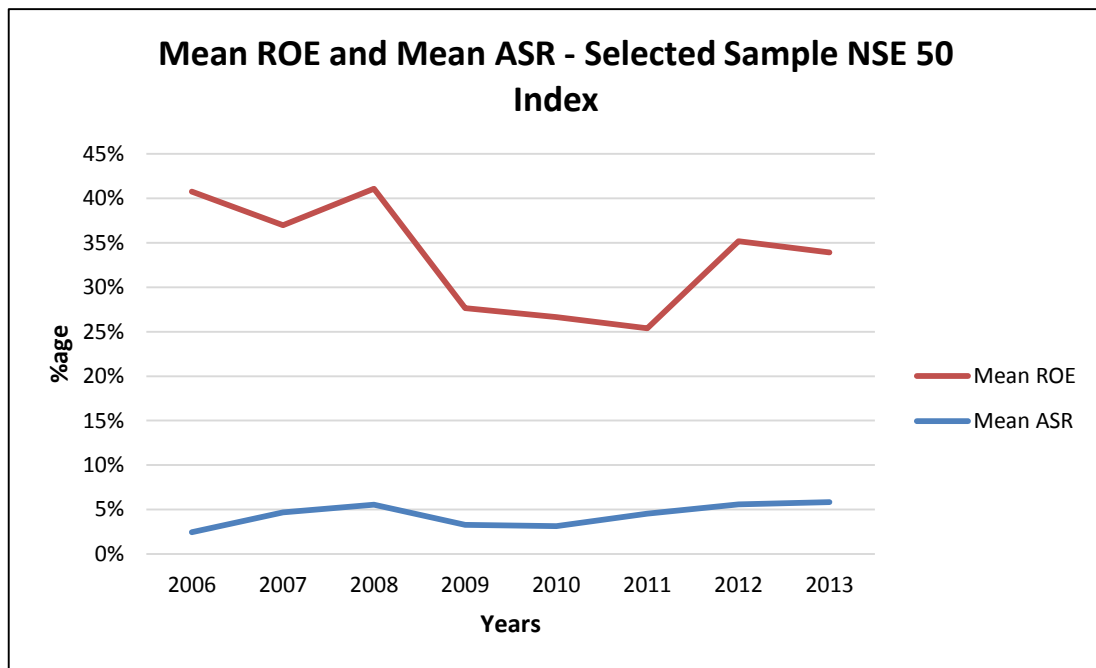
## 5.8 Hypothesis 4

The null hypothesis stated that there is no correlation between the average ROE of the companies and the average ASR of the companies listed on the NSE 50 Index. The

alternative hypothesis stated that there is a correlation between the average ROE of the companies and the average ASR of the companies listed on the NSE 50 Index.

The mean ROE and mean ASR percentages were calculated from inputs gathered during the data collection process for the period 2006 to 2013. The mean ROE and mean ASR's (with the outliers excluded) were plotted on a time series chart as displayed in Figure 17 below.

**Figure 17: Mean ROEs and mean ASRs for the selected sample from the NSE 50 Index**

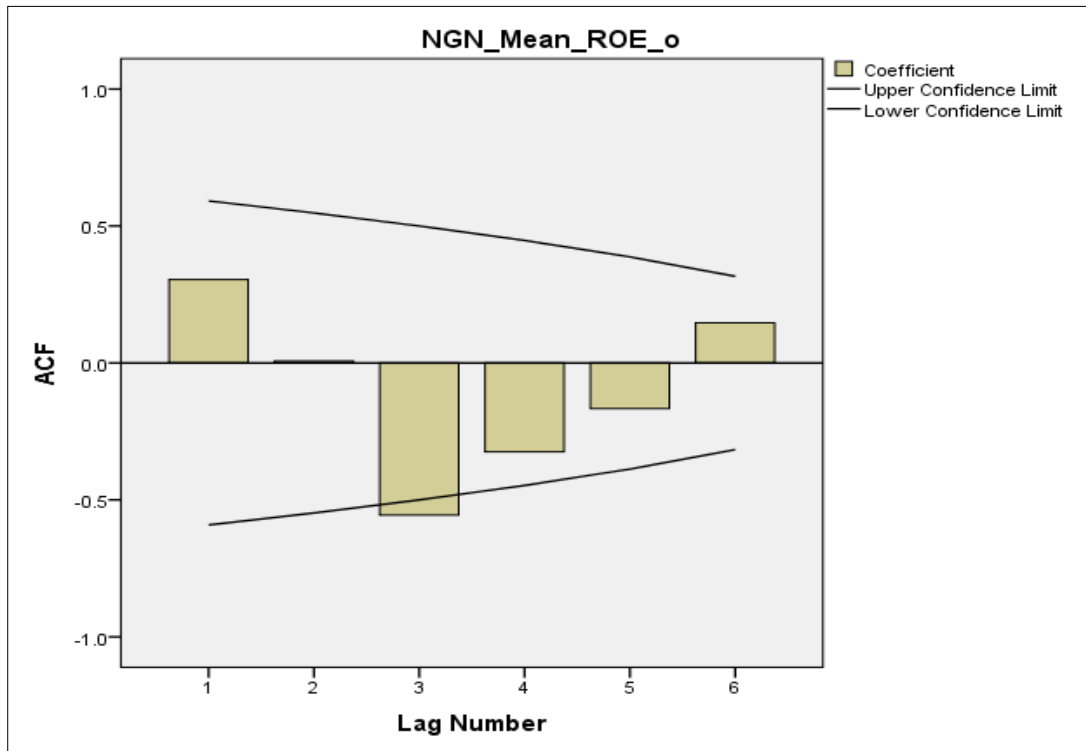


It can be observed from the chart that the mean ROE demonstrates a downward trend from 2006 to 2007 and from 2009 to 2011. The mean ROE and mean ASR do not seem to track each other in any particular pattern or trend. The mean ROE increased between 2011 and 2012 and then decreased again in 2013. The mean ASR does not fluctuate significantly during the period of the longitudinal study with the highest returns being achieved in 2007, 2008 and 2013. The trends between the mean ROE and the mean ASR are unclear.

The effect of the Global Financial Crisis is elaborated in Chapter 1 and Hypothesis 2 of this research study.

In accordance with the research design articulated in Chapter 4, the mean ROE for the selected sample of nine companies from 2006 to 2013 were tested for randomness using the autocorrelation test. The results of the test appear in Figure 18 below.

**Figure 18: Autocorrelation test: Mean ROEs of the selected sample from the NSE 50 Index**



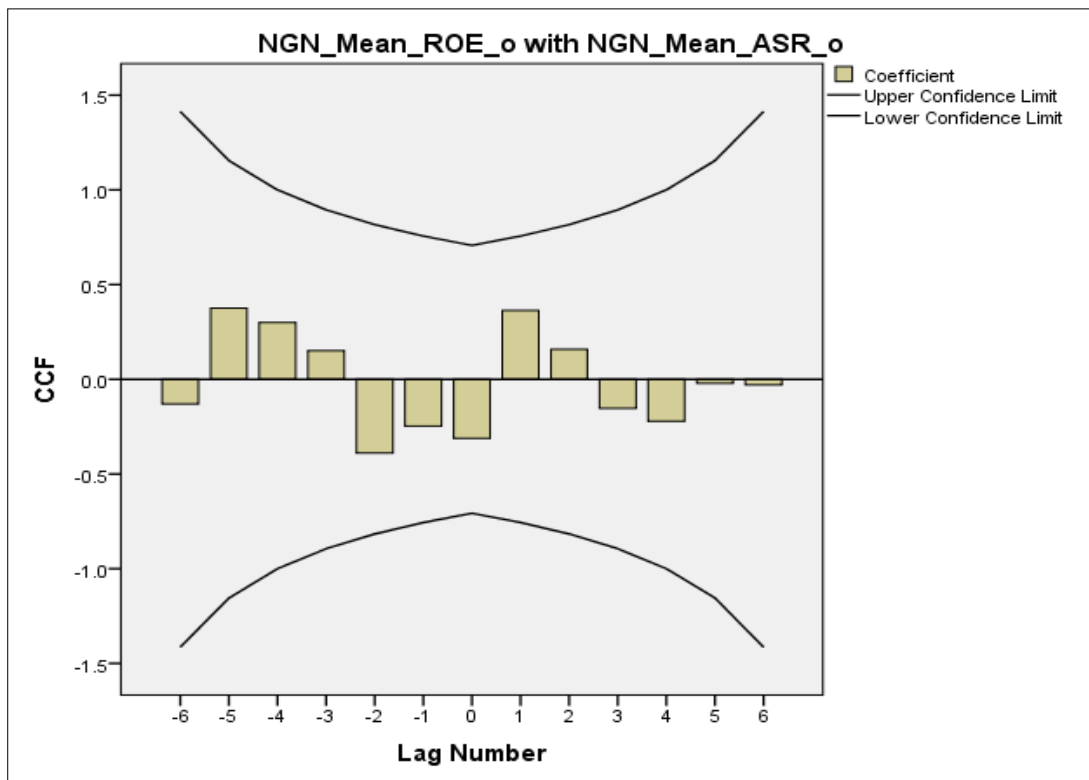
The results of the test indicate that the autocorrelations are within the confidence level of 95% except for the third lag that is outside the confidence level limit. Albright *et al.* (2006) stated that “the first few lags are the most important and intuitively if there is any relationship between successive observations, it is likely to be between nearby observations. As a result of this; autocorrelations at larger lags can often be ignored as a random “blip” unless there is some obvious reason for its occurrence”. No obvious reason for this occurrence was identified. Refer to Appendix 9.16 Detailed Autocorrelation test: Mean ROEs of the selected sample from the NSE 50 Index.

