ARE AFRICAN STOCK MARKETS INTEGRATED? THE CASE OF THE JSE AND SELECTED AFRICAN STOCK MARKETS

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ABSTRACT

Generally African stock markets are deemed to be small, segmented and illiquid. The study utilises monthly data for the period of 2000 to 2008, employing the Johansen and Julius cointegration method to determine the long run relationship between the five selected African stock markets. Granger causality test were also conducted to establish if there is any causal links between the stock markets in Africa. The analysis in the study indicates that African stock markets are improving in performance generally, growing and developing. However empirical results indicate that African markets are segmented. A further analysis, to determine the relationship between the five selected African stock markets and the world stock markets, show that African stock markets are affected by developments in the international markets. Hence portfolio diversification opportunities exist in the African stock markets suggesting that investors should also consider investing in their African countries as they offer opportunities rather than considering investing in the international markets only.

Keywords:

Stock market integration; Africa; South Africa, VAR, Portfolio investment

JEL Classification: C22, F37, G15

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LIST OF ABBREVIATIONS AND ACRONYMS

ACI	All Company Index
ADF	Augmented Dickey Fuller
AON	All or None Board
API	Application Programme Interface
APT	Arbitrage Pricing Theory
AR	Autoregressive Representation
ASEA	African securities Exchange Association
ASEM	Alternative Securities Market
ASI	All Share Index
ATS	Automated Trading System
AUC	African Union Conference
BBBEE	Broad-Based Black Economic Empowerment
BESA	Bond Exchange of South Africa
BOM	Bank of Mauritius
BSE	Botswana Stock Exchange
BSI	Botswana Share Index
BSM	Botswana Share Market
BVRM	Bourse Regional de Valeurs Mobilieres
CAPM	Capital Asset Pricing Model
CEE	Central Eastern Europe

CEO	Chief Executive Officer
CIMA	Cayman Islands Monetary Authority
CM	Compliance Manual
CMA	Capital Market Authority
COSSE	Committee of SADC Stock Exchanges
CSCS	Central Securities Clearing System
CSD	Central Securities Depository
CSDP	Central Securities Depository Participants
CSR	Corporate Social Responsibility
DCB	Development Capital Board
DCI	Domestic Company Index
DCM	Development Capital Market
DEM	Development and Enterprise Market
DTI	Department of Trade and Industry
EEZ	Emerging Enterprise Zone
EGX	Egyptian Stock Exchange
ETF	Exchange Traded Products
FCI	Foreign Company Index
FIBV	Federation International Bourses de Valeurs
FSB	Financial Services Board
GAAP	General Acceptable Accounting Practice
GARCH	Generalised Autoregressive Conditional Heteroscedasticity
GCC	Gulf Cooperation Council

GDP	Gross Domestic Product
HMRC	Her Majesty's Revenue and Customs
HQIC	Hannan-Quinn Information Criterion
IBP	International Best Practice
IFRS	International financial Reporting Standards
IOSCO	International Organisation of Securities Commission
IPO	Initial Public Offering
JET	Johannesburg Equities Trading
JETS	Johannesburg Equities Trading System
JSE	Johannesburg Stock Exchange
LCE	Liverpool Cotton Exchange
LEC	Listing Executive Committee
LOOP	Law of One Price
LSE	Lagos Stock Exchange
LSE	London Stock Exchange
MAR	Moving Average Representation
MCSD	Misr Clearing, Settlement and Depository
MIASE	Most Innovative African Stock Exchange
MIASE	Most Innovative African Stock Exchange
NAMFISA	Namibia Financial Institutions Supervisory Authority
NEPD	Nigerian Enterprise Promotion Decree
NLB	Normal Lot Board
NSE	Nigerian Stock Exchange

NSEA	Namibian Stock Exchange Association
NSX	Namibian Stock Exchange
NYSE	New York Stock Exchange
ODI	Overseas Development Institute
OLS	Ordinary Least Squares
OTC	Over the Counter
PNB	Pre-Negotiated Board
PP	Phillips Peron
RECS	Reuters Electronic Contributor System
SADC	Southern African Development Community
SAFEX	South African Futures Exchange
SARB	South African Reserve Bank
SEM	Stock Exchange of Mauritius
SEMATS	Stock Exchange of Mauritius Automated Trading System
SEMDEX	Stock Exchange of Mauritius All Share Index
SEMTRI	Stock Exchange of Mauritius Total Return Index
SENS	Securities Exchange News Services
SIC	Schwartz Information Criterion
SMEs	Small and Medium Enterprises
SML	Security Market Line
SRO	Self-Regulatory Organisation
SRP	Securities Regulation Panel
STRATE	Share Trading Transactions Totally Electronic

UK	United Kingdom
USA	United States of America
VAR	Vector Autoregressive
VCB	Venture Capital Board
VCM	Venture Capital Market
VECM	Vector Error Correction Model
WFE	World Federation of Exchanges

CHAPTER ONE

INTRODUCTION OF THE STUDY

1.1 Introduction

Determining the magnitude to which African stock markets are integrated is a pragmatic inquiry which has a significant impact on a number of issues affecting problems that are addressed by financial market theory. The issue has attracted a large body of academic literature; (Adebola and Dahalan, 2012; Alagidede, 2008; Agyei-Ampomah, 2011; Srikanth, 2012; Bekaert, Havey and Lumsdaine, 1998). However results vary. The easing of controls on capital movements and foreign exchange transactions, deregulation and elimination of restrictions on banking and securities dealings, communications and technological adjustments that have occurred in the world economy has amplified cross-border investment activity and hastened the flow of resources between national economies (Alagidede, 2008). Also the growing prominence of developing countries in the globalisation process has attracted the attention of fund managers as an opportunity for portfolio diversification as well as policy makers and researchers.

Financial theory suggests that, integrated stock markets are more efficient as compared to segmented stock markets. Hence any disparities between stock market indices pose good opportunities for international investors to diversify their portfolios and any interdependence between stock markets may reduce the possibility of diversification (Srikanth, 2012). More so financial integration is believed to be accelerated by the growing reliance of nations on savings from other nations, and the shift in the leverage preference of companies from debt to equity finance. Stock market integration is also perceived to be beneficial, that is; it leads to well developed markets and institutions, boost liquidity, increase competitiveness, lowers costs and encourages information sharing across financial institutions, creates wide choice and innovations across institutions and offers companies and consumers more financing opportunities.

On the other hand, stock market linkages pose risks such as contagion and disruptions in economic activity, as evidenced by the 1997 Asian contagion which started with Thailand and spread across bordering South East Asian countries and spilled to Latin America. Furthermore international investment inflows and outflows can have a substantial influence

on emerging market economies and their stock markets. Because monetary policies in a domestic economy could be affected by the linkages between the local capital market and other markets within the sub-region and globally, improved integration mightconsequently have macroeconomic and monetary policy implications (Agyei-Ampomah, 2011).

Howbeit, according to Alagidede, (2009) and Ntim et al, (2011) African stock markets, (excluding South Africa) are comparatively different from their developed counterparts and insignificant compared to other emerging markets despite the rapid development in the establishment of stock markets in Africa. Thus this study seeks to examine if stock markets in Africa are integrated.

1.2 Statement of Research Problem

Most of the African stock markets are very small and still growing compared to world market standards. They are fragmented, lack economies of scale and lack operational efficiency. Being disjointed, African capital markets are illiquid and ranked last on the competitive global financial market scale (Ntim, 2012). This poses a lot of risk to African economies, as the economic landscape is rapidly changing and globalisation is increasing.

It is important to note also that African stock markets are exposed to risk due to the formation of numerous regional blocs around the world and the global financial and economic crisis (Mkwezalamba, 2011).Further, Blanchard, Hagan, Tiwari and Vinals (2012) suggest that capital flows have increased significantly in recent years and are a key aspect of the global monetary system. These flows offer potential benefits to countries, but the size of the stock markets maybe a hindering factor. Also stock market integration is an important factor for portfolio benefits and diversifying funds globally.

1.3 Objectives of the Study

The main objective of this study is to determine if there are any linkages between selected stock markets in Africa. The specific objectives include:

- Assessing performance and examining the trends in the growth of selected stock markets in Africa
- Examining the extent to which the selected African stock markets are integrated.
- Examining the extent to which African stock markets are related to the rest of the world.

1.4 Hypotheses

The hypothesis which this study seeks to test is:

H_0: African stock markets are not integrated.

H_1: African stock markets are integrated.

The study further in relation to the world stock markets seeks to test the following hypothesis:

H_0: African stock markets are not related to the rest of the world.

H_1: Africa stock markets are related to the rest of the world.

1.5 Significance of the Study

Stock markets form an important and significant body for finance and capital flows within African nations (Ndikumana, 2003). The importance of well integrated stock markets cannot be underestimated as they can help to boost liquidity and improve the development of stock markets in Africa. In addition, highly liquid stock markets attract both international and local investments which will boost resource mobilization and hence the achievement of economic growth in Africa. Lack of relationship between the stock markets, is not only problematic towards African countries, but also to the world economy since there is globalisation and an increasing interdependence between nations for finance. Hence stock market integration in Africa provides a platform to alleviate economic distress between nations and encourages economic growth amongst other benefits.

In the event that the stock markets in Africa are not integrated, apart from affecting the effectiveness of price discovery which depresses savings opportunities and investments, and hinders economic progress, it is also an inimical practice in a globally integrated world. Thus having well-integrated stock markets in Africa is of great importance thereof. Howbeit, few studies have been carried out to establish the dynamic relationship between African stock markets due to under development of stock markets in Africa. However it is interesting to note that there has been a proliferation of stock markets in a number of African countries. This makes it interesting to carry out the study.

1.6 Delimitations

There are a number of factors that affect the development of stock markets in Africa; however the study is not concerned about that. It only focuses on determining the extent to which stock markets are integrated.

1.7 Ethical Consideration

The study uses secondary data hence ethical considerations are irrelevant to this study.

1.8 Organisation of the Study

The study is divided into six chapters. Chapter 1 focuses on the background (Introduction) of the study; chapter 2 looks at the overview of the five African stock markets, with special emphasis on the trends, development, functions, and characteristics of the markets; chapter 3 focuses on the theoretical and empirical literature review. Chapter 4 focuses on the empirical framework, with emphasis on the formulation and estimation of the specified model. Chapter 5 focuses on model robustness, reporting of results and articulates policy implications of the reported results, and chapter 6 constitutes the summary and main conclusions of the study.

CHAPTER TWO

OVERVIEW OF THE FIVE AFRICAN STOCK MARKETS

2.1 Introduction

Establishment of a vibrant stock market in a developing economy can be one of the sources of development finance which supports economic growth by routing domestic savings and attracting foreign investment. However in Africa, stock markets face intense challenges in terms of depth measured by market capitalization and listing (Allen, Otchere & Senbet, 2010). The following section provides an overview of the development of stock markets in Africa. The emphasis is on the trends, development, functions, and characteristics of the markets. The chapter begins with a discussion on the development of stock markets in Africa in general, and then it examines the development of the five countries chosen for the study. Given that stock markets in Africa are under developed, the stock markets were chosen on the basis of the availability of data.

2.2 Development of stock markets in Africa

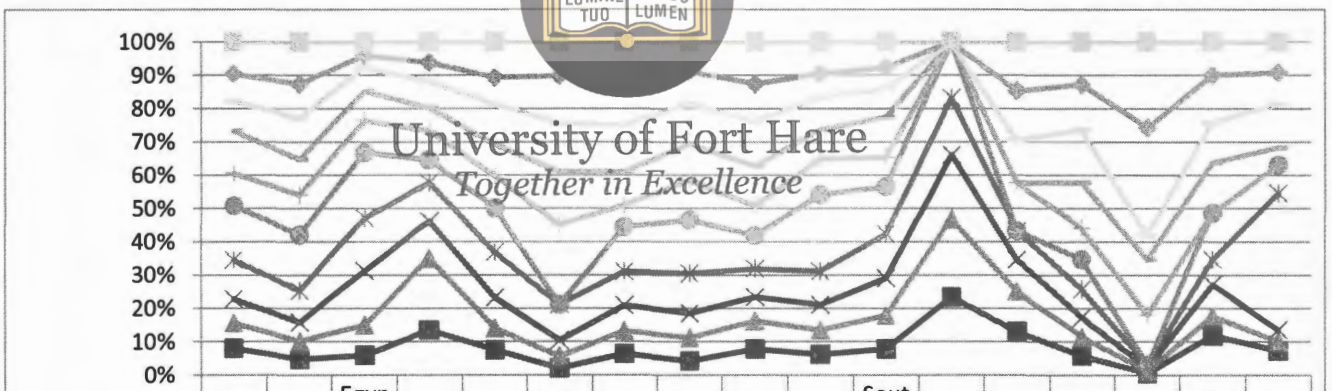
Some researchers, (Yartey and Adjasi, 2007; Akinlo and Akinlo, 2009) have found a strong positive relationship between stock market development and economic growth in Africa. Of their findings, a 1% increase in liquidity could account for approximately 3.7% increase in African economic growth in the long run and the authors further evidenced a short run finance led growth hypothesis for countries such as Egypt and South Africa. Prior to the 2008 financial crisis, Africa had at a very short space of time developed and expanded the equity market sector.

For instance the number of operating stock exchanges rose from eight (8) in 1989 to twenty three (23) in 2007, reaching a total market capitalisation of over $2.1 trillion (Massa, 2009). More so, since 1995 there has been at least one African stock market in the top–ten best performing markets in the world. According to the Overseas Development Institute (ODI) research report by Massa, (2009), in 2004, six African countries (Ghana, Uganda, Kenya, Egypt, Mauritius and Nigeria) were among the world's 10 best-performing stock markets and in 2006 Malawi outperformed every other market in the world (Massa, 2009).

2.2.1 African Stock Markets Capitalisation

The emergence of these stock markets in the African continent provides important opportunities for integrating Africa into a global financial market for attracting global capital.Over the years, especially in the early twenty first century there has been a sharp increase in initial public offerings (IPOs) which have allowed some businesses to raise sizeable amounts of capital. For example, the Lagos Stock Exchange in Nigeria raised approximately US$4 billion since 2000 (Nkontchou, 2010).As shown in figure 2.1,African stock markets have grown and have been improving in terms of market capitalisation. However, in 2008 market capitalisation dropped considerably for all African stock markets with countries such as, Zimbabwe, Swaziland and Zambia, recording zero percent of GDP. South Africa on the other hand is the best performing stock market in Africa with a market capitalisation of 159% of GDP in 2003 and a 179% in 2008 amidst the financial crisis.

Figure 2. 1: African Stock Market Capitalisation of Listed Companies (% of GDP



	Botswana	Cote d'Ivoire	Egypt, Arab Rep.	Ghana	Kenya	Malawi	Mauritius	Morocco	Namibia	Nigeria	South Africa	Swaziland	Tanzania	Tunisia	Uganda	Zambia	Zimbabwe
2012	31.83	31.72	22.55	8.51	39.61	17.67	67.6	54.84	9.983	21.47	159.3		6.383	19.46	36.69	14.53	109.3
2011	26.86	26.12	20.63	7.828	29.72	24.63	68.2	60.57	9.13	16.1	130.2		6.445	20.81	45.93	20.88	112.9
2010	29.65	30.97	37.69	10.98	44.87	25.25	76.57	76.18	10.63	22.25	174.9		5.516	24.07	10.4	17.4	154.4
2009	42.33	26.65	47.6	9.653	35.15	27.49	53.65	69.2	9.553	19.77	248.2			20.91	23.7	21.9	62.45
2008	32	30.2	52.75	11.9	35.83	41.4	35.71	73.97	7.007	24.05	179.9		6.243	14.25	21.32		
2007	53.82	42.2	106.8	9.614	49.15		72.71	100.4	7.967	52.04	291.3	6.65		13.78		20.33	100.8
2006	38.97	23.93	86.97	15.84	50.56	18.84	55.3	75.2	6.79	22.57	273.9	6.78	3.776	12.93	1.163	11.08	487.8
2005	23.76	14.22	88.83	15.47	34.07	8.359	41.65	45.73	5.711	17.24	228.9	7.614	4.157	8.909	1.143	13.78	41.73
2004	25.36	13.45	48.85	29.77	24.17	6.058	37.25	44.01	6.695	16.47	207.9	9.284	5.221	8.47	1.209	8.347	33.44
2003	26.35	12.01	32.65	18.68	28.03	3.566	34.86	26.4	6.24	14.03	159.2	9.277	5.65	8.976	0.742	17.25	86.87

(Source: World Data Bank, 2013).

Although African stock markets have shown some improvements over the years in terms of market performance and listings among others, full stock market development is still at infancy compared to global standards. Surprisingly, even the most advanced stock markets are still immature. There are various bottlenecks affecting the growth and efficiency of African stock markets and amongst those bottlenecks is the lack of access to the banking sector to the private sector (Dahou, Omar & Pfister, 2009). In a nutshell African stock markets possess almost the same characteristics with a few exceptions to the JSE and EGX and they include:

- Weak regulatory framework. There is minimal or inadequate supervision by regulatory authorities.
- Lack innovative financial instruments. Most trading occurs in only a few stocks which make-up for a considerable part of the total market capitalisation. There are serious informational and disclosure deficiencies for other stocks apart from the actively traded ones.
- Lack economies of scale and or [illegible]all. The African stock markets are dominated by a few large companies which represent a high proportion of total market capitalisation. Also most of the stock markets except for the JSE, EGX and to a lesser extent NSE have limited or few listings.
- Markets are illiquid. There are large gaps between buy and sell orders, thus shares are rarely traded and business volume is too low.
- The stock markets lack operational efficiency.
- The stock markets are fragmented.

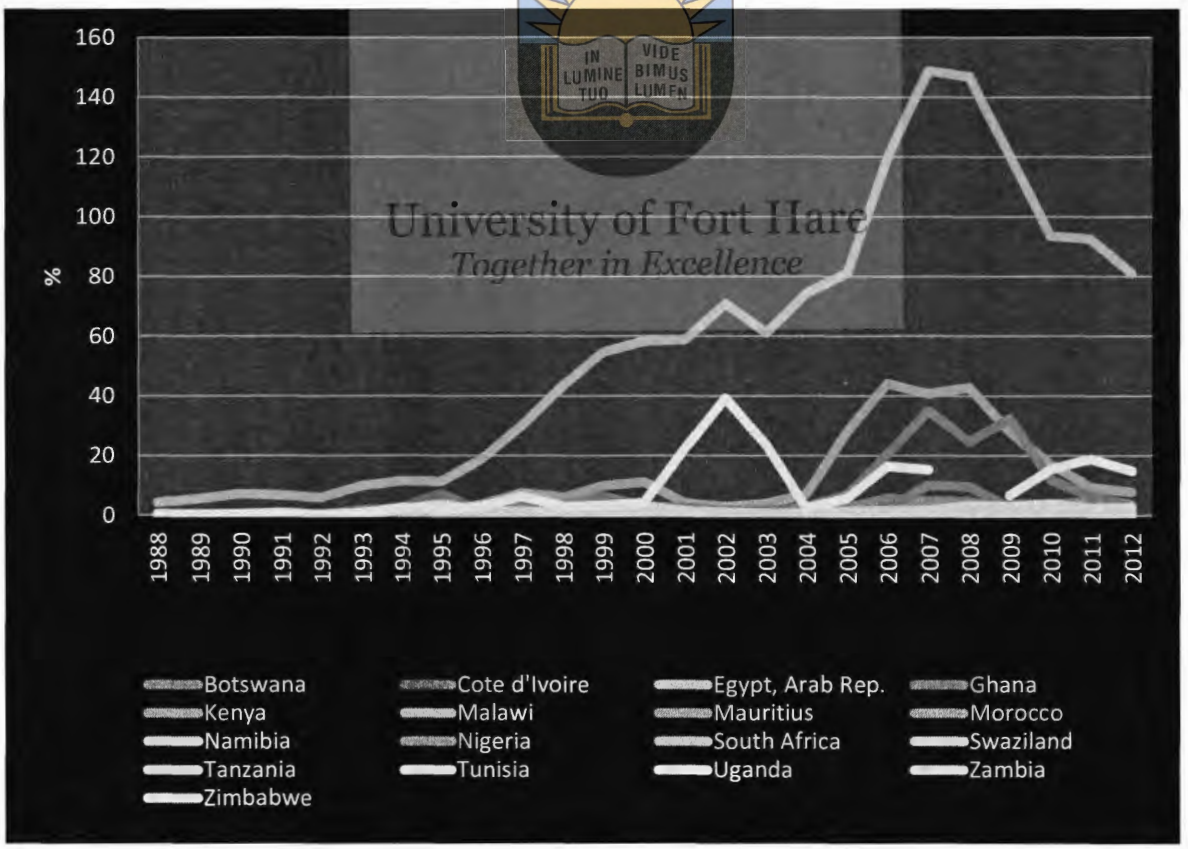
Also they have the following infrastructural characteristics:

- Have diversified trading mechanisms (such as on-line trading; margin trading and short selling and borrowing)
- Unrestricted foreign participation in the stock markets
- Shorter settlement cycles the availability of alternative markets (for instance, the derivatives market in South Africa)

2.2.2 Liquidity of African Stock Markets

Stock market liquidity is measured by the ease with which investors can buy and sell securities at given prices. However, due to the difficulty in obtaining such statistical data, two alternative measures of stock market liquidity are used to investigate the rate to which African stock markets are liquid.The turnover ratio which measures the market's overall trading activity relative to the size of the market is used in conjunction with the total value of shares traded on the exchange scaled by GDP as the two alternate standard indicators for stock market liquidity. The former is measured by the total value of shares traded scaled by the total market capitalization and the lattermeasures the market's trading activity, relative to the size of the economy (Allen, Otchere & Senbet, 2010).