In terms of the analysis and results, due to the fact that the first two lags do not breach the 95% confidence level, it can be concluded that the time series is a random series. The results indicate that the data is random and that the data points are not time sensitive. As a result of this test and the outcome noted above, no differenced tests were performed on the data as the data was tested and the tests confirm that the data is random.

The autocorrelation tests for randomness proved satisfactory. The time series was tested for correlations between the mean ROE and the mean ASRs.

In accordance with the research design discussed in Chapter 4, the mean ROE for the selected sample of nine companies from 2006 to 2013 was tested in terms of a cross-correlation test to determine the nature of the relationship and the correlation between the mean ROE and the mean ASR. A cross-correlation test is preferred to regression testing as cross-correlations allow the relationship at different time lags to be observed so that peculiar times within the time series can be identified. The results of the test appear in Figure 19 below.

**Figure 19: Cross-correlation test: Mean ROEs with the mean ASRs of the selected sample from the NSE 50 Index**



The results of the cross-correlation test between the mean ROE and the mean ASR proved to be inconclusive in terms of the relationship between the variables. Based on the 95% confidence level and in terms of the research design and data analysis, none of the correlations proved to be statistically significant at this confidence level regardless of the time lags applied in the testing. The strongest negative correlation of 0.389 occurred when the mean ROE lagged the mean ASR by two years; however this observation and all the other observations are statistically insignificant. Refer to

Appendix 9.17 Detailed Cross-correlation test: Mean ROEs with the Mean ASR's of the selected sample from the NSE 50 Index for a full presentation of these results.

Based on this result the null hypothesis that there is no correlation between the average ROE of the companies and the average ASR of the companies listed on the NSE 50 Index could not be rejected.

## **5.9 Conclusion of findings presented**

In summary, in terms of the overview and the data collection and analysis process the selected samples were tested and a summary of the findings is presented below.

The conclusions drawn from hypothesis 1 relating to the relationship between the mean DPO and the mean ASR for both companies listed on the JSE top 40 Index proved to be inconclusive. The conclusions drawn from hypothesis 2 relating to the mean ROE and the mean ASR for companies listed on the JSE Top 40 Index revealed a significant positive correlation. The conclusions drawn from hypothesis 3 relating to the relationship between the mean DPO and the mean ASR for companies listed on the NSE 50 Index proved to be inconclusive and the conclusions drawn from hypothesis 4 relating to the relationship between the mean ROE and the mean ASR for companies listed on the NSE 50 Index also proved to be inconclusive.

Chapter 6 will deal with the discussion of the research findings including the interpretation and analysis of the results.

## **CHAPTER 6: DISCUSSION OF RESULTS**

### **6.1 Overview**

This section of the report exhaustively, but comprehensively, discusses the research findings. The interpretation and analysis of these findings are illuminated in terms of the literature reviewed in Chapter 2 of this research study.

Any similarities or differences between the findings of these reports are discussed and analysed in this section. It must be noted that the previous studies such as Hussainey *et al.* (2011) and Baker *et al.* (2012) have been performed at different time periods and in different markets. Both studies were completed in developed and emerging markets and these findings have impacted the congruency of the current research study's results. This chapter follows the same construct as Chapter 5 in that the discussion of the results are arranged according to the individual research hypotheses.

### **6.2 Hypothesis 1**

The results of the cross-correlation test between the mean DPO and the mean ASR proved to be inconclusive in terms of the relationship between the variables. Based on the 95% confidence level and in terms of the research design and data analysis, none of the correlations proved to be statistically significant at this confidence level regardless of the time lags applied in the testing. The strongest negative correlation of 0.577 occurred when the mean DPO lagged the mean ASR by three years. This means that the mean DPO lagged the mean ASR by three years with a negative correlation.

Essentially, when the mean ASR increases, it is expected that the mean DPO decreases after three years. The increase in the mean DPO in 2010 could be attributable to the 2008/2009 Global Financial Crisis. Companies continued to pay dividends during this period although there was a significant decrease in the earnings, resulting in an increase in the mean DPO. However this observation and all the other observations are statistically insignificant in terms of the testing and the results are inconclusive confirming neither a significant positive nor negative relationship between the variables.



Based on this result the null hypothesis that there is no correlation between the average DPO of the companies and the average ASR of the companies listed on the JSE Top 40 Index could not be rejected.

Previous research studies have concluded the contrary to the findings of this research. Hussainey *et al.* (2011) stated that the dividend payout ratio is one of the main determinants of the volatility of companies' stock prices and by implication the stock returns to investors. The authors studied the relationship between companies' dividend policies (dividend yield and dividend payout) and the volatility of stock prices. They found that there is a negative relationship between dividend yield and the volatility of stock prices. They also concluded that if companies' dividend payout ratios are high, the companies' stock prices are less volatile. It must be noted that Hussainey *et al.*'s (2011) study was performed in the United Kingdom for companies listed on the London Stock Exchange. The United Kingdom is classified as a developed market in terms of the MSCI World Index (2014). Therefore, it must be considered whether the ASRs for companies listed on emerging market stock exchanges react differently to DPOs for companies listed in developed markets, which was one of the objectives of this research.

According to Kheradyar *et al.* (2011) there are significant variations between emerging and developed markets. This study aimed to contribute to previous studies in emerging markets.

Further research performed by Baker *et al.* (2012) studied the tendency of companies to pay dividends. They found that their research was not definitive on management's understanding of the effect of dividend policies on stock prices and concluded that their research proved to be inconclusive, similar to the conclusion for the current research study, above. It must be noted however that Baker *et al.*'s (2012) study was performed in Canada for companies listed on the Canadian Stock Exchange. Canada is classified as a developed market in terms of the MSCI World Index (2014), similar to the United Kingdom.

In the current research study, the findings concur with that of Baker *et al.* (2012) in that both results proved to be inconclusive.

There are various factors that affect the dividend payout policies of companies and Baker *et al.* (2012) also concluded that a country's institutional features have to be considered when examining corporate payout policies, as these have an effect on

stock prices. In addition, the research performed by Fatemi and Bildik (2011) confirmed that there is a world-wide decrease in the tendency for companies to pay dividends and this could explain Baker *et al.*'s (2012) research in that the research was not definitive on management's understanding of the effect of dividend policies on stock prices. If the views of the two research reports are combined, it can be inferred that due to the world-wide decrease in the tendency for companies to pay dividends, it has resulted in reduced management time and effort in understanding and formulating dividend payout policies due to the reduced importance thereof and the "reduced" inconclusive effect on stock prices. This could be one of the reasons that the conclusion of this specific research hypothesis is inconclusive.

Another reason could be the different time periods for the research studies. In terms of the time periods for the previous research studies, Hussainey *et al.* (2011) researched a period between 1998 and 2007 (a period of nine years) and they found that a negative relationship exists between dividend yield and the volatility of stock prices. Baker *et al.* (2012) researched a period between 1989 and 2006 (a period of 17 years) and their research proved to be inconclusive. This research report tracked a period between 2000 and 2013 (a period of 14 years) and also proved to be inconclusive. In summary, different time periods and different markets and market conditions effect the conclusions reached by different researchers.

The effect of the 2008/2009 Global Financial Crisis has been elaborated in Chapter 1 and Chapter 5 of this research study.

### **6.3 Hypothesis 2**

The results of the cross-correlation test between the mean ROE and the mean ASR revealed a significant positive correlation between the mean ROE and the mean ASR by two years. There is a statistically positive correlation between the two variables of 0.627. This means that the mean ROE lagged the mean ASR by two years with a positive correlation. Essentially, when the mean ASR increases, it is expected that the mean ROE increases after two years. The mean ROE in 2009 for the selected sample from the JSE Top 40 Index, decreased in 2009, this could be attributable to the 2008/2009 Global Financial Crisis. Companies' earnings decreased during this period resulting in a decrease in the mean ROE.

Based on the 95% confidence level and in terms of the research design and data analysis, the correlations proved to be statistically significant at this confidence level.

Based on this result the null hypothesis was rejected and the conclusion that has been reached based on the sample size of 27 companies comprising approximately 80% of the JSE Top 40 Index at 30 June 2014, is that there is a correlation between the average ROE of the companies and the average ASR of the companies listed on the JSE Top 40 Index.

In order to determine the constituents of ROE, Firer *et al.* (2012) stated that “the Du Pont system is a financial analysis and planning tool that is designed to provide an understanding of the factors that drive the return on equity of the firm”. These factors include operational efficiency, which is measured by profit margin; asset use efficiency, which is measured by total asset turnover; and financial leverage, which is measured by the equity multiplier.

Soliman (2008) and Chang *et al.* (2014) concurred with Firer *et al.* (2012) in that the DuPont analysis disaggregates companies’ returns on net operating assets into profit margin and total asset turnover, which are both constituents of ROE. Both Lim (2014) and Chang *et al.* (2014) concurred that profitability margins are more important than financing activities or asset turnover respectively.

Lim’s (2014) research concluded that profitability margins determined by operating activities have a stronger association with annual stock returns as compared to financing activities. The current research study’s findings concurred with Lim’s (2014) research in that there is an association between ROE (and its constituent profitability margins) and the annual stock returns for companies.

Novy-Marx (2013) also concurred with the results of this research in that controlling for profitability dramatically increases the performance of value strategies for a company. When companies manage and control their profitability this should result in increased stock returns to the investors. In addition, Da and Warachka’s (2010) research concluded that investors concentrate on medium-term earnings growth as compared to long-term growth forecasts. This infers that investors prefer to have visibility of medium-term forecasts in conjunction with the historic earnings and profitability of companies. This adds credence that investors prefer to utilise financial ratios based on historic financial results and this concurs with the results of this research in that there is

a positive correlation between the mean ROE and the mean ASR's of companies listed on the JSE Top 40 Index.

In contrast to the findings of this research, Barber *et al.* (2012) stated that stock returns are higher during the period of earnings announcements. In summary, this provides evidence of positive earnings announcements, resulting in higher stock returns for investors at the time of the earnings announcements. This is in contrast to the current research study's findings in that the ASRs increase at first and the increase in ROE lags the increase in ASR's by two years. Essentially, the market "pre-empt" and forecasts the profitability of companies into the future and their share prices increase; the profit from the activities and forecasts is then earned by the companies and reported in subsequent years in their audited financial results which results in an increase in ROE, albeit two years later.

Savor's (2011) research is also contrasted to the findings of the current research study in that Savor (2011) stated that investors underreact to news that affects the fundamentals of stock prices and overreacts to other news that affects stock prices. ROE is one of the fundamentals that affect stock prices; to this end, this research concluded that there is a positive correlation between ROE and the ASRs of companies.

In conclusion, there are many factors that affect stock returns that are currently being debated. Menike and Prabath (2014) stated that there are many factors that can affect stock prices, namely macro-economic conditions, political situations, government's industrial policy and technical aspects within companies. In particular, potential investors would need to perform an assessment of the financial markets and the investment environment in general. An assessment of the effects of ROE on annual stock returns would be one of the indicators that potential investors could utilise to determine the stocks in which they should invest.

### **6.4 Hypothesis 3**

The results of the cross-correlation test between the mean DPO and the mean ASR proved to be inconclusive in terms of the relationship between the variables. Based on the 95% confidence level and in terms of the research design and data analysis, none of the correlations proved to be statistically significant at this confidence level regardless of the time lags applied in the testing. The strongest negative correlation of

0.728 occurred when the mean DPO lagged the mean ASR by four years. This means that the mean DPO lagged the mean ASR by four years with a negative correlation. Principally, when the mean ASR increases, it is expected that the mean DPO decreases after four years. Similar to the mean DPO in 2010 for the selected sample from the JSE Top 40 Index, the increase in the mean DPO in 2010 could be attributable to the 2008/2009 Global Financial Crisis. Companies continued to pay dividends during this period although there was a significant decrease in the earnings, resulting in an increase in the mean DPO. However this observation and all the other observations are statistically insignificant in terms of the testing and the results are inconclusive, confirming neither a significant positive nor negative relationship between the variables.

Based on this result the null hypothesis that there is no correlation between the average DPO of the companies and the average ASR of the companies listed on the NSE 50 Index could not be rejected.

Similar to the findings and interpretation in Hypothesis 1, previous research studies have concluded the contrary to the findings of this research. Hussainey *et al.* (2011) studied the relationship between companies' dividend policies (dividend yield and dividend pay-out) and the volatility of stock prices. The authors found that there is a negative relationship between dividend yield and the volatility of stock prices. Further research performed by Baker *et al.* (2012) studied the tendency of companies to pay dividends. They found that their research was not definitive regarding management's understanding of the effect of dividend policies on stock prices and concluded that their research proved to be inconclusive, similar to the findings of the current research study. The limitations and the different markets in which these research studies were performed are elaborated on in Hypothesis 1.

There are various other reasons affecting the dividend payout policies of companies and Baker *et al.* (2012) also concluded that a country's institutional features have to be considered when examining corporate payout policies, as these affect stock prices.

One of the limitations of this study that could have affected the results is that fact that only nine companies of the 50 companies that comprised of the NSE 50 Index were tracked. In order to obtain credibility for the longitudinal study, this research attempted to obtain as many years of historical information of the companies listed in the NSE 50 Index and the maximum period of eight years (from 2006 to 2013) was selected due to the availability of information.

It was noted that Dangote Cement PLC was only listed on the NSE in 2010. Due to this fact, there was no historic information prior to 2010 and this company could not be included in the study. A period of four years, from 2010 to 2013 is too short a period to conduct a longitudinal analysis. At 30 June 2014, Dangote Cement PLC had a market capitalisation of approximately N2.32 trillion and was the largest listed company on the NSE 50 Index. Dangote Cement PLC comprised 18% of the NSE 50 Index. Based on the sample size of nine companies, these companies comprised approximately 42% of the NSE 50 Index at 30 June 2014 based on market capitalisation of the companies. If the information for Dangote Cement PLC was available, the total coverage of the NSE 50 Index would have increased to 60% from the current coverage of 42%.

In summary, different time periods and different markets and market conditions have an effect on the conclusions of the different researchers as noted above. The limitations and the different markets in which these research studies were performed are elaborated on in Hypothesis 1.

## **6.5 Hypothesis 4**

The results of the cross-correlation test between the mean ROE and the mean ASR proved to be inconclusive in terms of the relationship between the variables. Based on the 95% confidence level and in terms of the research design and data analysis, none of the correlations proved to be statistically significant at this confidence level regardless of the time lags applied in the testing. The strongest negative correlation of 0.389 occurred when the mean ROE lagged the mean ASR by two years. This means that the mean ROE lagged the mean ASR by two years with a negative correlation. Quintessentially, when the mean ASR increases, it is expected that the mean ROE decreases after two years. Similar to the mean ROE in 2009 for the selected sample from the JSE Top 40 Index, the decrease in the mean ROE in 2009 could be attributable to the 2008/2009 Global Financial Crisis. Companies' earnings decreased during this period resulting in a decrease in the mean ROE; however this observation and all the other observations are statistically insignificant.

Based on this result the null hypothesis, which states that there is no correlation between the average ROE of the companies and the average ASR of the companies listed on the NSE 50 Index, could not be rejected.

It is inconclusive whether there is a correlation between the ROE and the ASRs of companies that are listed on the NSE 50 Index; however this is in contrast to Lim's (2014) research that concluded that profitability margins determined by operating activities have a stronger association with annual stock returns when compared to financing activities.

One of the limitations of this study that could have affected the results is that fact that nine companies of the 50 companies that comprised of the NSE 50 Index were tracked. In order to obtain credibility for the longitudinal study, this research attempted to obtain as many years of historical information of the companies listed in the NSE 50 Index and the maximum period of eight years (from 2006 to 2013) was selected due to the availability of information.

It was noted that Dangote Cement PLC was only listed on the NSE in 2010. Due to this fact, there was no historic information prior to 2010 available, and this company could not be included in the study. The average ROE for Dangote Cement PLC from 2010 to 2013 was 48%. At 30 June 2014, Dangote Cement PLC had a market capitalisation of approximately N2.32 trillion and was the largest listed company on the NSE 50 Index. Dangote Cement PLC comprised 18% of the NSE 50 Index. Based on the sample size of nine companies, these companies comprised approximately 42% of the NSE 50 Index at 30 June 2014 based on market capitalisation of the companies. If the information for Dangote Cement PLC was available, the total coverage of the NSE 50 Index would have increased to 60% from the current coverage of 42%.

According to the Nigerian Stock Exchange (2014), the turnover velocity percentage of the NSE is 7.89%. In terms of the Nigerian Stock Exchange (2014), the turnover velocity percentage is calculated as the value traded of domestic equities divided by the domestic equities market capitalisation. The turnover velocity represents the liquidity of the stock market and this is important to potential investors when buying and selling shares on the NSE. In comparison, the turnover velocity of the JSE is 55.25% according to the Nigerian Stock Exchange (2014) report. The reduced liquidity in the NSE could impact the trading statistics of the NSE and subsequently the ASR of the companies that are listed on the NSE.

## **6.6 Conclusion**

In summary, different time periods and different sample sizes for the tests affects the conclusions of different researchers. The limitations and the different time periods and different sample sizes in which these research studies were performed are elaborated on in Hypothesis 1 and Hypothesis 3.

The research objectives formulated in the introductory chapter of this research report have been attained. Chapter 7 provides concluding comments on the research report.



## CHAPTER 7: CONCLUSION

### 7.1 Concluding remarks

The field of stock returns and the success that can be derived from assessing stock returns for investors depends on a variety of aspects: the perception of investors, investors' behaviour, stock fundamentals including historical results and financial ratios, investments in emerging or developed markets and market sentiment, amongst others.

With reference to the past decade, stock return performance from emerging markets has exceeded the returns from developed economies according to the MSCI Emerging Frontier Markets Africa Index (2014). The market in which an investor decides to invest in also has an effect on the returns of an investor. Kheradyar *et al.* (2011) stated that it is appropriate to consider and appreciate that there are significant variations between emerging and developed markets and that further studies in this regard would assist in determining the salient features that make emerging markets attractive options for investors. The research performed by Youssef and Galloppo (2013) stated that particularly, more studies are required for emerging stock markets in Asia and Africa. These markets were the least affected by the 2008/2009 Global Financial Crisis and potential investors could be attracted to these markets as a result of this resilience.