Figure 2. 2: Africa Stock Markets: Stocks Traded, Total Value (% of GDP)

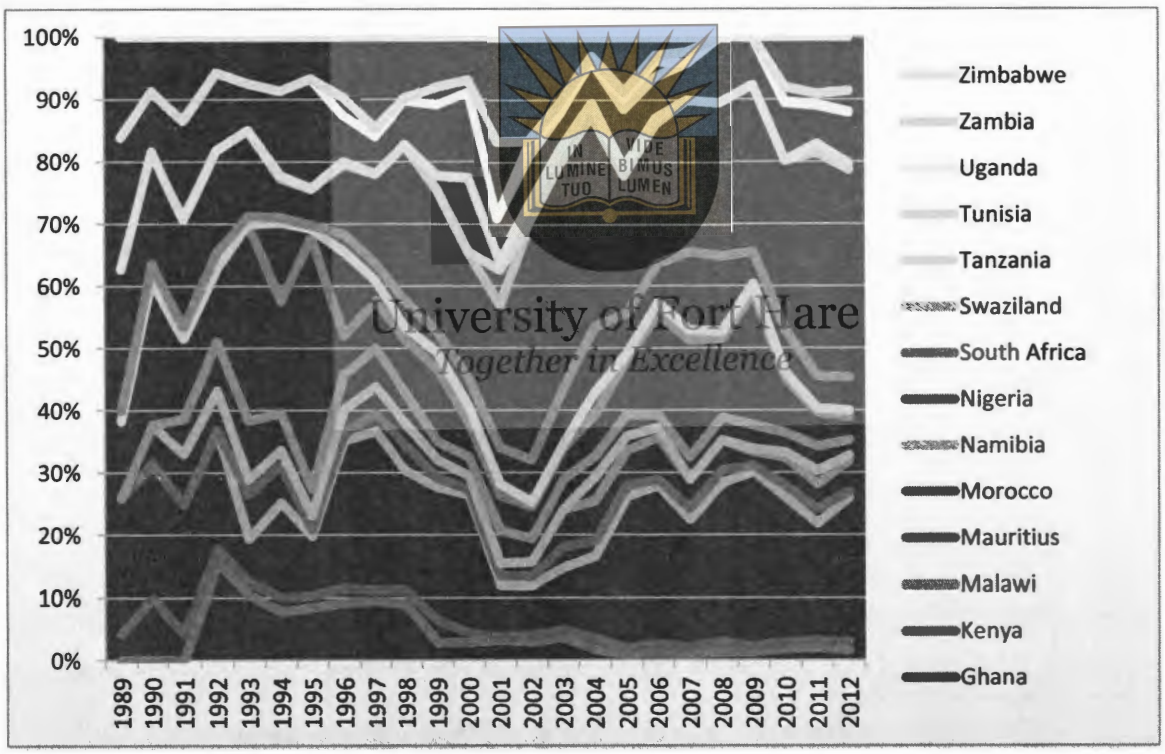


(Source: World Data Bank, 2013)

Despite the growth of the African stock markets over the years, most of the African stock markets are still very illiquid, except for South Africa, Egypt and Zimbabwe. As shown in figure 2.2, the total value of stocks traded, scaled by GDP is very low, although, in general the market performance has been improving. In countries such as Botswana, Zambia and

Namibia the value of stock traded is hardly more than 1% ofGDP. The same scenario is observed using the turnover ratio, reflecting minimal trading activity. Well established stock markets (South Africa & Egypt) exhibit high liquidity compared to other African stock markets as shown in figure 2.3. In addition, most African stock markets as discussed earlier, are faced with low liquidity due to the lack of innovativeness in securities traded. However, with the realisation that establishing a stock market only is not enough to sustain a profitable and healthy market, most policy makers in Africa are addressing the challenges faced by the markets.

Figure 2. 3: African Stock Markets: Stocks Traded, Turnover Ratio (%)



(Source: World Data Bank, 2013)

Amongst the measures adopted in fostering depth and liquidity of African stock markets is the regional consolidation of markets (for instance, the establishment of a regional stock market housed in Abidjan, namely Bourse Regional des Valeurs Mobiliéres (BVRM)).The BVRM serves as an anchor for the Francophone countries of West Africa and other African regions are considering such initiatives (Allen et al, 2010) as well.

2.2.3 Profitability of African Stock Markets

According to Allen et al, (2010:11) the viability of African stock markets as investment opportunities depends on the extent to which they have the potential to improve risk-return trade-offs facing global investors. As a matter of fact, African equities represent a vastly underutilized option for international investors. These are growing markets that have provided attractive returns in the last several years and can achieve the goal of portfolio diversification as they offer a superior risk/return profile (through very attractive price-earnings ratios) that is not affected by trends in the more developed markets. For instance the private investment activity for Africa increased by 136% in 2013 to US$ 3.2 billion up from US$ 1.46 billion in 2012 (Hlophe, 2014).

Hence apart from the poor performance and the vast challenges faced by most African stock markets, they pose as a good investment opportunity for portfolio diversification for international investors. Also smaller African markets have proved relatively immune to global tensions hitting share values worldwide, due to their lack of correlation with developed markets (Bunyi, 2003). This diverse character[illegible]African equity markets, therefore offers positive benefits in terms of risk diversification.

As postulated most African stock markets have been reaching a growing performance trend. However apart from the positive performance, most African markets are still faced with institutional challenges and are illiquid. This pose as a major concern for investors because, a well liquid stock market is attractive to investors. Also, there seem to be little or no integral relationship between the African stock market, and the smaller markets are not even linked to the global markets.

2.3 Overview of the South African Stock Market

2.3.1The South African Stock Market (JSE)

Founded 14 months after the discovery of the Witwatersrand gold fields by Benjamin Woollan, the JSE was established in 1887 as a stock exchange to enable new mining ventures to raise funds for the development of the then fledgling mining industry. Due to the lack of a well-developed industrial sector, there were no industry shares during its early years of existence. In an urge to regulate the operation of the exchange in South Africa, the Stock Exchanges Control Act was enacted in 1947. By 1963, the JSE was acknowledged as an associate of the Federation International Bourses de Valeurs (FIBV) which ensures the free flow of capital across national boundaries.

In 1984, the Development Capital Market (DCM) was created and the venture capital market was formed in 1989. JSE became an active member of the African Stock Exchange in 1993 so as to ensure proper exchange of information and to assist in the development of member exchanges. Up until November the 8th 1993, all securities brokers were obliged to be South African citizens. The South African Institute of Stockbrokers responsible for the examination, admission, training and discipline of the stock brokers was formed in 1995 (MacLeod, 2008 & Mabhunu, 2004). According to MacLeod (2008) and Faure (2005), in 1996, the open-outcry trading floor was closed on the 7th June and replaced by the electronic Johannesburg Equities Trading (JET) system as the exchange shifted from manual to digital trading.

To ensure early and wide dissemination of all information that might affect the prices of securities trading on the JSE, the Securities Exchange News Service (SENS) was introduced in 1997. To match seekers and providers of capital for small to medium businesses, the Emerging Enterprise Zone (EEZ), an internet based service was introduced in 1997. Three new versions of JET system were also fully implemented together with the signing of a memorandum of understanding with the [illegible] stock exchange. The Share Trading Transactions Totally Electronic (STRATE) was established in November 1999 as the electronic trading system, and the new insider trading law was promulgated in the same year. There was also the modification of the Johannesburg Equities Trading System (JETS) in preparation for the implementation of an open interface system via the Application Programme Interface (API).

JET API was officially launched in May 2000, and by June the same year, four companies moved across to STRATE. More so, to establish an international exchange programme for young people in the stock broking industry, the JSE reached a corporate agreement with the American state of Illinois and in 2001 JSE acquired or merged with the South African Futures Exchange (SAFEX). This was not the end of the exchange development, since 2002 all securities listed were dematerialised and transferred to the STRATE electronic settlement environment and the JET system was replaced by the London Stock Exchange (LSE)'s SET system which is operated in London by the LSE. The AltX was launched in partnership with the DTI (Department of Trade and Industry) in 2003 and in 2004 the interest rate exchange also known as the yield-X was launched. In 2009, the JSE merged with the Bond Exchange of South Africa (BESA) (Faure, 2005 & Samkange, 2010).

The JSE has achieved a lot since its establishment and is a reflection of the gold mining industry as argued by Murray (1987) For instance, the current top ten companies in South Africa are mining companies, being measured by market capitalisation. Having moved from one place to another, the JSE has finally established and is now housed in Sandton, Gauteng. As postulated by Moolman (2004), with the growth and expansion in the economy, quite a number of industrial companies have joined and are now listed on the JSE. Up until present day, the JSE has earned tremendous developments such that it has managed to be among the top five emerging markets globally and is an efficient and world class trading exchange in terms of regulation, settlement, risk management and clearing assurance.

2.3.2 The JSE Market Structure and Organisation

The JSE's main function is to ease the raising of principal wealth by re-channelling cash funds into fruitful economic activity so as to build the economy whilst enhancing job opportunities and wealth creation. As a listed company, it is governed by a board of directors and its activities are regulated by the parliamentary act known as the Securities Services Act 30 of 2004. Although the JSE is licensed as an exchange by the Act, under international standards and norms the philosophy of self-regulation by markets is applicable. In addition, the board consists of 14 directors (comprising the Chief Executive Officer (CEO), deputy CEO, chief operating officer, 9 non-executive members and 2 executive members) responsible for corporate strategy and policy (Clarke &Nortje, 2006).

Faure (2005) further argues that the equity market constitutes the primary and the secondary market (since equities are marketable) and these equities are issued and traded in the spot market. The equities market has an exchange market form which started off as Over the Counter (OTC), (where traditional options are traded) in the streets of Barberton and Johannesburg. In the primary market, the methods of issue are private placement or public issue or both, whilst in the secondary market, trading is order-driven than quote driven. Up to the early 1990s the open outcry/floor trading system was used. In addition, the JSE is governed by its members, who mostly trade in bonds through the Bond Exchange of South Africa (BESA) and financial futures through SAFEX (Berg, 2003). After moving from one building to another due to growth and the genesis and acceleration of the industrial activity, the JSE is now housed at the corner of Maude Street and Gwen Lane in Sandton.

2.3.3 Size and Performance of the JSE

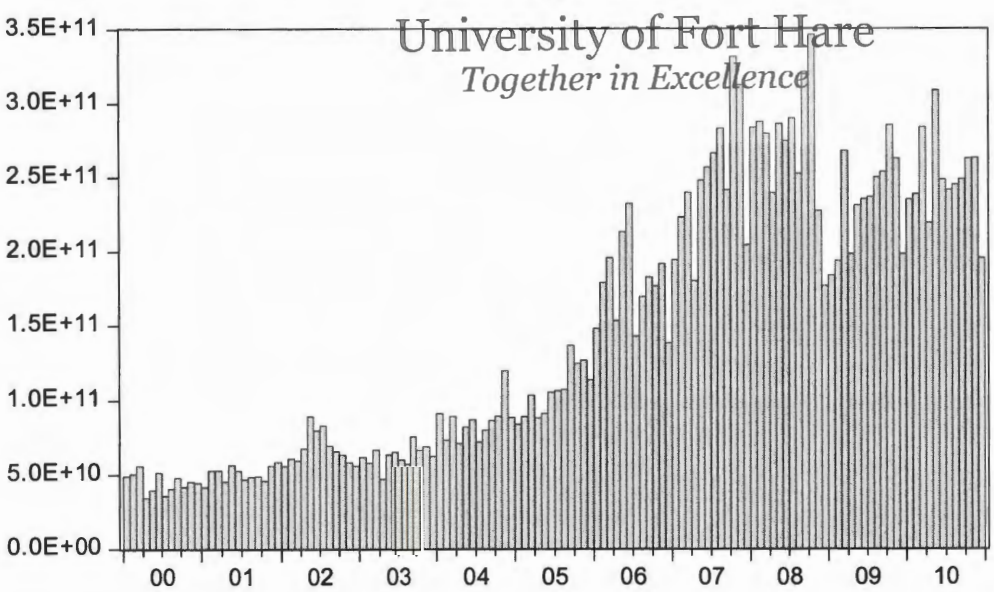
The JSE formation is attributable to the growing gold mines. Thus, from its inception until 1926 the market was dominated by gold mining shares. In the 1930s and after the 2nd world war, industrial company listings grew and by 1946 the market capitalisation of financial, commercial and industrial shares surpassed that of mining shares (Firer & McLeod, 1999). Beer and Keyser (2007) argued that the JSE returns from 1887 to 1960 represented the fortunes of gold mine industry resulting in a boom in 1894. As a result of exchange control developments the stock market experienced a major boom in 1930 and this was a period of financial security for South Africa. This took a dramatic change from 1960 as political unrest; Rubicon speech of 1985 and exchange controls trapped investments which greatly impacted on the governance structure and competitiveness of South African companies. Trade on the JSE was characterised by low turnover and liquidity, concentrated ownership of shares and dominance by mining houses. Wessels (2005), explained this era as a major bear market experienced from 1969 to 1978 with some mini bear markets within the major bull market from 1980 to 2005.

For the 1990 to 2004 period the number of listed companies was 604 with a market capitalisation of GDP of 147%. Presently 443 companies with a market capitalisation of R1 460 billion were listed by May of 2003. There was a sizable upsurge in liquidity from 6.3% in 1995 to 34.6% in 1999 and 39.6% by May of 2003. In terms of market capitalisation the JSE climbed down the ladder due to major de listings that have transpired since the 1990s, for instance, in 1991 740 companies were listed and by early 2003 the number had declined to 443. In 2004, the JSE had an estimated 472 listed companies and a market capitalization of US$182, 6 billion as well as an average monthly traded value of US$ 6,399 million (Mabhunu, 2004 &Yartey, 2008).

The JSE was ranked the 17th largest equity market the world over in 2008 (Yartey, 2008). It however, fell to 19th position in 2010, with a market capitalization equivalent to 200 percent of Gross Domestic Product (GDP). As of 2009, the JSE had 54 equity member firms and 419 companies with listed shares. However, it remains highly concentrated, with just 70 stocks accounting for 85 percent of its market capitalization with mining stocks accounting for around 40 percent of the market value and financial services stocks accounting for 20 percent. Between 2007 and 2010, the number of listed companies in the AltX grew from 57 to 76 and its total market grew from R 17 billion to 21.4 billion (Katz, 2010).

The JSE has also created two more new trading boards in which one board lists companies incorporated in neighbouring African countries and the second new board lists single stock futures in foreign companies, enabling South African investors to easily invest in foreign companies (Katz, 2010). Huge and tremendous changes have transpired in the stock market for the period of 2000 to 2010. Monthly stock value has been increasing since 2000. By October 2008 its value reached a pick with a turnover of R346 319 375 839 and there was a sharp decline to a turnover of R176 594 571 080 by December the same year. The year 2009 was a year of recovery with an increase in turnover to R253 689 043 758 in October. Gradually the market regained its value but has never been close to the turnover of R346 319 375 839 reached in 2008. In 2010, the market value declined, showing further signs of depression (Figure 2.4).

Figure 2. 4: Size and Performance of the JSE

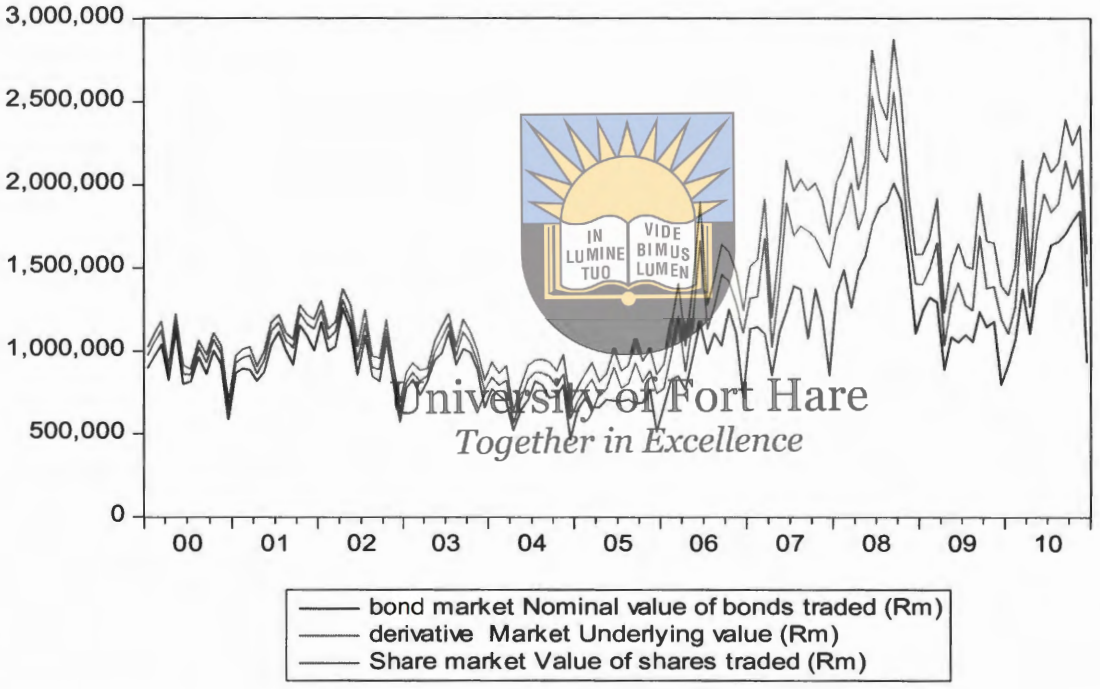


(Source: JSE, 2012)

Apart from being the largest of all global emerging markets, the JSE is the biggest in South Africa as compared to other financial markets (bond and derivative markets). The South African bond market is also a leader among emerging market economies. Dominated by government bonds, the bond market reached a total of R825 billion (nominal) in local debt securities and traded a volume of R19 trillion in 2008 (Fuzile, 2012).

Meanwhile the derivative market reached a peak of more than R680 trillion of gross outstanding estimated value by June 2008, which represented a 535% increase from seven years earlier (FSB, 2009). The growth of the derivative market was more than the bond market especially comparing the 2008 figures. Thus, sequentially the stock market is first followed by the derivative market and the least is the bond market. Proper trend analysis is shown in Figure 2.5.

Figure 2. 5: Market Trends and Comparisons of the JSE



(Source: SARB, 2012)

There is a positive correlation between the growth of the stock market value, nominal bond value and the stock derivative value. During the period of global economic recession, all the three markets grew extensively and reached their highest points in 2008, but latter declined. Even though there was an increase in all market values, none of the two markets surpassed the stock market value.

2.3.4 Listing Requirements of the JSE

After a full assessment of the company's goals, management, resources, stages of development, long-term strategies, future prospects and performance, one may wish to list his/her company. The JSE is South Africa's exchange that is well positioned to help leverage listings to the maximum. There are several benefits attached to listing such as access to capital for growth. This gives the opportunity to raise capital to fund acquisitions as well as growth. It also boosts a company's profile by generally enhancing the its public profile with customers, suppliers, investors and the media, giving room for the availability of more business opportunities. Listing creates value and liquidity for shareholders. Furthermore, listing allows an individual/company to facilitate Broad-Based Black Economic Empowerment (BBBEE) deals which is prerequisite to corporate citizenship in South Africa. Through listing a company may offer share incentives to employees to encourage commitment and improve the quality of recruits (Faure, 2005; Young, 2012).

More-so Young (2012) argues that listing at the JSE has additional benefits namely; enjoying local analyst coverage as well as high media [illegible], attracting international investors who can easily trade in JSE-listed shares without any restrictions. Also it enables trading shares securely and efficiently on JSE Trade Object, the London Stock Exchange's trading system and eligibility for inclusion in the FTSE/JSE Africa Index Series. Thus creates additional exposure for the company both locally and internationally and the ability to market a business to investors with the assistance of the JSE business development team. In the light of a volume of benefits, there also are costs to be considered for listing. The typical costs include sponsor or designated adviser, auditors, sundries, attorneys, printing of a prospectus and other documentation, JSE once-off listing fees, transfer secretary, marketing and advertising and the annual JSE listing fee.

The JSE consists of the main board, two sub-boards (development capital market and the venture capital market) and the AltX (alternative exchange) markets in which one can list in (Faure, 2005). The decision to list in either of the four differs due to the size of the company, the funding requirements and future expectations through listing. The listing requirements for the main board and the alternative exchange are contrasted in Table 2.1.

Table2. 1: JSE Main Board and AltX Listing Requirements

Requirement	Main Board	Alternative Exchange (AltX)
Share capital	R25 million	R2 million
Profit history	3 years	N/A
Pre-tax profit	R8 million	N/A
Shareholder spread	20%	10%
Number of shareholders	500 for equity shares, 50 for preference shares and 25 for debentures.	100
Sponsor/DA	Sponsor	Designated advisor
Publication of financial results in the press	Compulsory	Voluntary
Number of transaction categories	3	2
Special requirements	N/A	Financial director
Educational requirements	N/A	All directors to attend the Directors Induction Programme (DIP)

(Source: Young, 2012; Faure, 2005)

Some of the requirements for the main board include that all annual interim provisional reports must be audited and should comply with the Generally Acceptable Accounting Practise (GAAP). Also should comply with the international financial reporting and abridged annual financial statements are released on SENS on the day the statements are released. Furthermore the directors' emoluments should be disclosed in all forms and the company should be in compliance with some of the King 11 Code of corporate governance principles (Faure, 2005). The two sub-boards' listing requirements are presented in Table 2.2.

Table2. 2: JSE VCM and DCM Listing Requirements

Requirement	**Venture Capital Market (VCM)**	**Development Capital Market (DCM)**
Share capital	R500 000	R1million
Profit History	n/a	2 years
Pre-tax profit	n/a	R500 000
Shareholder spread	5%	10%
Number of shareholders	75	75
Educational requirements	Managers and directors should have successful records of achievement.	n/a
Minimal initial issue price	50c/share	50c/share

(Source: Faure, 2005)

These requirements are meant to protect both the companies and investors who would like to trade with each other. In other words they ensure a well designated trading and settlement system.

2.3.5 Trading and settlement

Since the 19th century, there has been a growing competition between exchanges across the globe. Hence, much pressure has been exerted on the JSE to improve its trading, clearing and settlement methods. Due to an increase in technology, there was a need to reduce costs and needs be, surpass other exchanges with regards to trading and settlement to attract more foreign investments. It had to adopt better electronic trading systems to ease time, errors and inefficiency in settlement. In 1996, an end to the open outcry trading floor gave way to the JET system, an order-driven, automated and centralised trading system. Inclusive is the introduction of dual trading and negotiated brokerage. In 2002, JET system gave way to SETS as a means of adopting global standards aimed at increasing transparency and liquidity on trading.

On the other hand, clearing and settlement is done through STRATE. STRATE Limited is the Central Securities Depository for the South African equity market, and deals only with Central Securities Depository Participants (CSDP), which are the transfer secretaries approved by the Financial Services Board. Under this system, share certificates dematerialised, that is, ownership of shares is indicated by a computer-generated statement sent from CSDPs to shareholders on monthly basis, mainly to eliminate paper dependence in the form of share certificates and transfer documents (Mabhunu, 2004).

With regards to the ever growing bond market, the JSE bond platform is the trading market for government, local government and Domestic Corporation ZAR-denominated debt. Whilst the JSE provides some small amount of indicative bids and offers for listed securities, secondary market trading in debt securities is largely an OTC market dominated by the leading South African banks and all trading is reported to the JSE for publication. An electronic money market programme became operational in 2010 led by STRATE and is designed to facilitate trade reporting and the bilateral clearance and settlement of short-term debt instruments. Furthermore, the bond futures contracts on YieldX are physically settled, that is, bonds are physically delivered on a t + 3 cycle (Katz, 2010).

2.3.6 Regulation of the JSE

The JSE is the primary and secondary market for listed equity securities, financial derivatives, agricultural commodities and the bond market. It is a licensed self-regulatory organization (SRO), has key regulatory obligations for authorizing members (authorized users), personnel, setting listing values and disclosure obligations meant for listed companies. Also it has central accountability for market reconnaissance and has the power to take punitive action against associate firms and their employees, listed companies together with company directors. The primary offering process for equity securities is under the regulation of the DTI and the JSE exercises primary responsibility through its listing requirements. As banks are the principal underwriter of securities in Africa, the SARB also plays a role in regulating this activity. There is diminutive regulatory inaccuracy of the over the counter market (Katz, 2010).

According to Faure (2005), there is a corporate body known as the Securities Regulation Panel (SRP) which is appointed by the minister. This panel consists of the registrar, chairperson of the competition board, three p[illegible]ominees of the share exchange and the council of South African banks), and one nominee by associations and institutions. The primary functions of the panel comprise regulation of all transactions or schemes which make up affected transactions (any transaction which taking into account any securities held before such transaction will have the effect of vesting control of any company in person(s) in whom control did not vest prior to such transaction).

They regulate all proposals which on triumphant accomplishment would become affected transactions, supervise dealings in securities and make rules in relation to the duties of the offeror and offeree. Insider trading as defined according to section 72 of the Securities Services Act, 2004 is one of the evils that destroy investors' confidence and zeal to invest. It is specific or precise information, which has not been made public and if it were made public would be likely to have a material effect on the price or value of any security listed on a regulated market,) Most stock markets suffer from this evil, in which those in possession of useful and private information tell it to their friends and they trade profitably disadvantaging those who cannot access the information (Faure, 2005).

As part of its regulation system, the JSE has surveillance division in place to prevent market abuse. This is the use of intense technology by the surveillance division department, in which all the activities in the market are closely monitored and in a case where suspicious trading is

identified it is quickly dealt with. According to Loubser (2006), the stock market has gone even beyond the best practices of the developed stock markets in terms of regulation. The FSB has all the authority to interrogate and punish any market abuses and cheatings, which gives the JSE an economic advantage over most developing markets and investor confidence in the market and has been ranked first in its regulation of financial markets for two consecutive years (that is 2011-2012) by the World Economic Forum (Clarke, 2012).

Part of the success to the JSE is patience in starting small, determination to reach a specific goal and minding the surrounding environment, i.e. Corporate Social Responsibility. This is done through hosting regular investor showcase events at the exchange that are open to the general public and high school engagement programmes. However, there are various lessons for emerging markets and those lessons can be learnt from the challenges that the JSE is exposed to also. By extensive regulation practices the exchange has created a conflict of interest within itself in terms of listing (Muller, 2012), thus for success, other emerging markets should be aware of such challenges and promote policies that cater for all spheres

2.4 Overview of the Botswana Stock Market

2.4.1 History and development of the Botswana Stock Exchange

With a single brokerage firm and five (5) listed companies, the Botswana stock exchange was established in 1989. Then the market was known as the Botswana Share Market (BSM) and was operating informally. Formally, after the enactment of the BSE Act 11 of 1994 (based on the Zimbabwe Stock Exchange Act), the BSE (Botswana Stock Exchange) was established as a separate legal entity in November 1995.At the end of 1996 the BSE had 12 listed securities with a total market capitalization of P1.190 million (US$326 million) (Ooka, 2010; Jefferis & Tacheba, 2010).

In 1989, the only market performance index was the Botswana Share Market index (BSI) and was set at 100. However, as the market developed and diversified in terms of domestic companies and dual foreign companies listed, the need for additional markets indicators arose. Three distinct indices were introduced to reflect the market diversity and these are; domestic company index (DCI), foreign company index (FCI) and the all company index (ACI). As at end of 2006 the DCI recorded 6 195.45 points, while the FCI hit 1 777.30 points and the ACI 1 914.18 points. In 2001 the BSE introduced a venture capital board (VCB) dedicated to companies looking for start-up capital. To widen the availability of alternative investment instruments the listing of government bond was introduced in 2003 as an initiative by the government to develop the domestic capital market (Jefferis & Tacheba, 2010).

As part of the BSE's strategy to develop the capital market, major developments are currently underway at the BSE for the implementation of a Central Securities Depository (CSD) which commenced in October 2007. The implementation seeks to bring prompt, efficient clearing and settlement of trades and the reduction of risks inherent in the process. In addition, the BSE Act of 1994 is being reviewed in order to set up an appropriate operational and regulatory legal framework in efforts to align it with International Best Practice (IBP) and cater for innovations in financial markets around the world (BSE, 2013B).

Also the exchange is involved in the development of more instruments which are more than traditional shares (equities) to be listed in the exchange, to give investors a variety of exchange listed instruments. By the end of 2008, a total of 36 bonds from 14 issuers were listed on the BSE, and as well there were a number of unlisted bonds in issue. According to the BSE 2012 Annual Report, 46% of all domestic company shares and 91% of foreign company shares were dematerialized by December 2011. The year 2012 was accomplished with the launching of the Automated Trading system (ATS) which is aimed at improving efficiency in the trading system of the exchange (Minney, 2012). The exchange is still improving its operations to suit international standards and to keep abreast with the current technological challenges.

2.4.2 The BSE Market Structure and Organisation

The BSE aims to provide and operate a fair, transparent and efficient stock market for all stakeholders in order to optimise national economic development. It has the responsibility to operate and regulate the equities and fixed interest securities market and is pivotal to Botswana's financial system, in particular the capital market, as an avenue on which government, quasi- government and the private sector can raise debt and equity capital (BSE, 2013B). Consequently, the exchange trades initial issues at the primary market and is the biggest secondary market for equities (found in the domestic, foreign and venture boards), corporate bonds, government bonds and commercial paper in Botswana.

The market comprises the Botswana Stock Exchange and three stock broking firms. It is regulated by a committee which reports to the registrar of the stock exchange. The parliament of Botswana has passed the non-bank Financial Institutions Act establishing a commissioner whose mandate is to regulate the activities of the BSE. Although the exchange is moving away or improving on the BSE Act 11of 1994, its structure is governed and based on the act. Under the Act, the minister of finance and development planning is conferred with powers to appoint the registrar of the Botswana Stock Exchange. Also, during the course of its development, the market has introduced Exchange Traded Products (ETFs), securitised products and derivatives (BSE, 2007; 2013). The bond market and the derivative markets are still on the development stage.

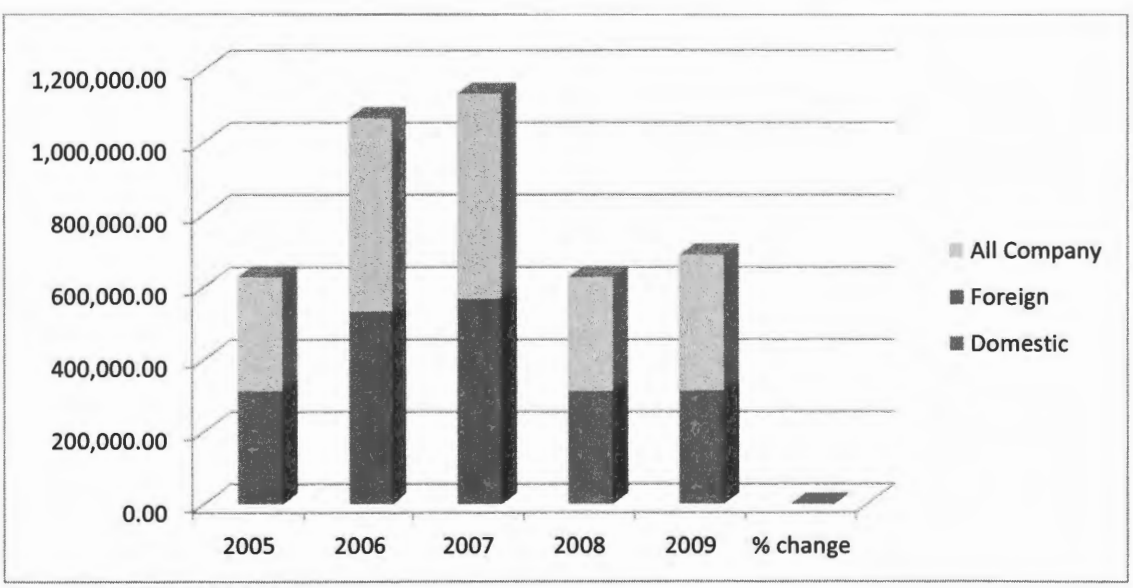
2.4.3 Size and Performance of the BSE

Though with a small market turnover, the BSE is experiencing a rapid growth rate and is one of Africa's best performing stock exchanges, averaging 24% aggregate return in the past decade. This has allowed the BSE to be the third largest stock exchange in terms of market capitalization, in Southern Africa. The number of listed shares has more than doubled (there were only five when it started) and capitalization grew by 900% between 1989 and 1996 in local currency terms and 409% in US dollar terms whilst the market index grew at an annual rate of 17% in local currency. Market capitalization of the BSE grew from 254 million pula in 1989 to 182 126.60 million in 2002 a huge and positive growth (BSE, 2013B: Jefferis & Tacheba, 2010).

Figure 2.6 and 2.7 below shows the market capitalisation trend of the exchange from 2005 to 2009 both in local and US$ currency. It further displays the dividend yields and liquidity in the exchange amongst the rest for the period 2005 to 2009. Available data shows that the foreign companies are the highest contributors to market capitalisation, with the domestic companies having a very small stake. The year 2006 experienced the highest overall market capitalisation figure both in local and US$ currency (that is 534 184.66 million pula or US$94,577 million). In 2008, the market experienced a drop in its market capitalisation which was the first of its kind since its establishment. The Domestic Company Index (DCI) recorded a negative growth.

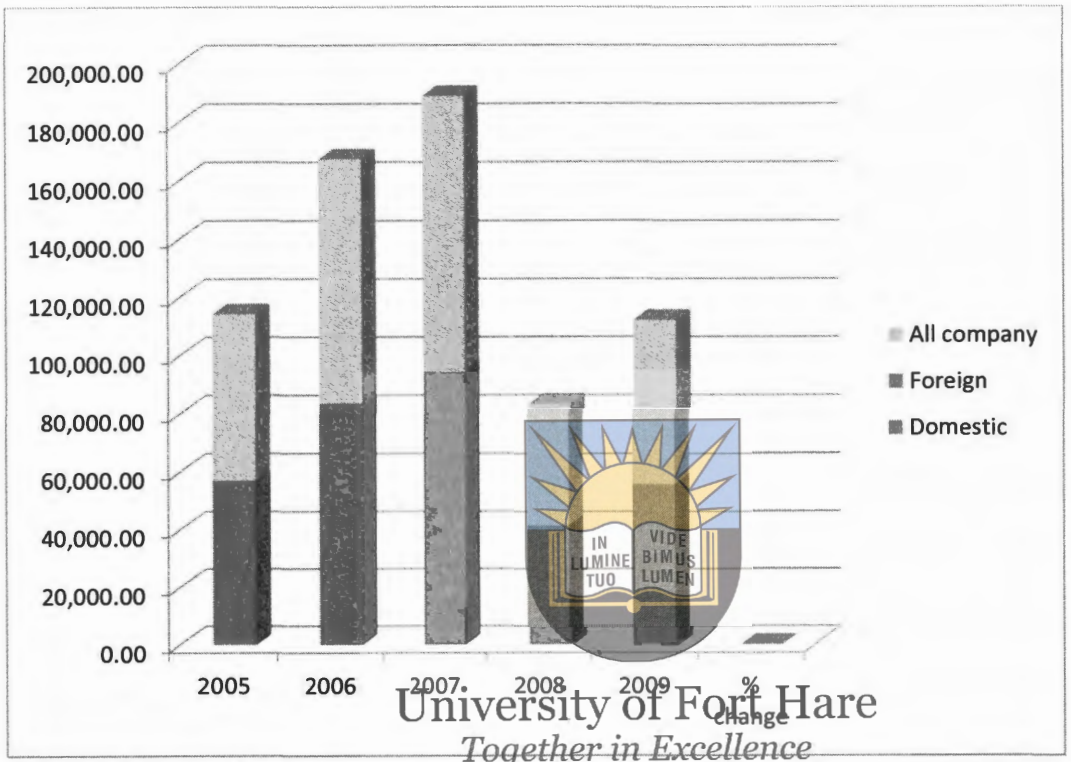
The DCI closed the 2008 year at 7,035.5 points compared to 8,421.6 points as at end 2007 depreciating by 16.5% compared to an appreciation of 74.1% and 35.9% in 2006 and 2007 respectively. In addition the Foreign Company Index (FCI) closed 2008 at 1,192.0 points, 45.8% below the level recorded as at the end of 2007.Further the All Company Index (ACI) fell by 44.1% in 2008 compared to a rise of 58% and 24.2% in 2006 and 2007 respectively (Mendis, 2008).The decline in the exchange performance was caused by the global economic crisis which translated to the exchange. Although the domestic companies contribute less to overall market capitalisation, their liquidity (figure 2.8) shows tremendous improvements which might pose a good indicator to market improvements.

Figure 2. 6: BSE Market Capitalisation (Pula Million) 2005 to 2009



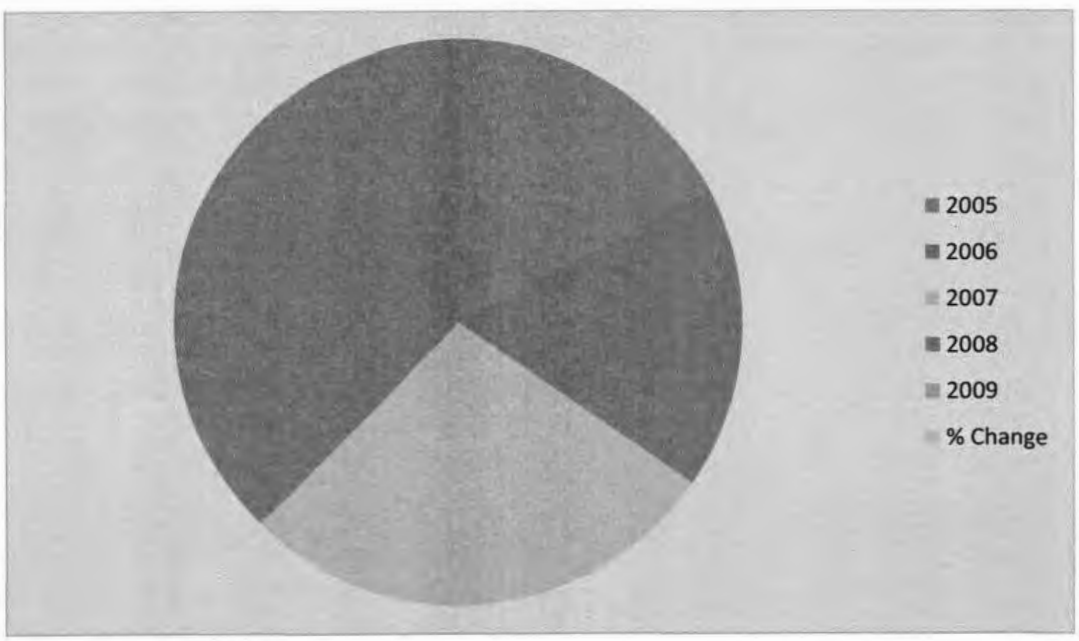
(Source: BSE, 2013B)

Figure 2. 7: BSE Market Capitalisation (US$ Million) 2005 to 2009



(Source: BSE, 2013B)

Figure 2. 8: BSE Domestic Market Liquidity (2005 to 2009)



(Source: BSE, 2013B)

However the BSE remains relatively small, with market capitalisation estimated at 35% of GDP at the end of 2008, and illiquid. There is also an embryonic bond market. Like the equity market, it is small (bond market capitalisation is equivalent to some 7.2% of GDP in 2009), but has been growing steadily in recent years (Jefferis & Tacheba, 2010). The debt market capitalisation increased by 10% during 2009 from P5.48 billion in 2008 to P6.03 (Sebate, 2009). Conversely, there is no central data source that exists for all transactions in the market which makes it very difficult to obtain comparative statistics for the bond and derivative markets. Due to the little commitment given to the two markets, and the fact that the markets are still developing, the BSE does not have the required statistics.