Africa with its emerging market economies is perceived as the final frontier for investors who seek to earn superior returns. This perspective is supported by the pertinent themes published in the Ernst and Young (2013) Africa Attractiveness Survey. The impact of financial ratios on stock returns in emerging financial markets in Africa is an important indicator to assess potential stock returns to investors. This emphasises the need for assessing stock returns in African stock markets, as investors could potentially earn higher yields in these markets.

In terms of the MSCI Emerging Frontier Markets Africa Index (2014), the researcher selected the largest emerging market country and the largest new emerging market or frontier market country in Africa by market capitalisation namely, South Africa and Nigeria, specifically concentrating on companies listed on the JSE and NSE respectively.

This research provided a more profound understanding of two specific financial ratios, namely the ROE and DPO ratios and their impact on stock returns in emerging stock

markets in South Africa and Nigeria, with Nigeria gaining specific attention due to the paucity of research available on financial ratios in the region.

In terms of the research methodology, autocorrelation and cross correlation tests were performed to determine whether a correlation existed between the financial ratios and the ASRs of the companies listed on the JSE Top 40 Index and the NSE 50 Index.

This section follows the same construct as Chapter 5 and Chapter 6 in that the conclusions are arranged according to the individual research hypotheses.

### **7.1.1 Hypothesis 1**

The conclusions drawn from the research study were inconclusive with regard to the results of the cross-correlation tests, in terms of the relationship between the mean DPO and the mean ASR for companies listed on the JSE Top 40 Index. The observations from these tests were statistically insignificant and the null hypotheses could not be rejected for these tests.

### **7.1.2 Hypothesis 2**

The conclusion delineated from the research study in terms of the cross-correlation test between the mean ROE and the mean ASR for companies listed on the JSE Top 40 Index revealed a significant positive correlation between the mean ROE and the mean ASR by two years. There is a statistically positive correlation between the two variables of 0.627. This means that the mean ROE lagged the mean ASR by two years with a positive correlation. Essentially, when the mean ASR increases, it is expected that the mean ROE increases after two years. Based on this result the null hypothesis was rejected. It was determined that the sample that comprised approximately 80% of the JSE Top 40 Index at 30 June 2014 was based on the full market capitalisation of the companies. The researcher therefore resolved that there was a correlation between the average ROE of the companies and the average ASR of the companies listed on the JSE Top 40 Index.

The implication of these results for potential investors is that there could be superior returns to be earned from investing in emerging markets in Africa. This is confirmed by Blitz *et al.* (2013) in that emerging markets are now becoming significant because of the high growth rates achieved by emerging market economies and by inference,

higher returns to potential investors provided that adequate risk assessments are performed before any investments are made.

### **7.1.3 Hypothesis 3**

The conclusions emanating from this research study were inconclusive with regard to the results of the cross-correlation tests in terms of the relationship between the mean DPO and the mean ASR for companies listed on the NSE 50 Index. The observations from these tests were statistically insignificant and the null hypotheses could not be rejected for these tests.

### **7.1.4 Hypothesis 4**

The conclusions inferred from the research study were inconclusive with regard to the results of the cross-correlation tests in terms of the relationship between the mean ROE and the mean ASR for companies listed on the NSE 50 Index. The observations from these tests were statistically insignificant and the null hypotheses could not be rejected for these tests.

In summary, there are numerous stakeholders that assess stock returns and investments in companies that are listed on various stock exchanges. These include corporate organisations, pension funds, investment banks, stockbrokers, asset management companies and investors. While these stakeholders have different aims and objectives when they consider investing in listed shares and listed stock markets, the ultimate aim is to increase shareholder wealth within an acceptable level of risk.

This research provided these stakeholders with additional information in terms of the relationships between the different variables and more specifically, the correlation between the average ROE of the companies and the average ASR of the companies listed on the JSE Top 40 Index. These stakeholders can use this information when selecting companies to invest in; pension funds could use this information when investing on behalf of provident and pension fund employees, asset managers could utilise this information when they allocate capital between competing investments and government can use this information to ensure that their stock markets and the regulatory environment in which their stock markets operate is investor friendly so that countries are better able to attract foreign investments.

## 7.2 Limitations of the research study

The following list presents the limitations of the research study:

- i. The study of the correlations relating specifically to the NSE 50 Index was limited by the short period of eight years and the small number of companies that was included in the longitudinal analysis due to the non-availability of information relating to these companies;
- ii. ROE is an aggregate ratio of PM, TAT and the EM. These drivers of ROE were not tested on a granular basis. The results of hypothesis 3 concluded that there was a correlation between the average ROE and the average ASR of the companies listed on the JSE Top 40 Index. The study did not include which component of ROE had the most significant effect on the results; and
- iii. The study only concentrated on two indices, the JSE Top 40 Index and the NSE 50 Index, which includes financial, industrial and mining companies. Cyclical variations in returns between the sectors could also affect the results.

## 7.3 Recommendations

In terms of the recommendations for future studies relating to the effects of financial ratios on annual stock returns, the following could be explored:

- i. In terms of the coverage of the companies listed on the different stock exchanges, it is advisable to obtain a high coverage of these companies so that the results are comparable to the entire exchanges or specific indices;
- ii. The study should be conducted over a longer time period due to the longitudinal basis of this study. The more data points and information that is available, the more accurate the results of the time series tests should be, depending on market conditions;
- iii. Only two financial ratios were tested as part of this research, other financial ratios could also be tested and in particular the individual

constituents of ROE can be tested individually, i.e.: profit margin, total asset turnover and the equity multiplier. This will assist to determine the drivers of ROE on a more granular basis;

- iv. The same study can be performed utilising industry indices such as the Financial and Industrial Index and the Resources Index on the JSE;
- v. This study utilised the statistical tests of autocorrelation and cross correlation in terms of the research methodology; it is possible to replicate these tests utilising other statistical tests such as regression analyses; and
- vi. This study could also be replicated for other emerging market countries especially in Africa as the data becomes available to perform the longitudinal study.

## REFERENCES

- Abreu, M., Mendes, V., & Santos, J. A. C. (2011). Home country bias: Does domestic experience help investors enter foreign markets? *Journal of Banking & Finance*, 35(9), 2330–2340.
- African Securities Exchanges Association. (2014). *ASEA 2014 Yearbook. September 2014*. Nairobi: ASEA Secretariat.
- Albright, C., Winston, W., & Zappe, C. (2006). *Data analysis and decision making*. Mason: South-Western Cengage Learning.
- Bai, Y. (2014). Cross-border sentiment: an empirical analysis on EU stock markets. *Applied Financial Economics*, 24(4), 259–290.
- Baker, H. K., Chang, B., Dutta, S., & Saadi, S. (2012). Why firms do not pay dividends: the Canadian experience. *Journal of Business Finance & Accounting*, 39(9-10), 1330–1356.
- Baker, M., Wurgler, J., & Yuan, Y. (2012). Global, local, and contagious investor sentiment. *Journal of Financial Economics*, 104(2), 272–287.
- Barber, B. M., De George, E. T., Lehavy, R., & Trueman, B. (2012). The earnings announcement premium around the globe. *Journal of Financial Economics*, 108(1), 118–138.
- Bergeron, C. (2011). Dividend growth, stock valuation, and long-run risk. *Journal of Economics and Finance*, 37(4), 547–559.
- Blitz, D., Pang, J., & van Vliet, P. (2013). The volatility effect in emerging markets. *Emerging Markets Review*, 16, 31–45.
- Cai, J., & Zhang, Z. (2010). Leverage change, debt overhang, and stock prices. *Journal of Corporate Finance*, 17(3), 391–402.
- Calomiris, C. W., Love, I., & Martínez Pería, M. S. (2012). Stock returns' sensitivities to crisis shocks: Evidence from developed and emerging markets. *Journal of International Money and Finance*, 31(4), 743–765.

- Chan-Lau, J. A. (2012). Frontier markets: Punching below their weight? A risk parity perspective on asset allocation. *Journal of Investing*, 21(3), 140.
- Chang, K. J., Chichernea, D. C., & HassabElnaby, H. R. (2014). On the DuPont analysis in the health care industry. *Journal of Accounting and Public Policy*, 33(1), 83–103.
- Christelis, D., & Georgarakos, D. (2013). Investing at home and abroad: Different costs, different people? *Journal of Banking & Finance*, 37(6), 2069–2086.
- Cooper, M. J., Gulen, H., & Schill, M. J. (2008). Asset growth and the cross-section of stock returns. *The Journal of Finance*, 63(4), 1609–1651.
- Da, Z., & Warachka, M. (2010). The disparity between long-term and short-term forecasted earnings growth. *Journal of Financial Economics*, 100(2), 424–442.
- De Groot, W., Pang, J., & Swinkels, L. (2012). The cross-section of stock returns in frontier emerging markets. *Journal of Empirical Finance*, 19(5), 796–818.
- Ernst and Young (2013). Ernst and Young's attractiveness survey Africa 2013. Getting down to business. Retrieved from: [http://www.avca-africa.org/wp-content/uploads/2013/09/Africa\\_Attractiveness\\_Survey\\_2013\\_AU1582.pdf](http://www.avca-africa.org/wp-content/uploads/2013/09/Africa_Attractiveness_Survey_2013_AU1582.pdf)
- Fatemi, A., & Bildik, R. (2011). Yes, dividends are disappearing: Worldwide evidence. *Journal of Banking & Finance*, 36(3), 662–677.
- Fernando, C. S., Gatchev, V. A., & Spindt, P. A. (2012). Institutional ownership, analyst following, and share prices. *Journal of Banking & Finance*, 36(8), 2175–2189.
- Financial Times (2014). Nigeria and South Africa intensify rivalry after GDP figure (Online). Available from: <http://www.ft.com/cms/s/0/0056b830-be68-11e3-a1bf-00144feabdc0.html#axzz306Q8rR6z>. (Accessed 27 April 2014).
- Firer, C., Ross, S. A., Westerfield, R. W., & Jordan, B. D. (2012). *Fundamentals of Corporate Finance*. Berkshire: McGraw-Hill Education (UK) Limited.
- FTSE/JSE All-Share Index (2014). *FTSE Factsheet, June 2014*. London: FTSE International Limited.
- FTSE/JSE Top 40 Index (2014). *FTSE Factsheet, June 2014*. London: FTSE International Limited.