2.3.4 Listing Requirements of the BSE

More than half of the listed companies are financial institutions; others are in trade, property and brewing. The mineral sector is not represented, and ownership of shares remains highly concentrated with large shareholdings by controlling parent companies. Also the number of securities (shares and fixed income) listed in the BSE rose from 5 in 1989 to 44 as of 2004 and to 56 in 2006 (Jefferis, Okeahalam & Ma[illegible]12). The growth in the number of listed companies has over the years been helped by the introduction of a venture capital board and a foreign board comprising secondary (dual) listings of companies listed in other jurisdictions.

The requirements to list in the BSE are listed in the following table 2.3 for the different market categories, that is, the domestic equity market/main board, venture capital market, foreign equity market and debt listing category. As for foreign companies wishing to list in the BSE, their listing requirements depend on their home country (BSE, 2013B). That is, their primary listing market requirements enables them to apply for admission in the exchange, as long as they are eligible and qualify in their domestic countries to list on the stock exchange. The listing requirements of the BSE are adopted from the JSE listing requirements.

Table2. 3: BSE Listing Requirements

Type of Condition	BSE Domestic Equity Market (Main Board)	Venture Capital Market	BSE Foreign equity Market	BSE Debt Listing
Share capital	At least P1,000,000	P 500,000	N/A	N/A>
Number of Shares issued	At least 1 million shares	At least 1 million shares	N/A	N/A
Minimal Initial Price	100 Thebe per share. i.e. P1.00	P0.50	N/A	N/A
Number of public security holders	300 public shareholders, 25 preference shares and 10 debentures. 20% of each equity class must be held by the public.	Minimum 5% of each class of to be held by the public. 75 equity, 25 preference shares and 10 debentures	N/A	No minimum number of shareholders however minimum P 50 million face value debt to be quoted
Profit Test	Satisfactory profit over 3 years, P 1 million before tax is the last reported and audited.	No profit history, but at least be able to project above average credible returns	N/A	N/A
Financial Statements	Last 3 financial years statements	N/A	N/A	N/A
Disclosure Document	Prospectus, or a memorandum	Information memorandum	N/A	N/A

(Source: BSE, 2013B)

2.3.5 Trading and settlement

Trading in the BSE consists of auctions and continuous trading sessions to carter for different trading requirements and strategies of investors to improve liquidity. Initially trading was through an open cry method which was phased out in 2012 with the introduction of the Automated Trading System (ATS). The ATS is made up of three bodies namely; the Nomal Lot Board (NLB, where bid and ask orders are entered into the central order book), the Pre-Negotiated (crossings) Board (PNB), where trades are negotiated between stockbrokers) and the All or None Board (AON), which carters for the transactions of large parcels). Also the ATS was integrated with the CSD, to tighten the settlement cycle and to shorten it to T+ 3 from the initial T + 5 in order to conform to international standards and to reduce settlement risk (BSE, 2012a).

The CSD makes it possible for the BSE to record and analyse trading information more efficiently thereby assisting in the deployment of the exchange's marketing strategy more effectively. This development acts as a supporting mechanism to the BSE's marketing initiatives by making it easy for both local and foreign investors to trade on the BSE. According to the 2012 annual report, the CSD is still being upgraded to ensure a more efficient trading and settlement system for the bond and the derivative markets, due to their small size and inefficiencies, the bonds are traded over the counter and settled at the BSE after the traders have agreed on the prices. Having a proper trading and settlement system enhances market liquidity which further attracts more foreign investment.

2.3.6 Regulation of the BSE

Prior 1995 the Botswana market did not have any applicable statute or act. There existed only an interim Stock Exchange Committee comprising of two stock broking members and three members appointed by the Ministry of Finance. It was only after the enactment of the act after the 1st November 1995 that the necessary regulations and rules were enforced for the operations of an efficient securities market with a legal status. The BSE Act No 11 of 1994 governs all the activities between the Exchange and its members, the proceedings of the main Committee and its composition; the relationship between the Minister and the Exchange together with the relations between the Registrar, the exchange and members of the exchange.

Further the members have publicized rules (known as member rules) which provide for certain requirements to be fulfilled for the securities listed and trading on the Exchange. These rules are set to ensure that the exchange operate in the public interest, to maintain fair and efficient dealing in securities for the protection of investors and to regulate the affairs of members. Also to warrant that issuers of securities disclose as much information to the public and investors so that the latter can make informed investment decisions, the exchange has a set of listing requirements which provide the pre-listing requirements and post listing requirements to be observed by the former. In addition, the BSE has established surveillance and compliance committees and employs well qualified staff to ensure compliance of the legal framework and rules of the exchange with regard to investor protection and fair market practice. Also for reliability, integrity, performance, capacity and cost effectiveness, the exchange acquaints itself with the rapid changing technology and adapts quickly (BSE, 2013B).

Part of the success of the BSE is enhanced by its involvement in the promotion of the following programmes as part of social corporate responsibility (CSR); HIV/Aids awareness, environmental protection, equitable distribution of essential drugs and public education campaigns and entrepreneurship. Furthermore the exchange has undertaken to diversify its international portfolios by being a member of COSSE (An Association of Southern African Stock Exchanges), ANNA and ASEA and is forming alliances with other stock exchanges through the World Federation of Stock Exchanges.

2.5 Overview of the Mauritius Stock Market

2.5.1 History and development of the Mauritius Stock Exchange

The Stock Exchange of Mauritius Ltd (SEM) was incorporated in Mauritius on March 30, 1989 under the Stock Exchange Act 1988, as a private limited company responsible for the operation and promotion of an efficient and regulated securities market. Like the Botswana Stock Exchange, the SEM's official market started its operations with 5 listed companies. The exchange operates the official market and development and Enterprise Market (DEM). The Official Market has a market capitalisation of US$ 6 billion and 42 listed companies, and the DEM has a market capitalisation of US$1.5 billion and 47 listed companies. To allow shareholders of companies which did not satisfy the listing requirements of the Official Market to trade their shares on the exchange, an Over the Counter (OTC) market was set up

in April 1990 as per Chamber of Brokers' request. Formal trading in the OTC market started with 9 companies on the 19th of April 1990 (Kuen & Tapesar, 2011).

In the same year (1990), in the month of November a 1st debenture was listed on the official market. Furthermore in a quest to increase market transparency the Box method (that is, the initial trading method) was replaced with an order driven single price auction system in September 1991. Likewise, after its inception, the SEM had few foreign portfolio inflows due to lack of coverage in its early stages of establishment. By 1994, following the lifting of exchange controls, there was a positive increase in net foreign inflows amounting 2.5% (Rs 38.9 million) of the year's turnover. With the rapid increase of foreign investors, the exchange authorities implemented the Central Depository System (CDS) in January of 1997 to increase efficiency in the clearing and settlement of securities. In 2001 SEMATS was introduced for electronic trading and in 2003 to create the secondary market for government instruments trading of treasury bills was launched (SEM, 2013).

A huge international break through was achieved in 2005 when the SEM attained the membership status of the World Federation of Exchanges (WFE). The DEM was set up in 2006 to assist Small and Medium Enterprises (SMEs) and newly set-up companies which possess a sound business plan and demonstrate a growth potential. By October 6th, 2008, the SEM became a public company. In early 2010, SEM brought major changes to its Listing Rules to align them with the Collective Investment Schemes Regulations 2008 to position itself as an attractive venue for the Listing of Global and Specialised Funds.

Since 2010, SEM can trade and settle equity and debt products in Euro and GBP and in June 2011 it became the first Exchange in Africa to list, trade and settle equity products in US$. As of March 2010, the SEM was designated by the Cayman Islands Monetary Authority (CIMA), an Approved Stock Exchange by virtue of its membership of the World Federation of Exchanges for the purposes of CIMA's Mutual Funds Law, Banks and Trust Companies Law, Insurance Law, Companies Management Law and Securities Investment Business Law (SEM, 2013; Kuen & Tapesar, 2011).

With effect from 31 January 2011, SEM has also been elected by the United Kingdom's Her Majesty's Revenue and Customs (HMRC), as a recognised Stock Exchange under section 1005 (1) (b) Income Tax Act 2007. Under this designation as a recognised stock exchange, SEM is also regarded as a 'recognised Stock Exchange' for Inheritance Tax purposes. This designation confers several potential benefits for SEM. That is, UK pension schemes will be permitted to hold securities listed on the Official Market of the SEM, giving companies and funds listed on SEM access to a larger market of sophisticated, well-capitalised investors. The designation further reinforces SEM's attractiveness as a listing venue for global funds and specialized products (SEM, 2013).

In May 2011, SEM introduced chapter 18 in the SEM's Listing Rules, to cater for the listing of global business companies and other specialist companies as well as specialist debt instruments, targeted at qualified investors. This path represents a major shift for SEM from a domestic-equity-focused exchange to a multi-product-internationally-focused Exchange. SEM listed its first GBL I company in March 2012 and in April 2012 it introduced listing rules for Depositary Receipts and Mineral Companies on the Official Market as well as requirements for the listing of junior Mineral Companies and Exploration Companies on the DEM. As of September 2012, SEM was awarded for the second consecutive year the "Most Innovative African Stock Exchange of the Year Award" at the Africa investor (Ai) prestigious annual Index Series Awards held at the NYSE (SEM, 2013).

The Award in the Most Innovative African Stock Exchange (MIASE) category was given on the basis of a number of criteria, including, amongst others, initiatives implemented by the Exchange to embrace new areas of development, programmes in place to enhance the services it provides to its key stakeholders and compliance of the Exchange's regulatory and operational set-up with international standards. SEM topped the MIASE category out of a group of eight African Stock Exchanges nominated. The other nominees being Johannesburg Stock Exchange, Egyptian Exchange, Casablanca Stock Exchange, Nigeria Stock Exchange, Nairobi Stock Exchange, Ghana Stock Exchange, Botswana Stock Exchange and Uganda Stock Exchange.

2.5.2 The SEM Market Structure and Organisation

The Stock Exchange of Mauritius Ltd (SEM) is a demutualised Exchange and is constituted as a public company. SEM's Board is the focal point of the corporate governance system and is ultimately accountable and responsible for the performance and affairs of the Company. In accordance with its Articles, the Board of the SEM has delegated authority for the implementation of Board decisions and day-to-day management of the SEM to the Chief Executive. Similarly the power to act on certain listing matters resides in the Board of the SEM. The Listing Executive Committee (LEC) deals with listing applications on the Official Market and other specific issues as provided in the SEM listing rules. The LEC is comprised of four Representatives of the SEM and four external Members (SEM, 2013).

The board also has two established sub-committees namely; the audit and risk management committee and the corporate governance committee, which also acts as the remuneration committee and the nomination committee. The Stock Exchange of Mauritius Ltd holds 51% of the ordinary share capital of the Central Depository and Settlement Co. Ltd (CDS). The market consists of three market indices namely, the SEMDEX, the SEM-7 and the SEMTRI. The SEM-7 is deliberated as a benchmark to assess the performance of seven listed shares on the exchange while the SEMTRI and the SEMDEX are important tools for market participants for performance measurement of all listed companies on the official market. The SEMTRI is a total return index, taking into account gross dividends as well as capital gain/losses while the SEMDEX is an all price share index taking into account only price movements of all companies on the official market (Ushad & Muhammad, 2010).

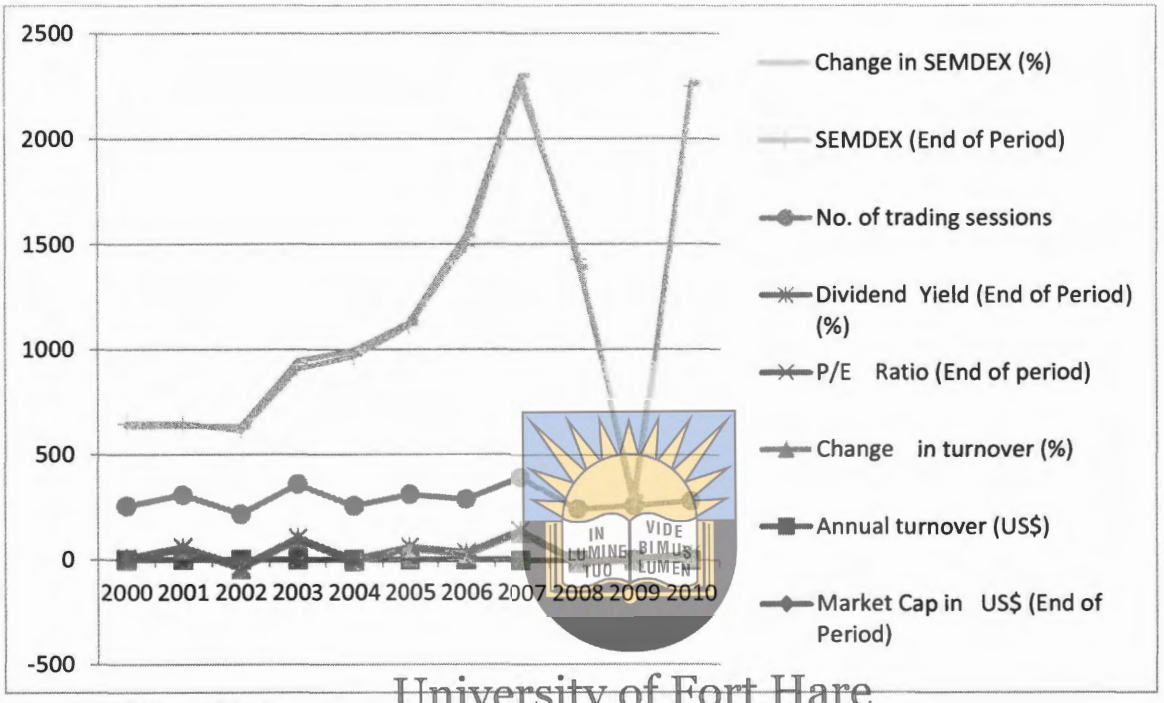
Consequently, the exchange operates two markets (the official and DEM markets). The DEM is a new exchange regulated market, which is designed for companies currently quoted on the OTC Market. It offers a platform for domestic companies to realise opportunities to trade in the exchange and to raise capital. However the official market is the secondary market in which both local and foreign investors trade their securities.

2.5.3 Size and Performance of the SEM

Owing to a stable political climate, excellent financial markets, favourable trade agreements, and government policies to promote economic development, Mauritius a small African nation is the second wealthiest country in Africa, behind only South Africa. The Stock Exchange of Mauritius counts as one of the most active in the continent. Since its launch in 1989, the SEM has done quite well in terms of the volume of transactions, the number of listed companies and the fairness and efficiency of its operations. The size of the market has grown from a market capitalisation to GDP ratio of less than 4% in 1989 to a current market capitalisation to GDP ratio exceeding 70%, in an economy that has witnessed a 5% average growth rate during the last 25 years (Banimadhu, 2010). Equally in 2011, the SEM counted 87 listed companies. It further accounted a market capitalization half the size of the local GDP (valued at USD 11.3 billion in 2011). The 2011 year realised positive contributions to the economy, attributable to the financial services across all sectors: 10.1%, of which 3% from the insurance business and 5.7% from the banking (Anoma, 2013).

Since the year 2000 the SEMDEX has been improving widely although in 2001 its performance declined by -12.61 percent. From then on it improved drastically reaching its peak of 1852.21 (or 53.78 % change). 2008 was not a favourable year for the Mauritius Stock exchange as in most of the stock markets; market capitalisation dropped drastically from US$ 6 035 377 908 in 2007 to US$ 3 343 389 240 in 2008 and the SEMDEX index fell by 36.14 %. Apart from the poor performance experienced in the exchange in terms of annual turnover, market capitalisation, and price/earnings ratio, the dividend yields were favourable. After performance decline in 2008, possibly caused by the global economic recession, the market is climbing up the ladder again. Market capitalisation has increased from the US$ 3 343 389 240 in 2008 to US$ 5 679 519 988 in 2010 (see figure 2.9).

Figure 2. 9: SEM Market Capitalisation (2000 to 2010)



(Source: SEM, 2013)

More so the SEM also trades in corporate and government debt instruments. The Bank of Mauritius (BOM) is the principal issuer in the debt market. Although in 2011-12 the BOM issued a total of 3 million Rupees in treasury bills with the government raising an amount of 10, 206 million Rupees for the period ending June 2012 the bond market is still at infancy with the purchase and sale of government securities limited to residents only (Anoma, 2013). Hence the bond market is insignificant, with the stock market being the chief contributor to economic well-being of the Mauritian economy.

2.5.4 Listing Requirements of the SEM

As of2011 the listing rules of the SEM are being revised and harmonized with those of countries in the Southern African Development Community (SADC) and the market is classified by the International Finance Corporation as a frontier market. Companies listed on the Mauritius Stock Exchange are classified into seven sectors of the economy, namely banking and insurance, industry, investments, sugar, commerce, leisure and hotels and transport (Bundoo, 2011). The opening-up of the ownership structure of a number of private companies combined with the privatisation of a few government controlled companies

increasingly increased the number of listings on the Official Market of the exchange (Benimadhu, 2005).

Due to the growth in the market more companies now consider listing in the exchange with the number of listings increasing from 5 in 1989 to 42 companies in the Official market and an increase from 9 in 2006 to 47 companies listed in the DEM in 2013.The general listing requirements for DEM include; a minimum market capitalization of 20 million Rupees, at least 100 shareholders, a minimum of 10 % of public shareholding and published financial statements for at least 1 year, prepared in accordance with IFRS and audited in accordance with ISA without qualification. Howbeit, for one to list in the official market, they have to meet the following criteria; they should demonstrate an adequate trading record with published or filed accounts for the three years preceding the application for listing; have an expected market capitalisation of not less than 20 million Rupees and issue at least 25% of the shares to the public, with a minimum of 200 shareholders, though this threshold may be phased in, with companies issuing 15% of their shares initially, increasing this proportion to 20% within three years and 25% by the end of five years (Kuen & Tapesar, 2011).

Additional listing requirements encompass the tender of numerous documents which provide detailed information on the company, an undertaking to conform to the rules and guidelines of the SEM, and listing particulars to be prepared prior to listing. The listing particulars should contain all the required information as per the listing rules to enable investors to be reasonably well informed about the securities likely to be listed and the issuer, including the assets and liabilities of the issuer, the financial position of the issuer, the stated capital of the issuer, the profits and losses of the issuer, the directorships of the issuer, the rights attached to the securities and the prospects of the issuer.

2.5.5 Trading and settlement

Initially, trading of shares was done through the Box Method which was later replaced in 1991 by the order-driven single price auction system. Currently all securities listed on the SEM are traded using an automated trading system (ATS) developed by the Sri-Lankan based Millennium Information Technology and the staff of the SEM and the CDS. It is a mainstream computer system designed to match buy and sell orders placed by stock broking companies. Trades executed on the Automated Trading System (SEMATS) are automatically fed into the CDS system and the relevant securities accounts are updated on a real-time basis

(purchase-in-suspense, sale-in-suspense) and trade confirmation between investment dealers occurs immediately after trading on T+0 (SEM, 2013).

Trades in securities denominated in foreign currency are settled at T+3 in the currency in which the securities are denominated. Likewise, the board of directors of the SEM may, with the approval of the FSC (Financial Services Commission established under the Financial Services Act 2007), from time to time amend the rules and the schedule of trading procedures. The Central Depository Securities Company (CDSC) handles all clearing activities for both fixed and equity securities. The depository has been successful in selling its services to other African capital markets (Benimadhu, 2005). That is, the CDSC has designed a Consortium with a Sri-Lankan company to implement the central depository systems of Kenya, Tanzania, Ghana, Botswana and Zambia. Thus the settlement criterion in the SEM is undergoing some changes to link with the rest of the Southern Africa countries including the international stock markets.

2.5.6 Regulation of the SEM

The Securities Act 2005 based on standards recommended by the International Organisation of Securities Commissions (IOSCO) seeks to enhance and upgrade the existing securities legislation in Mauritius and provides a wider and deeper coverage of the securities market. The main object of the Securities Act 2005 is to ensure a fair, efficient and transparent securities market and most importantly, to strike an appropriate balance between the protection of investors and the interest of the securities market. It replaces the Stock Exchange Act 1988 and is complemented by a number of regulations and rules on various aspects of securities market operations (SEM, 2013).

According to Benimadhu, (2010) the SEM has embraced a Compliance Manual (CM) which sets out the regulatory obligations of the exchange as a licensed securities exchange to safeguard full compliance with the new legal and regulatory requirements. The latitude of the exchange's regulatory responsibilities is extended under the new Act compared to those under the previous legislation. Consequently, SEM plays an important role as a front-line regulator of the market and as a self-regulatory organization. The market also has new structures such as the new Listing Executive Committee and Disciplinary Committee as well as procedures in order to appropriately discharge its responsibilities and obligations under the new legal and regulatory framework efficiently.

In addition to monitoring the trading activities of market participants, SEM also conducts on-site inspections of market participants to safeguard their compliance with the rules and requirements of the exchange. It also monitors on an on-going basis the financial health of market participants to ensure that they have adequate capital for their operations in accordance with the Stock Exchange (Financial Reporting of Investment Dealers) Rules 2010 (Rules on Capital Adequacy). Thus, participants are required to file financial reports with the exchange periodically and to lodge their annual audited accounts (SEM, 2013).

2.6 Overview of the Namibian Stock Market

2.6.1 History and development of the Namibian Stock Exchange

The first Namibian Stock Exchange (then known as the Lüderitz Stock Exchange) was established in Luderitz in 1910 in southern Namibia, as the diamond rush brought hundreds of prospectors to the desert. Within a few years, the rush was over and the exchange closed in 1920. However, the idea of an exchange d[illegible]e with the cessation of the diamond prospects. The idea of a second Namibian Stock Exchange came about the 1990 independence. The government gave full moral and legislative support, while funding came from 36 leading Namibian businesses, who became founding members by donating N$10,000 each to act as start-up capital for the first three years of the exchange (Bazuin *et al*, 2013).

The then, finance minister Gert Hanekom, conducted the official launch of the exchange on September 30, 1992. At that stage there was only one stockbroker, who also acted as a consultant. Since 1994, the exchange was characterised by a few domestic listings with the majority of the market contributors being the dual listed companies which trade in South Africa as well. As a result of the dual listing, NSX is one of the leading stock exchanges in terms of market capitalisation and is furnished with sophisticated infrastructure (Bohnstedt, Hanning & Odendall, 2000). In 2001, the exchange listed its first corporate bond (the Standard Bank Namibia bond) and three new companies in the financial, mining and retail sectors were listed (New Africa Capital Ltd., Anglo-American Plc and JD Group Ltd). More-so in the same year the new listing requirements and a new settlement system were introduced (Leslie, 2002).

2.6.2 The NSX Market Structure and Organisation

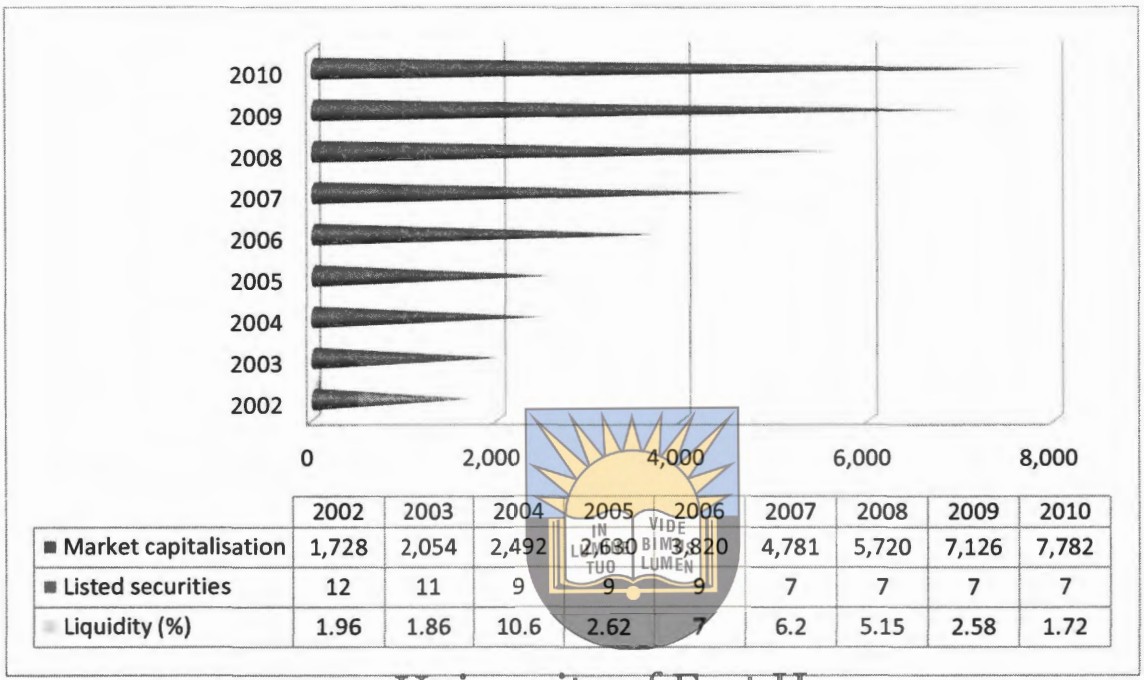
The exchange is operated by the not for profit making Namibian Stock Exchange Association (NSEA). The association consist of 43 associate members (banks, listed companies, investment institutions) who are the initial sponsors for the establishment of the NSX. Every year the members elect an Executive Committee of nine members of the business community, representing different business sectors, and the tenth member in attendance, representing NAMFISA (Namibia Financial Institutions Supervisory Authority). Sub-committees are chosen from time to time as need arises.

2.6.3 Size and Performance of the NSX

The NSX is the fast growing exchange, mainly due to its links with the South African Stock market (the JSE). Apart from its successes the exchange is faced with low market liquidity due to the fact that few domestic companies list on the market. However, the market is held in position by the dual listed companies from the JSE and the London Stock Exchange (LSE). In 2000, the exchange realised a market capitalisation of US$ 311 million for the 13 listed companies, contributing 8.945% of the country's GDP and a turnover ratio of 4.51% (Noble & White, 2012).For the year 2002, local listing market capitalisation was N$ 1728 million (US$ 201million). In 2003 the number of local listings dropped by one whereas overall listings remained at 35 companies. On the contrary local market capitalisation grew to NS$ 2054 million.

The exchange listed nine local companies with a market capitalization of only (N$2492 million) 5.9 % of GDP in 2004, a turnover ratio of 1.9 % and the value of traded local equities was 0.3 % of GDP (Noble & White, 2012).According to Mboweni (2006) the exchange was the second largest African stock exchange in terms of total market capitalisation and the fifth largest in terms of traded value by 2005. Market capitalisation grew substantially over the preceding years up until 2007 when it attained the highest overall market capitalisation of N$1186 365 million with the lowest number of listed companies of 27 companies. The year 2008 was not a pleasant one like in most stock markets. Overall stock market capitalisation dropped drastically by N$ 449 909 million to N$736 456 million, this may be due to the effects of the global financial crisis as it affected other stock market performances. Market liquidity has been and is very low in the market as shown in figure 2. 10 and 2.11).

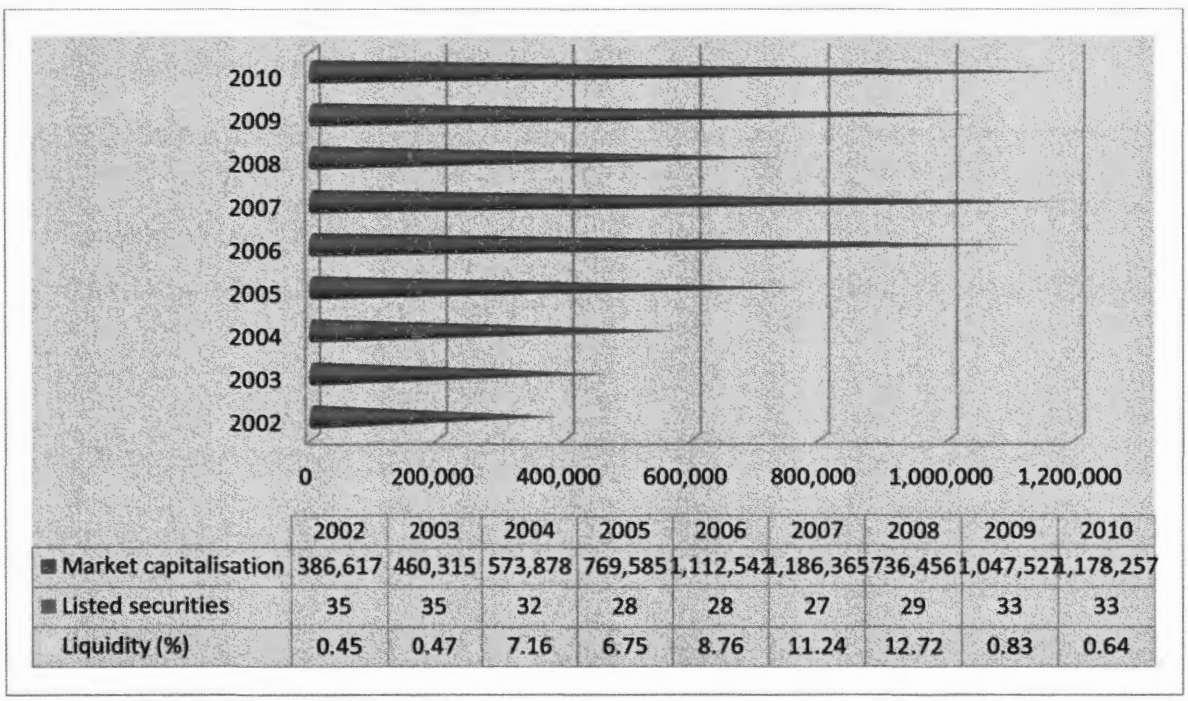
Figure 2. 10: NSX Local Market Capitalisation (N$ Million) 2002 to 2010



	2002	2003	2004	2005	2006	2007	2008	2009	2010
Market capitalisation	1,728	2,054	2,492	2,630	3,820	4,781	5,720	7,126	7,782
Listed securities	12	11	9	9	9	7	7	7	7
Liquidity (%)	1.96	1.86	10.6	2.62	7	6.2	5.15	2.58	1.72

(Source: NSX, 2013; Amadhila, 2011)

Figure 2. 11: NSX Overall Market Capitalisation (N$ Million) 2002 to 2010



	2002	2003	2004	2005	2006	2007	2008	2009	2010
Market capitalisation	386,617	460,315	573,878	769,585	1,112,542	1,186,365	736,456	1,047,527	1,178,257
Listed securities	35	35	32	28	28	27	29	33	33
Liquidity (%)	0.45	0.47	7.16	6.75	8.76	11.24	12.72	0.83	0.64

(Source: NSX, 2013; Amadhila, 2011)

2.6.4 Listing Requirements of the NSE

For a company to list in NSX the following requirements need to be met: a share capital amounting to a minimum of N$ 1 million, a minimum issue of 1 million shares, a profitable trading record for three years, with a current audited profit before tax of at least N$ 500 000 and an acceptable record in the company's field of business and adequate management to maintain business. Further, satisfactory evidence must be supplied to prove that the management as a whole has the required expertise. As of the companies that do not comply with some or all of the above criteria, the Namibian Stock Exchange has established a Development Capital Board (DCB) for listings of such companies. The main purpose of the DCB is to facilitate the listings of new ventures/businesses that do not have an adequate track record. However, such companies should have fully researched projects and at least 10% of the capital raised must be provided by management (NSX, 2013).

2.6. 5 Trading and settlement

As argued by, Irving (2005) the NSX uses the trading and settlement systems of the JSE in line with the country's Companies Act of 200[illegible]xchange was the first in SADC to start using the JSE's electronic trading system (the Jet system) in November 1998. Share trading on the NSX of dual-listed South African companies is settled through STRATE. While profiting from its close association with the JSE, the NSX retains control over its own listing requirements, regulations and supervision over compliance (Mboweni, 2006).The existence of dual-listing improves the liquidity and turnover on the NSX, making the dual listed securities more competitive and attractive to investors.

2.6.6 Regulation of the NSX

The NSX is regulated by the Stock Exchanges Control Act (1985, amended 1992) and overseen by the Registrar of Financial Institutions. Also Namibia Financial Institutions Supervisory Authority (NAMFISA) operating under the auspices of the Ministry of Finance is a public body established in terms of the Namibia Financial Institutions Supervisory Authority Act, 2001(Act No. 3 of 2001) which is tasked with the responsibility of regulating and supervising non-banking financial institutions in the country (NSX, 2013).

2.7 Overview of the Nigerian Stock Market

2.7.1 History and development of Nigeria Stock Exchange

The primary stock market for Nigeria was initiated as the Lagos Stock Exchange, which began operation in 1961. However, prior the establishment of the standard exchange the first ordinary shares to be traded in Nigeria and offered to the public were those of the Nigeria Cement Company Limited in 1959, trailed by the ordinary shares of Nigeria Tobacco Company Limited and the ordinary and preference shares of John Holt (Liverpool) Investment Company Limited in 1960.Subsequently, after the recommendation of Dr Pius Okigbo's committee in 1976, the Lagos Stock Exchange (LSE) was transformed into the Nigeria Stock Exchange (NSE) (Areago, 1990; Samuel & Oka, 2010).

Since June 2, 1987 the exchange linked up with the Reuters Electronic Contributor System (RECS) for online global dissemination of stock market information that is, trading statistics, All-Share Index, company investment ratios, and company news (financial statements and corporate actions). The market was deregulated in 1993 and was internationalised by the Federal government in 1995, by abrogating laws that constrained foreign participation in the Nigerian capital market. That is, upon the annulment of the Exchange Control Act 1962 and the Nigerian Enterprise Promotion Decree (NEPD) 1989, foreigners had the right to participate in the capital market both as operators and investors. In November, 1996 the exchange launched its internet system (CAPNET) as one of the infrastructural support for meeting the challenges of internationalisation and achieving an enhanced service delivery (NSE, 2013).

2.7.2 The NSE Market Structure and Organisation

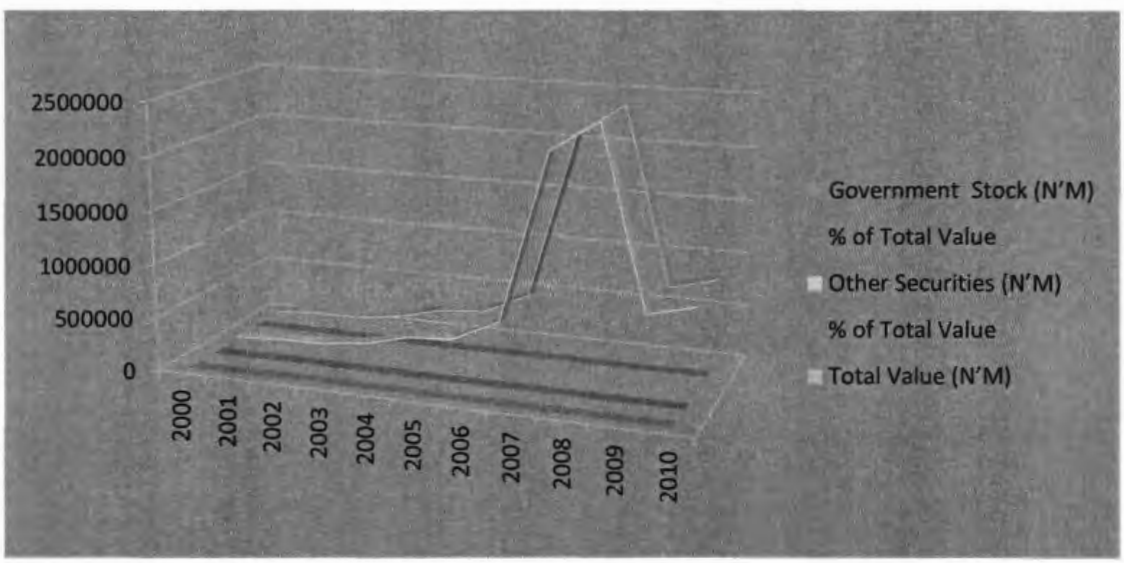
The NSE like most stock markets has the primary and secondary markets. The primary market is the market for newly issued shares and the secondary market trades on the already issued securities listed in the stock market. More so the secondary market is made up of two exchanges namely the Nigeria Stock Exchange and the Abuja Commodities Exchange (Sanni, 2008). The national council is the governing and is comprised of fourteen members. It directs the NSE's business and financial affairs, strategy, structures and policies. Further it monitors the exercise of any delegated authority and deals with challenges and issues relating to corporate governance, corporate social responsibility and corporate ethics (NSE, 2013).

2.7.3 Size and Performance of the NSE

The Nigerian stock exchange is a thriving exchange, and is recognised as one of the best stock markets in Africa. Compared to other leading stock exchanges such as the JSE and the Egyptian Stock Exchange, it has a better attraction for international investors. This is clearly explained by the rate of decline of government stock value traded in the exchange since 1961 to 1995. In 1961 government stock contributed 60.87% of total value of traded stock and declined to a zero percent in 1995. On the other hand, other securities including foreign investments climbed the ladder from a total traded value contribution of only 30.13% in 1961 to 100% 1995 (Okereafor, 2010).

Since then other securities dominated the market in terms of value traded with government stock contributing an average of 5% up until 2006. The years 2007, 2008 and 2009 recorded nothing for government stock trades and 100% of total value traded constituted other securities. Overall total value traded since 1961 has been improving, reaching a peak in 2008 with a total value trade of N'2 379 142 million. The value traded dropped N'684 451.2 million in 2009 and started rising again in 20[illegible] total value of N'797 551.6 million (see figure 2.12). The domination of foreign securities in the exchange was due to internationalisation of the market since 1995. Also the years 2007 to 2009 were bad years for government securities because of the economic crisis, which led to government performing badly in the stock market. Over the same period NSE, trailed behind the South African and Egyptian stock markets.

Figure 2. 12: NSE Value of Traded Securities (2000 to 2010)



(Source: Okereafor, 2010).

The NSE also is the secondary market for both government and corporate bonds. Contrary to the usual norm the market is dominated by corporate bonds instead of government bonds. Up until 2010, the exchange has issued 67 corporate bonds and 25 state/local bonds (Okereafor, 2010). Hence the exchange trades mostly in stock like other African stock markets.

2.7.4 Listing Requirements of the NSE

With an initial listing of 3 main listings and 5 debt listings in 1961, the number of listings have grown tremendously over the decade reaching a total of 264 total listings in 2010 (217 equity listings and 47 debt listings) (Okereafor, 2010).To carter for different investors, the NSE has the main board, the ASEM and the SEM, all with their special listing requirements. For a company to be eligible to list on the Main Board it has to adhere to the following: the company must be registered as a Public Limited Liability Company under the provisions of the Companies and Allied Matters Act 2004 and have a minimum of three (3) years' operating track record (NSE, 2013).

Further the company should adhere to the following: have a pre-tax profit from continuing operation of not less than N300million cumulatively for the last three (3) fiscal years and a minimum of N100 million in two (2) of these years; must have current audited financial statements not exceeding 9 months(should be compliant with the applicable SEC rules and covering the last three fiscal years); must ensure that if the listing is in connection with an Initial Public Offering (IPO) the promoters and directors will hold a minimum of 50% of their shares in the company for a period of 12 months from the date of listing and will not directly or indirectly sell or offer to sell such securities during that period; must have at least 20% public offering of share capital and have no less than 300 shareholders (NSE, 2013).

However to list on the ASeM Board the issuer should: be registered as a public limited company with no restrictions on the transfer of fully paid shares; have a designated advisor who shall be responsible for the Issuers compliance with the listing and post listing requirements throughout the duration of listing on ASeM; have a minimum of two (2) years' operating track record; provide a comprehensive plan of the company's business prospects covering a period of not less than two years and have financial statements which shall be compliant with the applicable SEC rules and the financial statement at the time of submission of the application shall not be more than 9 months old (NSE, 2011).