- Hussainey, K., Mgbame, C. O., & Chijoke-Mgbame, A. M. (2011). Dividend policy and share price volatility: UK evidence. *The Journal of Risk Finance*, 12(1), 57–68.
- Hwang, B.-H. (2010). Country-specific sentiment and security prices. *Journal of Financial Economics*, 100(2), 382–401.
- Innocent, E. C., Mary, O. I., & Matthew, O. M. (2013). Financial Ratio Analysis as a Determinant of Profitability in Nigerian Pharmaceutical Industry. *International Journal of Business and Management*, 8(8), 107-117.
- Jiang, C. X., Kim, J.-C., & Zhou, D. (2011). Liquidity, analysts, and institutional ownership. *International Review of Financial Analysis*, 20(5), 335–344.
- Johnson, R. A., & Wichern, D. W. (1997). *Business Statistics: Decision making with data*. New Jersey: John Wiley & Sons, Inc.
- Karami, G. R., & Talaei, L. (2013). Predictability of stock returns using financial ratios in the companies listed in Tehran Stock Exchange. *International Research Journal of Applied and Basic Sciences*, 5(3), 360-372.
- Kearney, C. (2012). Emerging markets research: Trends, issues and future directions. *Emerging Markets Review*, 13, 159–183.
- Kheradyar, S., Ibrahim, I., & Nor, F. (2011). Stock Return Predictability with Financial Ratios. *International Journal of Trade, Economics & Finance*, 2(5), 391-396.
- Lim, S. C. (2014). The information content of disaggregated accounting profitability: operating activities versus financing activities. *Review of Quantitative Finance and Accounting*, 43(1), 75–96.
- Liu, L.-M., Hudak, G. B., Box, G. E., Muller, M. E., & Tiao, G. C. (1992). *Forecasting and time series analysis using the SCA statistical system* (Vol. 1). Scientific Computing Associates DeKalb, IL. Retrieved from [http://scausa.com/SCADocs/SCAFTS\\_V1.pdf](http://scausa.com/SCADocs/SCAFTS_V1.pdf)
- Menike, M. G. P. D., & Prabath, U. S. (2014). The Impact of Accounting Variables on Stock Price: Evidence from the Colombo Stock Exchange, Sri Lanka. *International Journal of Business and Management*, 9(5), 125-137.
- Modigliani, F., & Miller, M. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. *The American Economic Review*, 48(3), 361-297.



- Modigliani, F., & Miller, M. H. (1963). Corporate income taxes and the cost of capital: A correction. *The American Economic Review*, 53(3), 433-443.
- MSCI World Index (2014). *Fund Factsheet, March 2014*. New York: MSCI Inc.
- MSCI Emerging Markets Index (2014). *Fund Factsheet, March 2014*. New York: MSCI Inc.
- MSCI Emerging Frontier Markets Africa Index (2014). *Fund Factsheet, March 2014*. New York: MSCI Inc.
- Nigerian Stock Exchange (2014). Index Component Securities and Weighting Values, June 2014. Nigeria: The Nigerian Stock Exchange.
- Novy-Marx, R. (2013). The other side of value: The gross profitability premium. *Journal of Financial Economics*, 108(1), 1–28.
- OECD (2013), “Foreign direct investment”, in OECD Factbook 2013: Economic, Environmental and Social Statistics, OECD Publishing.
- Saunders, M. & Lewis, P. (2012). *Doing Research in Business and Management*. London: Pearson Education Limited.
- Savor, P. G. (2011). Stock returns after major price shocks: The impact of information. *Journal of Financial Economics*, 106(3), 635–659.
- Soliman, M. T. (2008). The use of DuPont analysis by market participants. *The Accounting Review*, 83(3), 823–853.
- The World Bank. (2013). Market capitalisation of listed companies. Available from <http://data.worldbank.org/data-catalog/world-development-indicators>. (Accessed 6 November 2014).
- United Nations Conference on Trade and Development. (2013). World Investment Report 2013. Available from: <http://unctad.org/en/pages/PublicationWebflyer.aspx?publicationid=588>. (Accessed 24 February 2014).
- Yao, T., Yu, T., Zhang, T., & Chen, S. (2011). Asset growth and stock returns: Evidence from Asian financial markets. *Pacific-Basin Finance Journal*, 19(1), 115–139.

Youssef, A., & Galloppo, G. (2013). The efficiency of emerging stock markets:  
Evidence from Asia and Africa. *Global Journal of Business Research (GJBR)*,  
7(4), 1-17.

# APPENDICES

## Appendix 9.1 The JSE Top 40 Index companies

1. African Rainbow Minerals Limited
2. Anglo American Platinum Ltd
3. Anglo American Plc
4. AngloGold Ashanti Limited
5. Aspen Pharmacare Holdings Limited
6. Assore Ltd
7. Barclays Africa Group Limited
8. BHP Billiton Plc
9. Bidvest Group Limited
10. British American Tobacco Plc
11. Capital & Counties Properties Plc
12. Compagnie Financiere Richemont SA
13. Discovery Limited
14. Exxaro Resources Ltd
15. FirstRand Limited
16. Growthpoint Properties Ltd
17. Impala Platinum Holdings Limited
18. Imperial Holdings Limited
19. Intu Properties Plc
20. Investec Limited
21. Kumba Iron Ore Ltd
22. Life Healthcare Group Holdings Ltd
23. MediClinic International Limited
24. Mondi Ltd
25. MTN Group Limited

## Appendix 9.1 The JSE Top 40 Index Companies (continued)

26. Naspers Limited
27. Nedbank Group Limited
28. Old Mutual Plc
29. Reinet Investments Sca
30. Remgro Ltd
31. RMB Holdings Limited
32. SABMiller Plc
33. Sanlam Limited
34. Sasol Limited
35. Shoprite Holdings Limited
36. Standard Bank Group Limited
37. Steinhoff International Holdings Limited
38. Tiger Brands Limited and Woolworths Holdings Limited.
39. Vodacom Group Ltd
40. Woolworths Holdings Limited

## Appendix 9.2 The NSE 50 Index companies

1. Access Bank Plc
2. African Alliance Insurance Plc
3. Ashaka Cement Plc
4. Cadbury Nigeria Plc
5. Cement Company Of Northern Nigeria Plc
6. Champion Breweries Plc
7. Chemical And Allied Products Plc
8. Conoil Plc
9. Custodian And Allied Insurance Plc
10. Dangote Cement Plc
11. Dangote Flour Mills Plc
12. Dangote Sugar Refinery Plc
13. Diamond Bank Plc
14. Ecobank Transnational Incorporated
15. Fbn Holdings Plc
16. Fcmb Group Plc
17. Fidelity Bank Plc
18. Flour Mills Of Nigeria Plc
19. Forte Oil Plc

## Appendix 9.2 The NSE 50 Index Companies (continued)

20. GlaxoSmithKline Consumer Nigeria Plc
21. Guaranty Trust Bank Plc
22. Guinness Nigeria Plc
23. Honeywell Flour Mills Plc
24. International Breweries Plc
25. Julius Berger Nigeria Plc
26. Lafarge Cement Wapco Nigeria Plc
27. Mansard Insurance Plc
28. Mobil Oil Nigeria Plc
29. National Salt Co Nig Plc
30. Nestle Nigeria Plc
31. Nigerian Breweries Plc
32. Oando Plc
33. Okomu Oil Palm Company Plc
34. Presco Plc
35. Pz Cussons Nigeria Plc
36. SevenUp Bottling Co Plc
37. Skye Bank Plc
38. Stanbic Ibtc Bank Plc

## Appendix 9.2 The NSE 50 Index Companies (continued)

39. Sterling Bank Plc
40. Total Nigeria Plc
41. Transnational Corporation Of Nigeria Plc
42. Uac Of Nigeria Plc
43. Uacn Property Development Company Plc
44. Uba Capital Plc
45. Unilever Nigeria Plc
46. Union Bank Of Nigeria Plc
47. United Bank For Africa Plc
48. Unity Bank Plc
49. Wema Bank Plc
50. Zenith Bank Plc

## Appendix 9.3 JSE Top 40 Index: Selected Sample, Descriptives of the full base (including outliers)

**Descriptives**

**Full Base**

Exchange = ZAR

Outlier DPO01

Outlier DPO11

Statistics<sup>a</sup>

	N	Mean	Median	Mode	Std. Deviation	Skewness	Kurtosis	Minimum	Maximum
	Valid								
ROE00	29	.381170	.223409	.0489575324424880 <sup>b</sup>	.541189	3.681	14.720	.048958	2.778008
ROE01	29	.235728	.192382	-.0926548828587587 <sup>b</sup>	.204193	1.706	3.438	-.092655	.844014
ROE02	29	.178701	.170983	-.2629421587976317 <sup>b</sup>	.194560	.278	.803	-.262942	.617235
ROE03	29	.155954	.177569	-.1161026725825981 <sup>b</sup>	.138328	-.228	-.165	-.116103	.414765
ROE04	29	.192222	.200482	.0342657099125629 <sup>b</sup>	.093279	.097	-.460	.034266	.383562
ROE05	29	.260584	.254647	-.0597833325518242 <sup>b</sup>	.127243	-.066	.464	-.059783	.529963
ROE06	29	.273209	.274124	-.0317990884353105 <sup>b</sup>	.130828	.288	.917	-.031799	.597812
ROE07	29	.232355	.261122	-.2232232815826964 <sup>b</sup>	.130820	-1.542	4.727	-.223223	.495155
ROE08	29	.168994	.236610	-.9450147184024441 <sup>b</sup>	.300131	-2.927	8.995	-.945015	.472999
ROE09	29	.156173	.141145	-.1469935034834365 <sup>b</sup>	.130170	.007	.865	-.146994	.411219
ROE10	29	.180666	.165854	.0241738039658660 <sup>b</sup>	.091841	.942	.930	.024174	.417222
ROE11	29	.207867	.170084	.0125029188948001 <sup>b</sup>	.108596	.796	-.007	.012503	.440573
ROE12	29	.184597	.173676	-.0398902894767539 <sup>b</sup>	.114057	1.206	2.848	-.039890	.515500
ROE13	29	.150350	.167558	-.5953481865735828 <sup>b</sup>	.195789	-1.422	8.102	-.595348	.620943
DPO00	29	.360140	.332828	0.0000000000000000	.346070	2.663	9.793	.000000	1.773131
<b>DPO01</b>	<b>29</b>	<b>2.596407</b>	<b>.306817</b>	<b>0.0000000000000000</b>	<b>12.370166</b>	<b>5.379</b>	<b>28.957</b>	<b>-.764173</b>	<b>66.893392</b>
DPO02	29	.365395	.389768	0.0000000000000000	.515389	-1.720	7.534	-1.622451	1.324348
DPO03	29	.331136	.368785	0.0000000000000000	.442236	-.521	2.552	-.859241	1.440933
DPO04	29	.438397	.442871	0.0000000000000000	.308010	1.694	5.313	.000000	1.551558
DPO05	29	.266687	.290394	0.0000000000000000	.232956	-1.708	5.395	-.588642	.572204
DPO06	29	.279804	.367117	-2.1350216784538922 <sup>b</sup>	.521288	-3.494	17.752	-2.135022	1.316763
DPO07	29	.307252	.351699	-1.1746963886225632 <sup>b</sup>	.332328	-3.275	14.491	-1.174696	.743363
DPO08	29	.347464	.365434	-.0243329308628716 <sup>b</sup>	.208621	.185	-.093	-.024333	.792175
DPO09	29	.311818	.371252	0.0000000000000000	.249104	-.649	.309	-.242390	.776471
DPO10	29	.412616	.406162	.1197891710589363 <sup>b</sup>	.180661	.525	.066	.119789	.846488
<b>DPO11</b>	<b>29</b>	<b>.550406</b>	<b>.394322</b>	<b>.1299993758674699<sup>b</sup></b>	<b>.893136</b>	<b>5.070</b>	<b>26.657</b>	<b>.129999</b>	<b>5.107343</b>
DPO12	29	.406315	.434843	-.7139317481248791 <sup>b</sup>	.280044	-2.181	8.613	-.713932	.853238
DPO13	29	.349474	.476964	-1.1330311916822180 <sup>b</sup>	.395325	-2.525	7.288	-1.133031	.725378
ASR00	29	.046370	.034074	-.0459524523809523 <sup>b</sup>	.073608	2.707	9.049	-.045952	.337392
ASR01	29	.040768	.033451	0.0000000000000000	.049752	2.823	10.235	-.014909	.245439
ASR02	29	.050243	.043810	-.0136984950271910 <sup>b</sup>	.047378	2.737	10.545	-.013698	.247114
ASR03	29	.061352	.050390	.0000000000000000 <sup>b</sup>	.086799	4.644	23.601	.000000	.492351
ASR04	29	.051812	.037006	.0002942041776993 <sup>b</sup>	.079555	4.742	24.261	.000294	.449277
ASR05	29	.058287	.030437	.0004552071192393 <sup>b</sup>	.156723	5.291	28.300	.000455	.868705
ASR06	29	.045143	.030397	-.0107086614173228 <sup>b</sup>	.101449	5.104	26.952	-.010709	.564012
ASR07	29	.043095	.024508	-.0413333333333333 <sup>b</sup>	.114995	5.007	26.275	-.041333	.627882
ASR08	29	.055817	.049735	-.0023112480739599 <sup>b</sup>	.086991	4.500	22.529	-.002311	.483382
ASR09	29	.039534	.038212	-.0394736842105263 <sup>b</sup>	.042482	1.714	6.132	-.039474	.195634
ASR10	29	.026831	.022697	-.0008825164939703 <sup>b</sup>	.018679	1.453	3.278	-.000883	.089257
ASR11	29	.034980	.035470	-.0168900912965735 <sup>b</sup>	.018969	.077	2.079	-.016890	.086130
ASR12	29	.033345	.033526	.0104303931681491 <sup>b</sup>	.014064	.814	1.981	.010430	.076597
ASR13	29	.044052	.044037	-.0030970608551803 <sup>b</sup>	.022632	.271	.354	-.003097	.099647

a. Exchange = ZAR

b. Multiple modes exist. The smallest value is shown



## Appendix 9.4 JSE Top 40 Index: – Selected Sample, Descriptives excluding outliers

Removed Outliers  
Exchange = ZAR

Statistics<sup>a</sup>

	N	Mean	Median	Mode	Std. Deviation	Skewness	Kurtosis	Minimum	Maximum
	Valid								
ROE00	27	.388954	.223409	.1142992207511367 <sup>b</sup>	.557257	3.614	13.977	.114299	2.778008
ROE01	27	.251720	.193130	-.0926548828587587 <sup>b</sup>	.202545	1.739	3.479	-.092655	.844014
ROE02	27	.188602	.178077	-.2629421587976317 <sup>b</sup>	.198161	.150	.770	-.262942	.617235
ROE03	27	.170639	.186290	-.1161026725825981 <sup>b</sup>	.130347	-.263	.180	-.116103	.414765
ROE04	27	.202600	.203992	.0342657099125629 <sup>b</sup>	.087947	.087	-.186	.034266	.383562
ROE05	27	.267760	.255808	-.0597833325518242 <sup>b</sup>	.128480	-.192	.592	-.059783	.529963
ROE06	27	.269952	.274124	-.0317990884353105 <sup>b</sup>	.130527	.312	1.218	-.031799	.597812
ROE07	27	.242333	.267335	-.2232232815826964 <sup>b</sup>	.125776	-1.790	6.768	-.223223	.495155
ROE08	27	.201852	.239508	-.9450147184024441 <sup>b</sup>	.252278	-3.779	17.473	-.945015	.472999
ROE09	27	.168391	.142727	-.1104278717373226 <sup>b</sup>	.120542	.341	.719	-.110428	.411219
ROE10	27	.183507	.165854	.0241738039658660 <sup>b</sup>	.094362	.857	.686	.024174	.417222
ROE11	27	.217873	.178225	.0668875432626117 <sup>b</sup>	.104465	.944	-.202	.066888	.440573
ROE12	27	.190840	.181330	-.0398902894767539 <sup>b</sup>	.115183	1.153	2.753	-.039890	.515500
ROE13	27	.151374	.175203	-.5953481865735828 <sup>b</sup>	.203102	-1.395	7.481	-.595348	.620943
DPO00	27	.360613	.332828	0.0000000000000000	.354657	2.677	9.640	.000000	1.773131
DPO01	27	.280667	.296007	0.0000000000000000	.313445	-1.114	3.722	-.764173	.831406
DPO02	27	.312614	.356006	0.0000000000000000	.489325	-2.174	9.349	-1.622451	1.205869
DPO03	27	.352231	.368785	0.0000000000000000	.375274	.033	3.781	-.714889	1.440933
DPO04	27	.429433	.408710	0.0000000000000000	.316140	1.771	5.380	.000000	1.551558
DPO05	27	.267242	.317532	0.0000000000000000	.241713	-1.664	4.899	-.588642	.572204
DPO06	27	.281953	.367117	-2.1350216784538922 <sup>b</sup>	.538496	-3.444	16.972	-2.135022	1.316763
DPO07	27	.357341	.351699	-.0941256284753438 <sup>b</sup>	.176687	-.045	.705	-.094126	.743363
DPO08	27	.359580	.365434	-.0194567822140967 <sup>b</sup>	.203285	.277	-.070	-.019457	.792175
DPO09	27	.329595	.371252	0.0000000000000000	.233393	-.546	.428	-.191830	.776471
DPO10	27	.418643	.406162	.1197891710589363 <sup>b</sup>	.183421	.485	-.002	-.119789	.846488
DPO11	27	.385621	.356534	.1299993758674699 <sup>b</sup>	.178127	.450	-.390	.129999	.805184
DPO12	27	.387810	.434449	-.7139317481248791 <sup>b</sup>	.276247	-2.419	9.331	-.713932	.735458
DPO13	27	.343021	.483858	-1.1330311916822180 <sup>b</sup>	.409331	-2.413	6.574	-1.133031	.725378
ASR00	27	.047624	.034074	-.0459524523809523 <sup>b</sup>	.075793	2.641	8.485	-.045952	.337392
ASR01	27	.039918	.032831	0.0000000000000000	.051417	2.819	9.873	-.014909	.245439
ASR02	27	.051187	.043810	-.0136984950271910 <sup>b</sup>	.048827	2.654	9.859	-.013698	.247114
ASR03	27	.060982	.050390	.0000000000000000 <sup>b</sup>	.089813	4.552	22.450	.000000	.492351
ASR04	27	.053979	.037259	.0002942041776993 <sup>b</sup>	.082098	4.591	22.703	.000294	.449277
ASR05	27	.060879	.032526	.0004552071192393 <sup>b</sup>	.162322	5.106	26.353	.000455	.868705
ASR06	27	.046187	.030397	-.0107086614173228 <sup>b</sup>	.105180	4.927	25.106	-.010709	.564012
ASR07	27	.043711	.024215	-.0413333333333333 <sup>b</sup>	.119311	4.838	24.495	-.041333	.627882
ASR08	27	.057087	.049735	-.0023112480739599 <sup>b</sup>	.089846	4.382	21.229	-.002311	.483382
ASR09	27	.038714	.031407	-.0394736842105263 <sup>b</sup>	.043936	1.736	5.842	-.039474	.195634
ASR10	27	.026659	.021236	-.0008825164939703 <sup>b</sup>	.019289	1.454	3.060	-.000883	.089257
ASR11	27	.033812	.034305	-.0168900912965735 <sup>b</sup>	.018868	.155	2.483	-.016890	.086130
ASR12	27	.032604	.033526	.0104303931681491 <sup>b</sup>	.013813	.901	2.693	.010430	.076597
ASR13	27	.043366	.043889	-.0030970608551803 <sup>b</sup>	.023271	.353	.282	-.003097	.099647