Also the issuer should ensure that a minimum of 15% of the issued share capital is made available to the public and held by not less than 51 shareholders; ensure that if the listing is in connection with an IPO the promoters and directors will hold a minimum of 50% of their shares in the company for a period of 12 months from the date of listing and will not directly or indirectly sell or offer to sell such securities during that period and ensure that the securities are fully paid-up at the time of allotment or registration in compliance with the applicable SEC rules (NSE, 2011).

2.7.5 Trading and settlement

Prior to automated trading in 1999, the NSE relied on the manual call over trading system. The system was very slow and took long for the settlement of securities. It was until the introduction of the automated trading system, that clearing and settlement takes four days (that is, T+3).To provide an integrated and technologically driven central depository, clearing and settlement facilities for all transactions the Central Securities Clearing System (CSCS) Ltd was incorporated in 1992 and became operational in April 1997. Its main purpose is to speed up the delivery and settlement systems of the NSE market (Egunbiyi, 2009).

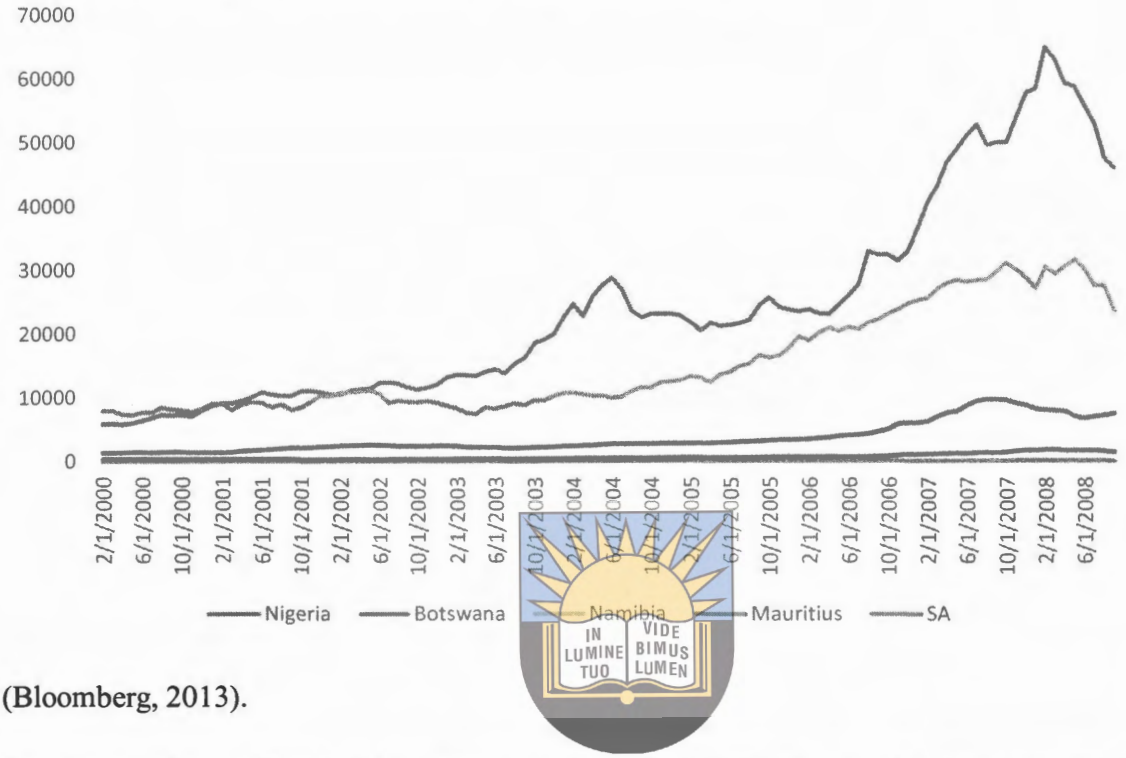
2.7.6 Regulation of the NSE

Transactions on the exchange are regulated by the NSE, as a self-regulatory organisation (SRO), and the Securities & Exchange Commission (SEC), which administers the Investments & Securities Decree 1999.The SEC has the mandate of Surveillance over the exchange to prevent breaches of market rules and to daunt and spot unfair manipulations and trading practices (NSE, 2013).

2.8 Conclusion

A review of the stock markets in Africa indicates that most African stock markets have been reaching a growing performance trend. However apart from the positive performance, evidence shows that most African stock markets are linked with other international stock markets and have a minimal relationship towards each other. Some markets are still very small and highly illiquid although concerned authorities are trying to merge legislation to standardise stock market performances. Evidence also shows that most stock markets have been performing badly prior to liberalisation or entrance of foreign investors into the markets. Some markets such as BSE, MSE and NSX, have been benefiting substantially from standardising their clearing systems and listing requirements with the JSE.

Figure 2.13: Selected African Stock Market Indices Trends



(Bloomberg, 2013).

As shown above figure 2.13 concurs the wide discussion on the development and performance of the African stock markets. Though the markets are illiquid and lack innovative financial instruments, the figure shows that the Nigerian NGSE index and the JSE All-Share Index move perfectly positive together in the same direction over the years, which may imply a bold relationship between the two market indices. On the other hand, the NSX Overall index and the SEMDEX index performed poorly, with the BGS-MDC moderately performing. Conversely, to clearly articulate any long run integration between the stock markets, an empirical test will be carried out. The subsequent section of the study focuses on literature review.

CHAPTER THREE

LITERATURE REVIEW

3.1 Introduction

A number of studies have been carried out globally to establish the rate of stock market integration between developed and developing countries, emerging economies and developing countries. However, results vary from region to region and differ based on the type of data, method and currencies used. This chapter focuses on reviewing the available studies, both theoretical and empirical studies which have been carried out to establish the importance of integrated stock markets. The chapter is divided into two major sections. The first section covers the theoretical literature which explains the importance of integration. The second section focuses on the empirical literature which has focused on examining the importance of integrated markets.

3.2 Theoretical Literature

Theoretically, financial market integration stems from numerous hypothesises such as; portfolio diversification with risky assets (Markowitz, (1952)), arbitrage price theory (Ross (1976)), the law of one price (Cournot (1927) & Marshall (1930)) and capital asset price models (Sharpe (1964) & Lintner (1965)). This section reviews these theories in detail.

3.2.1 Portfolio diversification theory

The birth of modern theory of investment can be traced to the 1950s when Markowitz developed the portfolio theory. Prior to the birth of Markowitz portfolio theory, investors did not have a solid measure of risk and return, although they were familiar to maxims such as; "don't put all your eggs in one basket." Hence the credit goes to Markowitz for developing a mathematically concept of diversification. In a nutshell, portfolio means a mix of assets (both real and financial) invested in and held by an investor and diversification is the act of holding many securities to minimize risk. The portfolio diversification theory, posits that if investors balanced their investment among several securities, it is possible to reduce risk. This possibility of risk reduction emerges if securities do not move in lock-step fashion (Asnari, 2000).

In other words, the risk of a portfolio is diversified if stocks added to portfolio do not co-vary (i.e. move together) too much in concordance with other stocks in the portfolio. This helps investors create portfolios that help minimise risk for a given level expected return and/or achieve the highest possible expected return for a given level of risk. The theory is grounded on the assumption that investors care only about the mean and variance of return. Hence the theory is also known as mean-variance analysis. Investors are believed to be mean-variance optimizers, and thus, seek and prefer portfolio with lowest possible return variance for a given level of mean (expected return). Basically, it implies that investors prefer portfolios that produce greatest amount of wealth with lowest amount of risk. This also suggests that variance-dispersion in possible return outcomes is an appropriate measure of risk (Asnari, 2000).

According to West, (2006) the central outcome of the theory is that with optimal diversification, the risk weight of a portfolio should be less than the average risk weights of the securities it contains. The portfolio diversification theory uses standard deviation as a substitute to risk. According to the theory di[illegible]ion of securities in a portfolio reduces risk. However, apart from being the [illegible] to investors in portfolio diversification and risk-return calculation, the portfolio theory has a considerable flaws expressed in its assumptions. For instance the assumption that all investors are equally informed stands false as the market is quite asymmetrical when it comes to information due to the presence of rudiments such as insider trading. Also the assumption that investors do not need to pay any taxes or transaction costs also does not hold true.

Furthermore the hypothesis that investors are able to buy securities of any sizes is not practical as some securities have minimum order sizes and securities cannot be bought or sold in fractions. Also the correlations between assets are never fixed and constant as correlations change with changes in universal relations that exist between fundamental assets. The assumption that the actions of investors have no impact on the market is also completely flawed as large amounts of sale or purchase of individual securities influence the price of the security or related securities. Further, it has also been observed that the return on assets is not always normally distributed due to frequent swings in the market (West, 2006).

The theory also does not take into account its own impact on the market. Additionally, the theory mathematically calculates expected values based on past performance to measure the correlations between risk and return. However, past performance is not a guarantee of performance in the future. Considering only past performances leads to the leaving out of current scenarios or circumstances that might not have been present during the time when collection of the past data had taken place.

3.2.2 Capital Asset Price Model

Although there are various advancements into the capital asset pricing model (CAPM), the model originated with Laureate William Sharpe (1964) of America and later developed by John Lintner (1965). It rests on the following assumptions; capital markets are perfect, there is only a single borrowing and lending rate (no transaction costs), all capital assets are perfectly divisible (one can buy fractions of a security) and there are no taxes, investors can sell short (sell stock they do not own), and information is freely available to all market participants; investors attempt to maximize their utility, which consists of maximizing returns for a given level of risk (investors are risk-averse) and measure risk in terms of standard deviations of returns); investors use a common one-period-ahead time horizon for investment decisions (that is, all investment decisions are made at the beginning of the period and no changes are made during the investment horizon); investors have identical expectations about the risk and return on various securities (hence, the only reason why investors hold different portfolios is because they have different risk preferences); and there exists a single risk-free asset at which borrowing and lending can take place (Harvey, 2000).

CAPM models the relationship between risk and expected return and is used in the pricing of risky securities. Thus, by aggregating utilities, a securities market line (SML) can be defined and an optimal investment portfolio can be determined. The model incorporates two types of returns, the risk free returns of the government bonds and beta times the return on the market portfolio (Naffa, 2009).CAPM asserts that there is a linear relationship between individual security and its systematic risk, and thus relates asset returns to asset risk as follows:

$$E(R_{it}) = R_{ft} + [E(R_{mt}) - R_{ft}]\,\beta \quad \ldots\ldots (1)$$

Where:

$E(R_{it})$ = the expected return on security *i* in period *t*.

R_{ft} = the return on riskless asset in period *t*.

E (R_{mt}) = the expected return on the market portfolio in period *t*.

$\beta = \underline{\sigma\,(R_{it},\ R_{mt})}$ = risk coefficient

$\sigma^2(R_{mt})$

$\sigma\,(R_{it}\,,\ R_{mt})$ = the covariance between R_{it} and R_{mt}

$\sigma^2\,(R_{mt})$ = the variance of the return on market portfolio.

This form of the CAPM is a specific circumstance of the more generalised form:

$$E(r_i) = \alpha_i + \beta[E(r_m) - r_f] + \varepsilon_i \quad \text{..... (2)}$$

The above linear regression provides a method for estimating α_i the mispricing of the stock relative to the market; and β the stock sensitivity to the market risk factor; and ε_i the residual return.

Furthermore, a more general version of CAPM (which does not alter the risk-return equation) which does not assume existence of a risk-free asset was derived by Black (1972). The primary difference is that risk-free return is replaced with the expected return of a portfolio with ß of zero. Hence, this portfolio has no correlation with the market portfolio and the model is also known as zero-p model. With a variety of applications, the CAPM retain helpful tools not only for allocation of capital for real investments but also for allocation of funds for financial investment. The model can be used for decisions concerning capital expenditure, corporate restructuring, financing, investment, and evaluation of portfolio performance (Riahi-belkaoui, 2005).

According to the model, pure diversification is much easier and cheaper for stockholders than for corporations. One of the main lessons of CAPM is that the market does not reward for bearing the risk which investors themselves can diversify away. The model, further provide guidelines about the fair price of the issue for financing new investments. Equity as a source of financing is generally avoided by the firms if they believe that their equity is undervalued. However, CAPM is one of the most widely used methods to determine the expected rate of return on stock to value the equity (Ansari, 2000 & Riahi-belkaoui, 2005).

The CAPM theory was developed to address the question of correlation amongst asset returns that affect the investor's trade-off between risk and return. One major problem in applying the model to international finance is the assumption of perfect capital markets. Generally, this assumption also means that markets are perfectly integrated. That is, the same risk asset commands the same expected return regardless of country location. A sufficient condition for this to work is that there are no effective barriers to portfolio investment across borders. That is, local investors are free to add any stock in the world to their portfolio and international investors are free to choose any stock within a particular country (Longstaff, 2004). Hence a well-integrated capital market is a proper reflection of a world version of the Capital Asset Pricing Model. That is, assets within a specific country are rewarded in terms of their contribution to a well-diversified world portfolio.

However, in the late 1970s, the capital asset price theory came under attack as striking anomalies of the theory were reported. These anomalies underlined the fact that firm characteristics such as company size (measured by market capitalization of common stock), the ratio of book-to-market value, price-to-earnings ratio, and prior return performance have more explanatory power than price in explaining cross-sectional variation in returns. In other words, differences in the risk coefficient (ß) do not account for differences in return as the CAPM predicts. As noted by Fama (1991), the evidence on return predictability based on these characteristics is amongst the most controversial aspects of debate on market efficiency.

Basu (1977) reported one of the earliest anomalies related to the price-earnings ratio effect. Firms with low price-earnings ratio yielded higher sample return and firms with higher price-earnings ratio produced lower returns than justified by ß. More recently, Fama and French (1993, 1996) reported that ß cannot be used as a sole explanatory factor of the sample return. They argued that portfolios formed on the basis of ratio of book value of equity to market value and size market capitalization) earn higher returns than what is predicted by CAPM. Thus, size and book-to-market ratio can capture the cross sectional differences in return better than ß.

3.2.3 Arbitrage Price Theory

Formulated by Ross (1976) the Arbitrage Pricing Theory (APT) provides a testable alternative to the widely known capital asset pricing model. The hypothesis stems from an entirely different set of assumptions; the market is perfectly competitive and frictionless hence, it is less concerned about the efficiency of portfolios. Most importantly it suggests a common linear relationship across securities relating expected returns to a set of security specific characteristics.APT infers that the return of an asset can be broken down into an expected return and an unexpected or surprise component. Hence any news will affect the rate of return on all stocks but by different amounts (López-Herrera& Ortiz, 2011).

Jecheche, (2011) argues that any portfolio with arbitrage opportunity, gives an investor, the ability to trade at no cost but gain profits. That is, if assets have no specific risk, all asset prices move in lockstep with one another and are therefore just leveraged 'copies' of one another. However it differs when assets do have specific risk. In this case it is possible to form portfolios where the specific risk may be diversified away. To achieve full diversification of residual risk, however, a po[illegible]needs to include an infinite number of securities. With a finite set of securities each of which has specific risk, the APT pricing restriction will only hold only approximately (Hassan, 2012). More so, the theory argues that in efficient markets, assets with similar risk must have similar expected rates of return, that is, two bonds with the same maturity and risk sold at different yields will result in arbitrage.

In other words, assets with the same sensitivity to identified factors in the economy must have the same expected return or else arbitrage will set in. According to the APT, the market return is determined by a number of factors (that is, macroeconomic factors having a pervasive influence and micro factors). Hence, rather than identifying a security's return as a function of one factor (the market return) one could specify required returns of individual securities to be a function of various fundamental economic factors (Osaze, 2007& Khan, 2007). Thus the APT is a multi-index linear model which requires that the returns of any stock be linearly related to a set of indices such that:

$$R_i = \alpha_i + b_{i1}I_1 + b_{ij}I_j + e_i \quad \ldots\ldots (3)$$

Where:

R_i = returns on stock i

a_i = the expected level of return for stock i if all indices have a value of zero

I_j = the value of the j^{th} index that impacts the return on stock i

b_{ij} = the sensitivity of stock i's return to the j^{th} index

e_i = a random error term with mean equal zero and variance equals to de^2_i

With APT, asset returns co-vary with movement of factors and this generates systematic risk hence these factors and asset's sensitivity to these factors determine expected and actual returns. The theory assumes that arbitrage profit opportunities are quickly eliminated through competitive forces, that is, an investor cannot earn a positive expected rate of return on any combination of assets without incurring some risk and without making some net investment (Ilas, 2009). Thus, the APT is more general than the CAPM, because it allows larger number of factors to affect the rate of return. It is one theory that tries to capture some of the non-market influences that cause securities to move together and is based on the law of one price which states that, two items that are the same cannot sell at different prices. However, the Arbitrage pricing theory does not provide a clear basis for identifying the macroeconomic factors that are related to stock returns with r[illegible]usality (Isenmila & Erah, 2012).

3.2.4The law of one price

The law of one price states that two assets with identical payoffs (in every state of nature) should not be priced differently. If the law fails to hold, then there arises profit opportunity from buying the cheaper asset and selling the more expensive one. In other words, a stochastic discount factor exists that prices all payoffs. But profit opportunity is still possible in the presence of zero or negatively priced assets which always yield nonnegative payoffs and positive payoffs with positive probability.

Important to note is that the LOOP does not imply the absence of arbitrage opportunities but is implied by the absence of arbitrage opportunities (Back, 2010). In a nutshell, the LOOP means that for any two portfolios θ and $\acute{\theta}$, if

$\sum_{i=1}^{n} \theta_i \, \tilde{x_i} = \sum_{i=1}^{n} \grave{\theta}_i \, \tilde{x_i}$ with probability of 1 then, $P^1\theta = p^1\acute{\theta}$.Hence, any two portfolios with the same pay-offs must have the same cost. Thus, the absence of arbitrage requires that the discount factor be strictly positive to rule out non-positive prices in practice.

Although the law is believed to hold in a world of perfectly rational individuals, it also holds in a world with no unexploited opportunities (Landsburg, 2011). In the general international context, integrated stock markets should assign the same positive price to assets in different markets which yield the same payoffs by the law of one price and in the absence of arbitrage opportunities (Chen & Knez, 1995). Subsequently, markets are integrated if there exists a stringently positive discount factor, which condenses the pricing structure of a market that is common across markets.

3.3 Empirical Literature Review

Establishing the integration of stock markets has become an empirical issue. A number of studies have been carried out to establish the link between stock markets. Some of the studies conducted in Africa on the level of integration between the stock markets for the period dating back from 1997 to 2012(all the studies are within this range), reveal inconclusive results. Also, studies conducted in other regions of the world have varying conclusions.

Agyei-Ampomah, (2011); and Srikanth and Aparna, (2012) used descriptive statistics on monthly data for the period ranging from 1998 to 2009, to examine stock market integration for African stock markets and the Indian stock market. Obtained results differ. The former author concluded that African stock markets are segmented and far from being integrated and any integration thereof is not reflected in the stock markets if there is any. The latter concluded that there is a substantial integration between India and international financial markets.

Moreover, some studies were conducted for different stock markets using the Johansen cointegration technique, daily and weekly data for the period of 1995 to 2006, (Neame, (2002); Karim and Karim (2008); and Onour, (2009); Raj and Dhal, (2009)). Neame and Raj and Dhal concluded that the GCC and India equity markets offer international investors portfolio diversification potential. That is they are integrated with the rest of the world. However, whilst Karim and Karim, (2008) found a direct link between US, Malaysia, China and Japan, Onour, (2009) found a non-linear cointegration between Egypt, Morocco and Tunisia. Thus the results show that emerging markets are not yet fully integrated and well developed markets are integrated. These results concur with the ones based on monthly studies ranging from 1991 to 2012,(Darrat, Ekhal and Hakim, (2000); Jain and Bhanumurthy, (2005); Arouriand and Jawadi, (2009); and Adelebola and Dahalan, (2012)).

Daily and weekly studies ranging from the period of 1991 to 2004 based on the Granger causality technique provide varying conclusions. Wong, Agarwald and Du, (2003) contest the findings made by Mukherjee and Mishra, (2005). The former concluded that the Indian stock market is integrated with the world equity markets whilst the former denies any link between India and the world equity markets. However Cerny, (2004), found that US, London, Frankfurt, Paris, Warsaw and Prague markets react quickly to the information revealed in the prices of others, hence they are integrated.