## Appendix 9.5 NSE 50 Index: – Selected Sample, Descriptives of the full base (including outliers)

Descriptives

Full Base

Exchange = NGN

Outlier

DPO09

Statistics<sup>a</sup>

	N	Mean	Median	Mode	Std. Deviation	Skewness	Kurtosis	Minimum	Maximum
	Valid								
ROE06	10	.357639	.243884	.0342596471628730 <sup>b</sup>	.392398	2.425	6.512	.034260	1.395320
ROE07	10	.310938	.206958	.1543849193823994 <sup>b</sup>	.221170	2.062	4.437	.154385	.863998
ROE08	10	.345389	.226799	.1497953242600305 <sup>b</sup>	.304888	2.086	3.927	.149795	1.091398
ROE09	10	.219385	.077607	.0000984467293809 <sup>b</sup>	.343863	1.889	2.452	.000098	.999590
ROE10	10	.222039	.105205	.0037314058127259 <sup>b</sup>	.323699	2.010	3.296	.003731	.991929
ROE11	10	.192392	.104829	-.1122668845176919 <sup>b</sup>	.305522	1.624	2.128	-.112267	.876410
ROE12	10	.278836	.226814	.1067488428921377 <sup>b</sup>	.184581	1.943	4.085	.106749	.732935
ROE13	10	.266885	.214932	.1419447485407073 <sup>b</sup>	.145593	1.531	1.883	.141945	.595297
DPO06	10	.370678	.315626	.000000	.391084	.622	-.982	.000000	.999043
DPO07	10	.502023	.508989	.0000000000000000 <sup>b</sup>	.325903	-.086	-.404	.000000	.998076
DPO08	10	.486283	.446944	.0409356725146199 <sup>b</sup>	.317871	.607	-.287	.040936	1.000471
<b>DPO09</b>	<b>10</b>	<b>6.811114</b>	<b>.519580</b>	<b>.0000000000000000<sup>b</sup></b>	<b>20.133273</b>	<b>3.160</b>	<b>9.992</b>	<b>.000000</b>	<b>64.102564</b>
DPO10	10	.985377	.791515	.1537279016141430 <sup>b</sup>	.776573	1.964	4.274	.153728	2.904028
DPO11	10	.418134	.529448	.000000	.262916	-.769	-.973	.000000	.679105
DPO12	10	.392297	.441059	.0000000000000000 <sup>b</sup>	.206425	-.516	-.018	.000000	.693757
DPO13	10	.468990	.398987	.1519664458087654 <sup>b</sup>	.237696	.747	-.153	.151966	.908100
ASR06	10	.022200	.000000	.000000	.042561	.559	-1.510	-.026316	.087660
ASR07	10	.043933	.048489	.0069264069264069 <sup>b</sup>	.025593	-.130	-1.700	.006926	.075900
ASR08	10	.053566	.046021	-.0070103092783505 <sup>b</sup>	.047280	.611	-.417	-.007010	.137240
ASR09	10	.032151	.031928	-.0120001000000000 <sup>b</sup>	.032930	.353	-.264	-.012000	.093717
ASR10	10	.034554	.041144	.0060512629170442 <sup>b</sup>	.021349	-.382	-1.159	.006051	.064815
ASR11	10	.049871	.033941	-.0253808199129402 <sup>b</sup>	.047874	.180	-1.027	-.025381	.125290
ASR12	10	.062329	.050359	-.0020202626670760 <sup>b</sup>	.051238	.202	-1.893	-.002020	.129652
ASR13	10	.061718	.061738	.0199999333333333 <sup>b</sup>	.035823	.280	-1.428	.020000	.116431

a. Exchange = NGN

b. Multiple modes exist. The smallest value is shown

## Appendix 9.6 NSE 50 Index: Selected Sample, Descriptives excluding outliers

Removed Outliers  
Exchange = NGN

Statistics<sup>a</sup>

	N	Mean	Median	Mode	Std. Deviation	Skewness	Kurtosis	Minimum	Maximum
	Valid								
ROE06	9	.382861	.313154	.0342596471628730 <sup>b</sup>	.407513	2.294	5.856	.034260	1.395320
ROE07	9	.323096	.212399	.1543849193823994 <sup>b</sup>	.231014	1.908	3.759	.154385	.863998
ROE08	9	.355387	.224976	.1497953242600305 <sup>b</sup>	.321639	1.939	3.203	.149795	1.091398
ROE09	9	.243750	.094921	.0112827522867197 <sup>b</sup>	.355448	1.751	1.829	.011283	.999590
ROE10	9	.235121	.106114	.0037314058127259 <sup>b</sup>	.340519	1.857	2.582	.003731	.991929
ROE11	9	.208448	.118858	-.1122668845176919 <sup>b</sup>	.319548	1.464	1.527	-.112267	.876410
ROE12	9	.295956	.234142	.1067488428921377 <sup>b</sup>	.187167	1.892	3.823	.106749	.732935
ROE13	9	.280767	.220355	.1552395993231301 <sup>b</sup>	.147238	1.447	1.567	.155240	.595297
DPO06	9	.411865	.350139	0.0000000000000000	.391128	.449	-1.127	.000000	.999043
DPO07	9	.557804	.514427	.0459770114942529 <sup>b</sup>	.290663	-.062	.280	.045977	.998076
DPO08	9	.503383	.449622	.0409356725146199 <sup>b</sup>	.332238	.432	-.598	.040936	1.000471
DPO09	9	.445397	.487731	.0000000000000000 <sup>b</sup>	.375278	.205	-1.481	.000000	1.020134
DPO10	9	1.037807	.793651	.1537279016141430 <sup>b</sup>	.804688	1.823	3.720	.153728	2.904028
DPO11	9	.394277	.487259	0.0000000000000000	.267137	-.586	-1.259	.000000	.679105
DPO12	9	.381073	.429991	.0000000000000000 <sup>b</sup>	.215686	-.339	-.287	.000000	.693757
DPO13	9	.493552	.429876	.1519664458087654 <sup>b</sup>	.238275	.587	-.222	.151966	.908100
ASR06	9	.024667	.000000	-.0263157894736842 <sup>b</sup>	.044378	.376	-1.830	-.026316	.087660
ASR07	9	.046712	.051402	.0069264069264069 <sup>b</sup>	.025495	-.422	-1.376	.006926	.075900
ASR08	9	.055360	.054629	-.0070103092783505 <sup>b</sup>	.049786	.472	-.789	-.007010	.137240
ASR09	9	.032843	.037931	-.0120001000000000 <sup>b</sup>	.034851	.269	-.626	-.012000	.093717
ASR10	9	.031192	.040863	.0060512629170442 <sup>b</sup>	.019635	-.489	-1.566	.006051	.056629
ASR11	9	.045339	.031882	-.0253808199129402 <sup>b</sup>	.048448	.467	-.652	-.025381	.125290
ASR12	9	.055755	.032347	-.0020202626670760 <sup>b</sup>	.049671	.499	-1.497	-.002020	.129652
ASR13	9	.058240	.060975	.0199999333333333 <sup>b</sup>	.036161	.583	-1.026	.020000	.116431

## Appendix 9.7 Detailed Autocorrelation test: Mean ASRs of the selected sample from the JSE Top 40 Index

ZAR_Mean_ASR_o						
Autocorrelations						
Series:		ZAR_Mean_ASR_o				
Lag	Autocorrelation	Std. Error <sup>a</sup>	Box-Ljung Statistic			
			Value	df	Sig. <sup>b</sup>	
1	.044	.241	.033	1	.856	
2	-.273	.231	1.427	2	.490	
3	-.140	.222	1.824	3	.610	
4	-.148	.211	2.315	4	.678	
5	.332	.200	5.059	5	.409	
6	-.009	.189	5.061	6	.536	
7	-.319	.177	8.324	7	.305	
8	-.184	.164	9.590	8	.295	
9	.019	.149	9.606	9	.383	
10	.135	.134	10.631	10	.387	
11	.078	.116	11.084	11	.436	
12	-.021	.094	11.132	12	.518	

a. The underlying process assumed is independence (white noise).

b. Based on the asymptotic chi-square approximation.

## Appendix 9.8 Detailed Autocorrelation test: Mean ASRs of the selected sample from the NSE 50 Index

NGN_Mean_ASR_o						
Autocorrelations						
Series: NGN Mean ASR o						
Lag	Autocorrelation	Std. Error <sup>a</sup>	Box-Ljung Statistic			
			Value	df	Sig. <sup>b</sup>	
1	-.167	.296	.318	1	.573	
2	-.301	.274	1.525	2	.466	
3	.001	.250	1.525	3	.676	
4	-.115	.224	1.792	4	.774	
5	.215	.194	3.026	5	.696	
6	.212	.158	4.818	6	.567	

a. The underlying process assumed is independence (white noise).  
b. Based on the asymptotic chi-square approximation.

## Appendix 9.9 Detailed Autocorrelation test: Mean DPO's of the selected sample from the JSE Top 40 Index

ZAR_Mean_DPO_o						
Autocorrelations						
Series: ZAR_Mean_DPO_o						
Lag	Autocorrelation	Std. Error <sup>a</sup>	Box-Ljung Statistic			
			Value	df	Sig. <sup>b</sup>	
1	.269	.241	1.251	1	.263	
2	.055	.231	1.307	2	.520	
3	.034	.222	1.331	3	.722	
4	.077	.211	1.464	4	.833	
5	-.030	.200	1.487	5	.915	
6	.046	.189	1.545	6	.956	
7	-.110	.177	1.932	7	.963	
8	-.133	.164	2.588	8	.957	
9	.051	.149	2.704	9	.975	
10	-.052	.134	2.852	10	.985	
11	-.197	.116	5.748	11	.890	
12	-.364	.094	20.574	12	.057	

a. The underlying process assumed is independence (white noise).  
b. Based on the asymptotic chi-square approximation.

## Appendix 9.10 Detailed Cross-correlation test: Mean DPOs with the Mean ASRs of the selected sample from the JSE Top 40 Index

ZAR_Mean_DPO_o with ZAR_Mean_ASR_o		
Cross Correlations		
Series Pair: an DPO o with ZAR Mean ASR o		
Lag	Cross Correlation	Std. Error <sup>a</sup>
-7	-.051	.378
-6	-.280	.354
-5	.122	.333
-4	.026	.316
-3	-.577	.302
-2	-.162	.289
-1	.100	.277
0	.151	.267
1	-.049	.277
2	-.206	.289
3	-.224	.302
4	.216	.316
5	.242	.333
6	.049	.354
7	-.087	.378

a. Based on the assumption that the series are not cross correlated and that one of the series is white noise.

## Appendix 9.11 Detailed Autocorrelation test: Mean ROEs of the selected sample from the JSE Top 40 Index

ZAR_Mean_ROE_o						
Autocorrelations						
Series:		ZAR_Mean_ROE_o				
Lag	Autocorrelation	Std. Error <sup>a</sup>	Box-Ljung Statistic			
			Value	df	Sig. <sup>b</sup>	
1	.613	.241	6.478	1	.011	
2	.114	.231	6.720	2	.035	
3	-.292	.222	8.457	3	.037	
4	-.470	.211	13.399	4	.009	
5	-.390	.200	17.187	5	.004	
6	-.185	.189	18.150	6	.006	
7	-.004	.177	18.151	7	.011	
8	.065	.164	18.306	8	.019	
9	.020	.149	18.325	9	.032	
10	.034	.134	18.390	10	.049	
11	.026	.116	18.439	11	.072	
12	-.005	.094	18.442	12	.103	

a. The underlying process assumed is independence (white noise).  
b. Based on the asymptotic chi-square approximation.

**Appendix 9.12 Detailed Differenced Autocorrelation test: Mean ROEs of the selected sample from the JSE Top 40 Index**

DIFF(ZAR_Mean_ROE_o,1) Autocorrelations						
Series: DIFF(ZAR_Mean_ROE_o,						
Lag	Autocorrelation	Std. Error <sup>a</sup>	Box-Ljung			
			Value	df	Sig. <sup>b</sup>	
1	.204	.248	.673	1	.412	
2	-.120	.238	.930	2	.628	
3	-.364	.226	3.510	3	.319	
4	-.448	.215	7.852	4	.097	
5	-.062	.203	7.946	5	.159	
6	.057	.189	8.036	6	.235	
7	.176	.175	9.039	7	.250	
8	.155	.160	9.978	8	.267	
9	-.057	.143	10.135	9	.340	
10	-.035	.124	10.214	10	.422	
11	-.010	.101	10.224	11	.510	

a. The underlying process assumed is independence (white noise).  
b. Based on the asymptotic chi-square approximation.



**Appendix 9.13 Detailed Cross-correlation test: Mean ROEs with  
the Mean ASRs of the selected sample from the JSE  
Top 40 Index**

DIFF(ZAR_Mean_ROE_o,1) with ZAR_Mean_ASR_o		
Cross Correlations		
Series Pair: lean_ROE_o,1) with ZAR_Mean_ASR_o		
Lag	Cross Correlation	Std. Error <sup>a</sup>
-7	-.070	.408
-6	-.408	.378
-5	-.226	.354
-4	.003	.333
-3	.313	.316
-2	.627	.302
-1	-.237	.289
0	-.117	.277
1	.107	.289
2	-.084	.302
3	.228	.316
4	-.248	.333
5	-.178	.354
6	-.097	.378
7	-.124	.408

a. Based on the assumption that the series are not cross correlated and that one of the series is white noise.

## Appendix 9.14 Detailed Autocorrelation test: Mean DPOs of the selected sample from the NSE 50 Index

NGN_Mean_DPO_o					
Autocorrelations					
Series:		NGN_Mean_DPO_o			
Lag	Autocorrelation	Std. Error <sup>a</sup>	Box-Ljung Statistic		
			Value	df	Sig. <sup>b</sup>
1	-.022	.296	.006	1	.940
2	-.210	.274	.595	2	.743
3	-.092	.250	.730	3	.866
4	-.330	.224	2.911	4	.573
5	.018	.194	2.920	5	.712
6	.063	.158	3.078	6	.799

a. The underlying process assumed is independence (white noise).  
b. Based on the asymptotic chi-square approximation.

## Appendix 9.15 Detailed Cross-correlation test: Mean DPOs with the Mean ASRs of the selected sample from the NSE 50 Index

NGN_Mean_DPO_o with NGN_Mean_ASR_o		
Cross Correlations		
Series Pair: an_DPO_o with NGN_Mean_ASR_o		
Lag	Cross Correlation	Std. Error <sup>b</sup>
-7 <sup>a</sup>		
-6	.094	.707
-5	-.091	.577
-4	-.728	.500
-3	.220	.447
-2	.384	.408
-1	-.051	.378
0	.276	.354
1	-.279	.378
2	-.252	.408
3	.412	.447
4	-.016	.500
5	-.007	.577
6	.080	.707
7 <sup>a</sup>		

a. Statistics cannot be computed for this lag due to the length of the series.

b. Based on the assumption that the series are not cross correlated and that one of the series is white noise.

**Appendix 9.16 Detailed Autocorrelation test: Mean ROEs of the selected sample from the NSE 50 Index**

NGN_Mean_ROE_o					
Autocorrelations					
Series:		NGN Mean ROE o			
Lag	Autocorrelation	Std. Error <sup>a</sup>	Box-Ljung Statistic		
			Value	df	Sig. <sup>b</sup>
1	.304	.296	1.059	1	.303
2	.007	.274	1.060	2	.589
3	-.555	.250	5.994	3	.112
4	-.324	.224	8.099	4	.088
5	-.167	.194	8.841	5	.116
6	.146	.158	9.697	6	.138

## Appendix 9.17 Detailed Cross-correlation test: Mean ROEs with the Mean ASR's of the selected sample from the NSE 50 Index

NGN_Mean_ROE_o with NGN_Mean_ASR_o		
Cross Correlations		
Series Pair: an ROE o with NGN_Mean_ASR o		
Lag	Cross Correlation	Std. Error <sup>b</sup>
-7 <sup>a</sup>		
-6	-.130	.707
-5	.376	.577
-4	.300	.500
-3	.151	.447
-2	-.389	.408
-1	-.247	.378
0	-.312	.354
1	.363	.378
2	.159	.408
3	-.154	.447
4	-.221	.500
5	-.022	.577
6	-.030	.707
7 <sup>a</sup>		

a. Statistics cannot be computed for this lag due to the length of the series.

b. Based on the assumption that the series are not cross correlated and that one of the series is white noise.