Ayuso and Blanco, (1999) used the VAR model on weekly data to find if financial market integration increased during the nineties, and results show that integration increased since the nineties. Using the same model, a study based on daily data conducted by Melle, (2001), produced the same results as the study by Bartram, Taylor, and Wang (2006). Both these studies show that the introduction of a common currency accelerated the rate of integration in the European countries; hence common currency is an ideal policy for stock market integration. Furthermore, these studies concur with the studies conducted by Atmadja, Wu and Juli, (2010); Diebold and Yilmaz (2007); Yang, Kolari and Min, (2002) and Bekaert, Havey and Lumsdaine, (1998).

Using the VAR models and daily data for the period ranging 1992 to 2009, for different stock markets across the globe, including stock markets from Asian, US and emerging markets, Atmadja, Wu and Juli, (2010); Diebold and Yilmaz (2007); Yang, Kolari and Min, (2002) evidenced the increase in integration between the markets investigated. The degree of integration within the different markets proved to accelerate after the crisis than before the crisis. Bekaert, Havey and Lumsdaine, (1998), however, used monthly data to investigating the 20 world emerging markets for the period 1978 to 1995. Obtained results, were not different from those found by other authors, using the VAR model, the markets proved to be well integrated. Strong structural breaks existed between emerging markets but were not evidenced for the world equity markets.

Studies using GARCH models, daily data for the period ranging from 1994 to 2013, (Fratzscher, (2001); Batram, Taylor and Wang, (2006); Wang and Moore, (2008); Yoshida, (2009) and Baumohl, (2013))'s conclusions for the different stock markets concur with the studies conducted using weekly data. For instance, Berben and Jansen, (2005) utilised weekly data for the period of 1980 to 2003 and concluded that stock market integration advanced in the late 1980s and 1990s in Europe. That is the stock markets from the developed nations prove to be integrated. More so, monthly studies provide same results for different markets. Buttner and Hayo, (2008); Johansson (2009); Guesmi, (2011); Arouri, (2012); and Berger and Pozzi, (2012), conducted the studies within the range of 1970 to 2011. All the studies show that integration is increasing for the different stock markets. This might prove to be a weakness or strength of the GARCH model. One would expect that results vary due to the difference in the markets and regions under investigation.

More so, different rates of integration were evidenced by Sakthivel, Bodkhe and Kamaiah, (2012); Joshi, (2011); Li and Giles, (2013) and Baele, (2002a) between the Indian, European, Asian and emerging markets. The authors used weekly data and the GARCH models for the period ranging 1980 to 2012. Sakthivel, Bodkhe and Kamaiah, (2012) concluded that there is a bidirectional volatility spill over between the US and Indian stock markets due to the fact that the two market economies are strongly integrated. However, Joshi, (2011) when investigating Hong Kong, Japan, China, Jakarta and Korea stock markets found that own volatility spill overs is high than cross market spill overs, implying a weak rate of integration between the stock markets.

Concurring, Joshi, (2011), is Li and Majerowska, (2005). The latter author used daily data and the BEKK-GARCH model from 1998 to 2005 (for Warsa, Budapest, Frankfurt and US) and evidenced a weak linkage between the emerging and the developed markets. On the contrary, although using the same methodology, daily data and evidencing integration between the different countries of study, Liao and Williams, (2003) and Coudert, Herve and Mabille, (2013), the authors concluded that the rate of integration is high especially in the post-Euro period. These studies fairly, agree with the studies conducted using the GARCH model.

Bernie, Caporale, Ghattas and Spagnolo, (2009) and Jeong, (2012) used the tri-variate and multivariate VAR-GARCH model and weekly data for the period ranging 1993 to 2010. Bernie,*et. al,* (2009) conducted a study on the volatility spillovers and contagion from mature to emerging stock markets for 41 EMEs in Asia, Europe, Latin America, Middle East, North Africa and US and found that spill over from mature markets are present only during turbulent episodes in the EMEs markets. In unison, to the conclusion made is Jeong, (2012) who investigated China, Korea and Japan and evidenced that the recent global financial crisis has caused a shift in the pattern of integration in the region.

Although all GARCH modelled studies are somewhat biased to evidencing some integration in the different stock markets from across the globe, Lucey and Zhang, (2007) have different conclusions for the study they conducted. The authors used the DCC-GARCH model, daily data from January 1993 to April 2007, to analyse integration in the Latin American stock markets and the US. Results show that none of the stock markets demonstrate a stable long run relationship, either with regional or world benchmark indices. In a nutshell the authors concluded that the Latin American stock markets are not integrated within themselves or with the world stock markets.

Coinciding with Lucey and Zhang, (2007) is Bala and Premaratne, (2002). The latter authors conducted a study on volatility spill over and co-movements: some new evidence from Singapore. They used daily data from 1992 to 2002 and various models (univariate GARCH model, VAR multivariate model and the GARCH model with GJR extensions) in investigating the relationship between Singapore, US, UK, China and Japan. Asymmetry was found to be significant and supported in all the five market. Hence the markets are not integrated.

Other studies (Ntim, 2012 and Onour, 2009), utilised daily data for the different African countries to determine why African stock markets should formally harmonise and to determine financial integration of north African stock markets, utilising the parametric and non-parametric variance ratios , and Breitung (2001) rank test. The results from the study conducted by Ntim, (2012) suggest that there is weak form information efficiency and the author concluded that formal harmonisation may improve information efficiency. Also results from Onour, (2009) provided evidence of multivariate and bivariate non-linear cointegration between the three North African stock markets (Egypt, Morocco and Tunisia).

However, in a study conducted by Alagedede (2008),on the implications for portfolio diversification and international risk sharing for African stock market integration, the results suggest that African stock markets share a weak trend with the rest of the world and there is a unidirectional causality between South Africa and emerging markets. The study covered the period of 1997 to 2008 (monthly data) for four countries (South Africa, Egypt, Nigeria, Kenya, Brazil, Mexico, India, United States of America, Japan and the United Kingdom), and utilised both the Johansen cointegration test and granger causality test using the VAR model. The results of the study concur with the study done by Adebola & Dahalan, (2012) concerning the level of interaction between African stock markets.

Tam and Tam, (2012) conducted a study on re-thinking stock market integration: globalisation, valuation and convergence using monthly data for the period of 1973 to 2011. By using a unified framework synthesizing the stock valuation model and convergence hypothesis, results, show that integration varies within different time period for the 51 countries studied across the globe. This study somewhat concurs the study done by Babetskii, Komarek and Komarkova, (2007). In the latter case, weekly data from 1995 to 2006, and the standard and rolling correlation analysis were used to determine the level of integration for Czech Republic, Hungary, Poland and Slovakia. Results revealed that the stock markets are integrated at both national and sectorial levels.

Samitas, Kenourgios and Paltalidis, (2007) and Srinivasan and Kalaivani, (2013) used the Johansen cointegration models, for the period ranging 2000 to 2013. Both studies utilised daily data and obtained results coincide with most GARCH modelled studies which are based on both daily and weekly data. For all the different stock markets that were studied, the results are the same. There is evidence of a long run relationship between the stock markets under investigation. These results may prove troublesome, considering that most of the studies using daily and weekly data converge on the same conclusion of the presence of integration between stock markets.

However, Tudor, (2011) conducted a study on changes in stock market interdependence as a result of the global financial crisis: empirical investigation on the CEE region. The author used daily data from January 2006 to March 2009 and the granger causality test to determine the interdependence between Czech Republic, Hungary, Bulgaria, Poland, Russia and Romania. Results reveal that the relationship between the Central Eastern Europe (CEE) markets are time varying. That is, before the crisis stock market linkages are limited and the interactions become significantly stronger during the crisis, implying that the potential for diversifying risk by investing in different CEE markets is limited during financial turmoil.

Using the Markov regime switching model, Aray, (2005) conducted a study on the Latin American and the Spanish stock markets using monthly data from 1985 to 2000. The author proved that the Spanish stock market is positively affected by the Latin American stock markets. Consequently, the study coincides with the study conducted by Baele, (2003b) on the volatility spill-over effects in European equity markets. The latter utilised weekly data from 1980 to 2001 and adopted and modified the model introduced by Bekaert et al, (2002). According to the findings made by the latter author, there are contagion effects from the US to a number of local European markets in times of high equity market vitality due to increased integration.

Howbeit, Andrade and Chhaochharia, (2012) totally disagree with the conclusions made by Melle, (2001) and Batram, Taylor and Wang, (2006) concerning the introduction of the Euro, for the European stock markets. Instead of investigating the rate of integration between the 11 Eurozone countries, Andrade and Chhaochharia, (2012) conducted a study on the Euro and European equity market disintegration. The authors utilised monthly data from January 2005 to December 2011 and the BHLS model (2007, 2010, 2011). Obtained results proved that while the Euro was in part conceived to further integrate European financial markets, it set the stage for the triple crisis which resulted in a reversal of European equity market integration.

3.4 Conclusion

This section of the study comprised of two distinct segments/parts. The first section covered the theoretical literature which explains the importance of integration within stock markets. The second section focused on the empirical literature which has focused on examining the importance of integrated markets and has provided some considerable advantages. For instance due to integration the European Union is one of the world's economic giants. Also empirical literature shows that integration can be attained regardless of economic situation, given a good example of the studies conducted by Atmadja, Wu and Juli, (2010); Diebold and Yimlaz (2007); Yang , Kolari and Min (2002). The authors found that after the financial crisis the rate of integration for the US, Asianand emerging markets accelerated which gives hope for African stock markets given the current financial crisis. Theoretical literature on the other hand argues that for well integrated stock markets the law of one price has to exist for the same portfolios and securities. Whilst other theories such as the portfolio diversification theory argues that if markets are integrated there exist more risk for investors and limited or no chance to diversify their portfolios between different markets.

More so, studies focussing in Africa are still limited and provide scanty information on the rate of integration in the region, as discussed. However empirical literature, show different results, and show that although developed markets, are integrated, there are various contributing factors for well integration to be realised, posing a great challenge to the developing economies. Well integrated markets are arguably necessary for portfolio diversification and raising finance. However, both theoretical and empirical literature provides inconclusive results on the basis for integration of stock markets in Africa. Thus, this study seeks to provide a clearer picture on the rate of integration of African countries' stock markets, and policy implications for financial growth. The next section of the study focuses on the methodology which is used to examine the integration between African stock markets.

CHAPTER FOUR

METHODOLOGY

4.1 Introduction

An econometric model was used to investigate if there are any inter-linkages between the selected five African stock markets. The stock markets analysed in the study were selected based on the availability of data.

4.2Model Specification

Financial theory asserts that, stock market integration is a consequence of the relationship between different stock markets and or movements of portfolios between the stock markets. Thus, it is of no theoretical sense to assume a single equation model when investigating any relationship between the different stock ma[illegible]e the OLS (ordinary Least Squares) method which assumes a single exogenous variable to be affected by various endogenous variables, the VAR methodology allows all variables to be treated both as endogenous and exogenous variables. In this study a multivariate time series analysis to examine the presence of long run equilibrium and dynamic relationships among the indices was employed. Hence, the most appropriate model suitable for this study is a VAR. Two models are estimated in this study, the first model focuses on the relationship between African stock markets and the second model seeks to examine the extent to which African stock markets are integrated to the world stock markets.

4.2.1Model 1

The model used in this study was adopted from Adebola and Dahalan, (2012), to investigate the relationship between stock indices across selected African stock markets based on the law of one price theory. As discussed in the theoretical literature review, the law of one price asserts that two identical assets with identical payoffs in every state of nature should not be priced differently. It will be injustice to base the study on the other theories expanded on in the literature, given their shortcomings and the fact that the markets under investigation are still developing. For instance the portfolio diversification theory asserts complete knowledge to the investors which cannot be true especially in the African stock markets. On the other hand, the CAPM beta is insufficient in explaining cross-sectional variation in returns and

cannot be an ideal theory for the study. The arbitrage price theory, on one stance is based on the law of one price, hence the law of one price has to exist in the stock markets for them to be well integrated.

Thus in well integrated stock markets prices will be the same; however, if the markets are segmented from each other, the asset prices will differ. Stock market indices are used as a proxy for stock market performance since it is an indicator of the stock market performance (Chuang, Ouang & Lo, 2010; Kao & Tate, 2001; Abraham, 2009). In other words, indices measure the overall stock market behaviour, thus, it represents the entire market and sets the broad outline of market movements. It captures major economic units, that is, it acts as a status report on the general performance of the economy and is a useful tool for evaluating investors' portfolio.

The study utilises the VAR model in establishing the extent to which stock markets in Africa are integrated. The VAR model for the study is discussed as follows:

Assuming that X_t is the nx1 vector of logged variables, the intra-impulse transmission process of which is to be captured by the study, the dimension of X_t (that is n) is 5, given the five variables of the analysis. Using matrix algebra notations, a 5-variable structural dynamic economic model for the study can be stated as:

$$BX_t = \mu + \Gamma X_{t-1} + \varepsilon_t \quad \ldots\ldots (4)$$

Where B is the matrix of variable coefficients

X_t is the 5 x 1 vector of observations at time t of the variables of the study, that is vector X is defined as $X_t = (\text{Log}S_t, \text{Log}B_t, \text{Log}M_t, \text{Log}Na_t, \text{Log}Ni_t)$

Also, μ is the vector of constants

Γ is a matrix polynomial of appropriate dimension

ε_t is a diagonal matrix of *structural innovations* that has zero means, constant variance, and are individually serially uncorrelated, i.e. $\varepsilon_t \sim (O, \Sigma)$

Where: LogS_t is the South African stock market index, LogB_t is the Botswana stock market index, LogM_t is the Mauritius stock market index, LogNa_t is the Namibian stock market index and LogNi_t is the Nigerian stock market index.

4.2.2Model 2

Intuitively, it is of paramount importance to address empirically the question of whether African stock markets are completely segmented. To investigate further the dynamic relationship between African stock markets and the rest of the world, a VAR in first difference for the non-cointegrated markets is estimated. The model is advantageous in that it estimates the dependence among markets and allows shocking a particular market and analysing how shocks perpetuate themselves through impulse responses (Alagidede, 2008:46).

The study utilises the USA (S&P 500) index as the proxy for world stock markets, and further incorporate the Japan (NIKKEI 225 index) and Germany (Deutscher Aktien index/DAX index) stock markets to provide a comprehensive argument for the world markets due to their sizes. In a broad-spectrum a *kth* order VAR in first difference for a 2x1 vector of jointly determined (endogenous) variables X_t is presented as follows:

$$\Delta X_t = \mu + \sum_{i=1}^{k} \prod_i \Delta X_{t-i} + \varepsilon_t \quad \ldots\ldots (5)$$

Where: ε_t the residual factor is said to be the innovation shock in X that cannot be predicted from past values of variables in the system. The corresponding MAR (moving average representation) is derived from the following equation (either by successive substitution or polynomial lag division):

$$\Delta X_t = \Pi^{-1}(B)\varepsilon_t = \Psi(B)\varepsilon_t = \varepsilon_t + \sum_{i=0}^{\infty} \Psi_i \varepsilon_{t-i}$$

Where: $\Psi_i = \sum_{j=1}^{i} \Pi_j \Psi_{i-j}$ and $\Psi_0 = I_n$

In the above model no distinction is made between endogenous and exogenous variables.

Ψ_i represents the matrices that are the dynamic multipliers of the system (that is, they represent the model's response to a unit shock in each of the variables. According to Sims (1980), it is more informative to analyse the system's reaction to typical random shocks by tracing out the system's MAR rather than to continue with the complicated cross-equation feedbacks involved in the Autoregressive representation (AR). Thus, while the estimated

coefficients in the VAR provide little insight as to the dynamic interactions amongst the series, the MAR is the best representative because it presents information equivalent to that contained in the original estimates and it allows the tracing of the time path of the various shocks on the return series (Alagidede, 2008).

4.3 Apriori Expectations

A positive relationship is expected amongst the five African stock markets. Moreover a further positive relationship between African stock markets and the world stock markets is also expected. The positive relations are expected between the markets to symbolise the presence of integration, attributable to various developments and institutional changes in the respective stock markets in the drive to link markets locally, regionally and globally.

4.4 Estimation Technique

Prior to estimating the VAR model to be used to determine stock market integration between the selected African stock markets , the time series properties of the stock indices are analysed carefully through the Augmented Dickey Fuller (ADF) and the Phillips Peron (PP) test. The two methods are used in order to get robust results.

The main purpose of the unit root test is to determine whether the series is consistent with an I(1) process with a stochastic trend, or if it is consistent with an I(0) process, that is, it is stationary, with a deterministic trend. The Augmented Dickey fuller test is one of the most used tests for unit root in time series models. It involves the use of the ordinary least squares (OLS) method to find the coefficients of the chosen model. The t-statistic is computed and compared with the relevant critical value to estimate the significance of the co-efficient. If the test statistic is less than the critical value then the null hypothesis is rejected with the conviction that there is no unit root (Brooks, 2002).

However the DF test is sensitive to the way it is conducted. If a wrong functional model is used for testing, the size of the test may be inappropriate leading to wrong conclusions. This size distortion could be as a result of the exclusion of the moving average (MA) components from the equation. Also the DF has got a low power of test that is, it tends to accept the null of a unit root more frequently than warranted. Thus it cannot be used to detect the presence of more than one unit root. The DF may not detect structural breaks in a time series and the test depends on the time span of the data and not on the size of the sample (Brooks, 2008).

Hence due to the limitations of the ADF Phillips and Peron developed a more comprehensive theory of unit root non-stationarity. The tests are similar to ADF tests, but they incorporate an automatic correction to the DF procedure to allow for auto correlated residuals. That is, the PP test uses nonparametric methods to take care of the serial correlation in the error terms without adding lagged difference terms. Thus the test is needed as it allows that error disturbances are heterogeneously distributed and weak dependent (Gujarati, 2004:820).

4.5Johansen Cointegration Approach

Traditionally, measuring integration is usually done by applying correlation and cointegration tests. Howbeit a study by Pukthuanthong and Roll, (2009) proves that correlation across markets is a poor measure of integration, as perfectly integratedmarkets can reveal weak correlation. Intuitively, any existence of cointegration in a speculative market has been argued by early literature (for instance; Engle and Granger, 1987), to imply violation of market efficiency since past prices could be used to improve current price forecasts. This phenomenon has since changed and the existence of cointegration relationship between stock prices is believed not to necessarily imply market efficiency (Adelebola & Dahalan, 2012). Consequently, the Johansen cointegration test which is a Vector autoregressive (VAR) framework provides a unified approach for the estimation of the multivariate cointegration system based on the error correction mechanism of the VAR (κ) model.

Assuming X_t is a set of I (1) variables consisting n stock indexes, the VAR (κ) model is specified below:

$$LogX_t = \mu + \beta_1 LogX_{t-1} + \beta_2 LogX_{t-2} + \cdots \beta_\kappa LogX_{t-\kappa} + \varepsilon_t \quad \ldots\ldots (6)$$

Where: β_κ , is an n x n coefficient matrix

$t = 1, 2, 3 \ldots . T$

ε_t is an error term.

To estimate the Johansen cointegration test, equation (6), may be transformed into an error correction model as follows:

$$\Delta LogX_t = \mu + \sum_{i=1}^{k=1} \Gamma_i \Delta \mathrm{Log} X_{t-i} + \Pi LogX_{t-\kappa} + \varepsilon_t \quad \ldots\ldots (7)$$

Where:

Δ, is the first difference operator

Γ_i, is an n x n coefficient matrix defined asΓ_i = - (I -β_1 $-\cdots$ β_i) representing the short run dynamics, Π is an n x n matric defined as Π = - (I - $\beta_1 - \cdots \beta_\kappa$) representing the long run dynamics and I is an identity matrix whose rank determines the number of distinct cointergrating vectors.

ε_t is the diagonal matrix of structural innovations that has zero means, constant variance and are individually serially correlated.

To test the long run restrictions implied by economic theory there is one cointegrating vector ($\beta_{11}S_{t-1} + \beta_{21}B_{t-1} + \beta_{31}M_{t-1} + \beta_{41}Na_{t-1} + \beta_{51}Ni_{t-1} + \beta_{61}C$) which feeds into five different equations as follows:

$$\Delta LogS_t = a_{11}[\beta_{11}S_{t-1} + \beta_{21}B_{t-1} + \beta_{31}M_{t-1} + \beta_{41}Na_{t-1} + \beta_{51}Ni_{t-1} + \beta_{61}C]$$

$$\Delta LogB_t = a_{21}[\beta_{11}S_{t-1} + \beta_{21}B_{t-1} + \beta_{31}M_{t-1} + \beta_{41}Na_{t-1} + \beta_{51}Ni_{t-1} + \beta_{61}C]$$

$$\Delta LogM_t = a_{31}[\beta_{11}S_{t-1} + \beta_{21}B_{t-1} + \beta_{31}M_{t-1} + \beta_{41}Na_{t-1} + \beta_{51}Ni_{t-1} + \beta_{61}C]$$

$$\Delta LogNa_t = a_{41}[\beta_{11}S_{t-1} + \beta_{21}B_{t-1} + \beta_{31}M_{t-1} + \beta_{41}Na_{t-1} + \beta_{51}Ni_{t-1} + \beta_{61}C]$$

$$\Delta LogNi_t = a_{51}[\beta_{11}S_{t-1} + \beta_{21}B_{t-1} + \beta_{31}M_{t-1} + \beta_{41}Na_{t-1} + \beta_{51}Ni_{t-1} + \beta_{61}C]$$

In the event that there is cointegration a Vector Error Correction model is estimated, however, if there is no cointegration a VAR model in first difference is estimated.

4.6 Vector Error Correction Model (VECM)

The vector error correction (VEC) model is a special case of the VAR for variables that are stationary in their first differences and it takes into account any short run cointegrating relationships among the variables. The VEC specification restricts the long run behaviour of the endogenous variables to converge to their long run equilibrium relationships and allow the short run dynamics (Asari et.al, 2011). In the event that in the model specified, there exists a long run relationship between the variables, or series, the VECM is applied in order to evaluate the short run properties of the cointegrated series.

Since a constant is included in the cointegrating space, there are at most five cointegrating vectors for the above estimated VAR model. The VEC model matrices are specified below:

$$\begin{bmatrix} \Delta LogS_t \\ \Delta LogB_t \\ \Delta LogM_t \\ \Delta LogNa_t \\ \Delta LogNi_t \end{bmatrix} = \begin{bmatrix} d_{11}\, d_{12} d_{13} d_{14} \\ d_{21} d_{22} d_{23} d_{24} \\ d_{31} d_{32} d_{33} d_{34} \\ d_{41} d_{42} d_{43} d_{44} \\ d_{51} d_{52} d_{53} d_{54} \end{bmatrix} \begin{bmatrix} D_1 \\ D_2 \\ D_3 \\ D_4 \end{bmatrix} + \begin{bmatrix} \gamma_{11}\gamma_{12}\gamma_{13}\gamma_{14}\gamma_{15} \\ \gamma_{21}\gamma_{22}\gamma_{23}\gamma_{24}\gamma_{25} \\ \gamma_{31}\gamma_{32}\gamma_{33}\gamma_{34}\gamma_{35} \\ \gamma_{41}\gamma_{42}\gamma_{43}\gamma_{44}\gamma_{45} \\ \gamma_{51}\gamma_{52}\gamma_{53}\gamma_{54}\gamma_{55} \end{bmatrix} \begin{bmatrix} \Delta LogS_{t-1} \\ \Delta LogB_{t-1} \\ \Delta LogM_{t-1} \\ \Delta LogNa_{t-1} \\ \Delta LogNi_{t-1} \end{bmatrix} +$$

$$\begin{bmatrix} a_{11}a_{12}a_{13}a_{14}a_{15} \\ a_{21}a_{22}a_{23}a_{24}a_{25} \\ a_{31}a_{32}a_{33}a_{34}a_{35} \\ a_{41}a_{42}a_{43}a_{44}a_{45} \\ a_{51}a_{52}a_{53}a_{54}a_{55} \\ a_{61}a_{62}a_{63}a_{64}a_{65} \end{bmatrix} \begin{bmatrix} \beta_{11}\,\beta_{12}\beta_{13}\beta_{14}\beta_{15}\beta_{16} \\ \beta_{21}\,\beta_{22}\beta_{23}\beta_{24}\beta_{25}\beta_{26} \\ \beta_{31}\,\beta_{32}\beta_{33}\beta_{34}\beta_{35}\beta_{36} \\ \beta_{41}\,\beta_{42}\beta_{43}\beta_{44}\beta_{45}\beta_{46} \\ \beta_{51}\,\beta_{52}\beta_{53}\beta_{54}\beta_{55}\beta_{56} \end{bmatrix} \begin{bmatrix} LogS_{t-1} \\ LogB_{t-1} \\ LogM_{t-1} \\ LogNa_{t-1} \\ LogNi_{t-1} \\ C \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \end{bmatrix}$$

Where, the α represents the short term dynamics with the β representing the long run cointegrating vectors.

4.7Granger Causality

In an integrated market, stock market performance is assumed to be affected by the performance of another. The efficient market hypothesis suggests that stock market prices reflect all the available information. Thus, in a fully integrated market all the information in one country's stock market is translated into the other stock market's stock price of the same portfolio. In other words, past changes in one country's stock price should cause the change in another country's stock price.

Defined by Granger (1969), the Granger causality test, is a test to determine any correlation between the current value of one variable and the past values of others. It assumes that time series involved in the analysis are stationery and is sensitive to lag length selection, hence the need for conducting stationarity tests and determining the proper lag length before carrying out the causality test (Brooks, 2008:298). Thus, the test seeks to answer the following question: Do changes in X_1 (stock market 1) cause changes in X_2 (stock market 2)? Hence granger causality test determines the correlation between the current value of one variable and the past values of others (Brooks, 2008: 298).

This phenomenon is presented in the following linear model:

$$X_t = \alpha + \propto X_{t-1} + \propto X_{t-\kappa} + \acute{Z}_{t-1}\gamma_1 + \acute{Z}_{t-\kappa}\gamma_\kappa + e_t \quad \ldots\ldots (7)$$

Where: X_t and $\acute{Z}_t$ are vectors for the different African stock market indices.

e_t is the error term.

In the above equation (7) $\acute{Z}_t$ does not granger cause X_t ifH_0: $= \gamma_1 = \gamma_2 = \cdots \gamma_\kappa = 0$. That is, the null hypothesisH_0, that one stock market does not granger cause another stock market is tested using the F-test.

The linear equation can be expressed in a VAR model as follows:

$$\begin{bmatrix} Y_t \\ Z_t \end{bmatrix} = \sum_{i=1}^{p} \begin{bmatrix} a_{11i} a_{12i} \\ a_{21i} a_{22i} \end{bmatrix} \begin{bmatrix} Y_{t-1} \\ Z_{t-1} \end{bmatrix} + \mu_t$$

In the event that the variables are I(0), a test that Y_t granger causes $Z_t$is tested as:

a_{21i}=0 for i = 1, 2, 3…….p.

However, in the case for which the variables are I(1), the above VAR granger causality model can be re-written in a VECM format as:

$$\begin{bmatrix} \Delta Y_t \\ \Delta Z_t \end{bmatrix} = \alpha\hat{\beta} \begin{bmatrix} Y_{t-1} \\ Z_{t-1} \end{bmatrix} + \sum_{i=1}^{p-1} \begin{bmatrix} \gamma_{11i}\gamma_{12i} \\ \gamma_{21i}\gamma_{22i} \end{bmatrix} \begin{bmatrix} \Delta Y_{t-1} \\ \Delta Z_{t-1} \end{bmatrix} + \mu_t$$

Where $\alpha\hat{\beta}$ can be expressed as:

$$\alpha\hat{\beta} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \end{bmatrix} [\beta_1 \beta_2] = \begin{bmatrix} \alpha_1\beta_1 \alpha_1\beta_2 \\ \alpha_2\beta_1 \alpha_2\beta_2 \end{bmatrix}$$

By replacing $\alpha\hat{\beta}$ by the latter expression to the former I(1) granger causality model, the granger causality tests the following hypotheses:

γ_{21i} = 0, for i =1, 2, 3……p-*1;* and$\alpha_2\beta_1$ = 0.

The causality test is performed to identify the existence and nature of the causality relationship between the variables. This is appropriate to identify relationships between variables because multiple relationships may cause simultaneity, especially if the variables involved in the model are more than two.

4.8 Data Sources and Collection

The data used in the study was obtained from Bloomberg. It constitutes of samples of five (5) African stock markets (South Africa, Botswana, Namibia, Mauritius and Nigeria) and German Japan and USA (to represent the world stock markets). Other African and world stock markets are not included in the sample due to the unavailability of data. The markets in the sample have well reported and available data. This study utilises monthly data to avoid the possible effects of autocorrelation in volatility and to circumvent the problem of non-

synchronous trading for the period of February 2000 to September 2008. Further the study period was chosen attributable to availability of data. The All-Share Index (ASI) is used as the proxy for the South African stock market (JSE). The BGS-MDC Index, SEMEDEX Index, NSX overall Index and NGSE Index are used for Botswana, Mauritius, Namibia and Nigeria respectively.

4.9 Diagnostic Checks

Diagnostic checks are done in the study to verify if none of the assumptions which underlie the model have been violated. These checks test the stochastic properties of the model such as residual heteroscedasticity, normality and autocorrelation, amongst the rest. The multivariate extensions of the residual test just mentioned is applied in this study and is briefly discussed.

4.9.1 Heteroscedasticity test

A sequence of random variables is heteroscedastic if the random variables have different variances. Conversely a sequence of random variables with a constant variance are said to be homoscedastic. Brooks (2002:148) posits that there are a number of formal statistical tests for heteroscedasticity and the most popular is the White test for heteroscedasticity. The test is useful because it assumes that the regression model estimated is of the standard linear. After running the regression, residuals are obtained and then test regression is run by regressing each product of the residuals on the cross products of the regressors and testing the joint significance of the regression. The null hypothesis (H_0) for the White test is homoscedasticity and in the event that accept the null hypothesis, it implies that there is homoscedasticity. But if the null hypothesis is rejected then there is heteroscedasticity.

4.9.2 Normality test

The Jarque-Bera JB) test is one of the most commonly applied tests for normality in time series analysis. Results for asymptotic validity of the Jarque-Bera test in vector autoregressive (VAR) models assume stationarity. The JB uses the property of a normally distributed random variable that the entire distribution is characterized by the first two moments, that is, the mean and the variance. For stationary VAR models and in VEC models the bootstrap critical values are used and the JB test statistic asymptotically follows a distribution under the null hypothesis that the distribution of the series is symmetric

(Muchaonyerwa, 2011).In the event that the residuals from the model are either significantly skewed or leptokurtic/platykurtic (or both) the null hypothesis of normality would be rejected.

4.9.3 Autocorrelation test

Autocorrelation or serial correlation refers to the case in which the error term in one time period is correlated with the error term in any other time period. If the error term in one time period is correlated with the error term in the previous time period, there is first-order autocorrelation. This is common in time-series analysis and leads to downward-biased standard errors (and, thus, to incorrect statistical tests and confidence intervals). The Durbin-Watson (DW) is a test for first order autocorrelation, that is, it tests only for a relationship between an error and its immediately previous value. Most of the applications in econometrics involve first rather than second or higher order autocorrelation(Salvatore & Reagle, 2002: 222).In the event that there is evidence of a relationship between the successive residuals, the null hypothesis which states that the error terms are independent is rejected.

4.10 Conclusion

This section of the study discussed the methodology in depth. Two models based on the VARs were specified to investigate the relationship between stock indices across selected African stock markets and the world markets. The first model focuses mainly on the relationship between the selected African stock markets only and the second model, examines any linkages between the selected African stock markets and the world markets. On the specified models, a positive relationship is expected amongst the chosen stock market indices. Furthermore, in determining the long run relationship, the Johansen cointegration test is employed and to capture the short run dynamics the VECM to be employed is specified. More so the granger causality test and diagnostics checks are performed as discussed. The following section focuses on the empirical analysis of the specified models and interpretation of results.

CHAPTER FIVE

EMPIRICAL ANALYSIS AND INTERPRETATION OF RESULTS

5.1 Stationarity

The empirical investigation of the relationship between the five African stock markets begins with testing for unit root. The statistical results in tables 5.1 and 5.2 refer to the unit root test based on the Augmented Dickey Fuller and the Phillips Peron tests. They provide some preliminary statistics on all the variables in the explained model 1; South Africa (All Share Index), Botswana (All Company Index), Mauritius (SEMDEX Index), Namibia (NSX overall Index) and Nigeria (NGSE Index) and model 2 (USA, Japan and Germany).

Table 5. 1: Unit Root Results (Level Series)

	ADF			PP		
Variables	Intercept	Trend and Intercept	None	Intercept	Trend and Intercept	None
Log S_t	-0.505756	-1.686155	1.949575	-0.511318	-1.754834	1.941334
Log B_t	-0.474577	-1.974616	2.034729	-0.497017	-1.836493	2.436586
Log M_t	1.241856	-2.682062	3.504807	0.779603	-2.609173	2.618034
Log Na_t	-0.120734	-1.313576	5.871358	-0.190162	-1.561084	5.016472
Log Ni_t	-1.389666	-2.423082	2.371769	-1.297434	-2.118007	2.859545
LogJ_t	-1.935782	-2.383943	-1.076698	-2.031278	-2.394358	-0.944333
Log G_t	-1.469146	-1.876609	-0.445201	-1.482076	-1.883030	-0.445201
LogUSA_t	-1.438498	-1.822575	-0.235871	-1.445705	-1.797865	-0.241670

The star (s) *, **, *** imply 10%, 5% and 1% significance levels respectively.

(Source: Author's Computation)

Table 5. 2: Unit Root Results (First Difference Level)

ables	ADF			PP		
	Intercept	Trend and Intercept	None	Intercept	Trend and Intercept	None
S_t	-9.608737***	-9.544905***	-9.289750***	-9.613040***	-9.549643***	-9.403715***
B_t	-4.991868***	-4.970082***	-4.439450***	-5.053308***	-5.033203***	-4.435629***
M_t	-7.772212***	-7.989486***	-7.161651***	-7.956173***	-8.038536***	-7.596479***
Na_t	-9.523553***	-9.501240***	-3.077530***	-9.630150***	-9.606322***	-8.509077***
Ni_t	-7.326732***	-7.368620***	-6.725304***	-7.337195***	-7.374934***	-6.728552***
J_t	-8.793345***	-8.835472***	-8.743679***	-8.951839***	-8.912320***	-8.904424***
G_t	-9.677479***	-9.796282***	-9.712358***	-9.677479***	-9.800827***	-9.712358***
USA_t	-9.705086***	-9.716609***	-9.751643***	-9.698032***	-9.709402***	-9.746956***

The star(s) *, **, *** imply 10%, 5% and 1% significance levels respectively.

(Source: Author's Computation)

The time series properties of the data show that the variables are non-stationary at level series as reported by both the ADF and the PP. However, at first differences all variables are stationary. Therefore, we proceed to test for cointegration among the variables in order to determine any linkages between African stock markets. The cointegration analysis helps to explore the stochastic trends in the series based on the Johansen (1995) cointegration test. Innately, in the event that financial markets share a common trend, then there will be no long term gains for international diversification. An important component in performing a VAR is the proper determination of the number of lags to be used. Hence prior to conducting the cointegration test, the lag length is determined.

5.2 Lag length Selection

Table 5.3 shows the results of the lag length selection test. The study uses a lag of 1 as chosen by the Schwarz Information Criterion (SIC), and Hannan-Quinn criterion (HQIC) the LR test The SIC has a characteristic of underestimating the lag order whilst the HQIC is somewhere in between. However, adding more lags increases the penalty for the loss of degrees of freedom (Brooks, 2008). The above mentioned criterions concur that the maximum lag length for the six endogenous variables is one (1). This implies the VAR for this study is estimated using the lag length of one (1) for each endogenous variable.

Table 5. 3: VAR Lag Order Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	231.6143	NA	3.66e-10	-4.700297	-4.540026	-4.635513
1	996.7836	1418.751*	9.27e-17	-19.89132	-18.76942*	-19.43783*
2	1038.233	71.67225	8.35e-17*	-20.00485*	-17.92131	-19.16265
3	1052.604	23.05423	1.34e-16	-19.55425	-16.50909	-18.32335
4	1072.191	28.97308	1.96e-16	-19.21232	-15.20553	-17.59271
5	1110.299	51.60397	2.02e-16	-19.25623	-14.28781	-17.24791
6	1137.013	32.83592	2.73e-16	-19.06277	-13.13272	-16.66575
7	1176.802	43.93345	2.95e-16	-19.14170	-12.25002	-16.35597
8	1232.745	54.77786	2.44e-16	-19.55719	-11.70387	-16.38275

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

(Source: Author's Computation).

5.3 Co-integration

Having selected the ideal lag for the model, the next step is to conduct the Johansen cointegration test. Prior to testing for cointegration relationships we first determined whether deterministic components such as constant, time trend and dummy variables should be included in the model. Thus, using the general to specific approach, a linear deterministic trend (at intercept, no trend in CE and VAR) was chosen as the most appropriate model for the cointegration space. Table 5.4 tabulates the co-integration tests results for stationary variables using trace and max-eigenvalue methods and the computations indicate the presence of a single cointegration equation at none, at 5% level of significance.

However to a greater extent the law of one price does not hold in that there are potential gains from portfolio diversification among the African stock markets since there is only a single cointegration equation. With the presence of cointegration, instead of estimating a VAR at first difference, a VECM was estimated to determine the short run dynamics of the series.

Table 5. 4: Johansen-Julius Cointegration Test Results

odel	Null hypothesis	Statistical Trace	Critical Value (5%)	Maximum Eigen Statistical Trace	Critical Value (5%)	Variable	Long-term Coefficient Elasticity	Results
g	$r \leq 0$	112.7556**	103.8473	47.87738**	40.95680	Log(SA)	1.000000	Statistical
ngth	$r \leq 1$	74.87823	76.97277	25.35620	34.80587	Log(Botswana)	-1.148727	Trace showed a 1- way cointegration
#	$r \leq 2$	49.52203	54.07904	21.23420	28.58808	Log(Mauritius)	0.080549	
	$r \leq 3$	28.28783	35.19275	13.62097	22.29962	Log(Namibia)	0.333255	
	$r \leq 4$	14.66686	20.26184	9.524351	15.89210	Log(Nigeria)	-0.416785	
	$R \leq 5$	5.142510	9.164546	5.142510	9.164546	Dum	0.982375	
						C	1.166151	

The star(s) *, **, *** imply 10%, 5% and 1% significance levels respectively.

(Source: Author's Computation).

5.4 Vector Error Correction Model Results

Having established that there is a long run relationship between the variables, the next step is to do a vector error correction model (VECM) test. Vector Error Correction Models (VECM) are the basic VAR, with an error correction term incorporated into the model. More so, because the error correction term is the same with the standard error correction model and it measures any movement away from the long-run equilibrium.

5.4.1Long Run Cointegration test results

Results from Appendix 2 show that the normalised cointegration vector (LSA) is as depicted in table 5.5 below:

Table 5. 5: Long Run Cointegration Relationship Results (African Stock Markets)

Dependent Variable (LSA)	Independent Variables					
	LBotswana	LMauritius	LNamibia	LNigeria	Dum	C
Coefficient	-1.166689**	0.056124	-0.433565	0.376489	0.240025	-2.133859
Standard Errors	(0.20662)	(0.22235)	(0.32887)	(0.27807)	(0.17394)	
t-statistics	[-5.64646]	[0.25242]	[-1.31836]	[1.35395]	[1.37992]	

The star(s) *, **, *** imply 10%, 5% and 1% significance levels respectively.

(Source: Author's Computation).

In the above equation the South African stock market is the representative dependent variable because it is a well-established African stock market. Apriori expectations are that there is a positive relationship between the African stock markets depicting the presence of integration and the absence of portfolio diversification opportunities. Thus, the law of one price is expected to exist within the markets. Evidence from the long run equation shows a negative relationship between JSE, BSE and NSX implying the possibility of gains from portfolio diversification. However, in-line with the apriori expectation there is a positive relationship between JSE, NSE and SEM suggesting that investors cannot gain through diversification as the markets move in the same direction. This is consistent with Mlambo and Biekpe, (2007) who argue that these markets have dual listings.

5.4.2 Short Run Analysis: An Error Correction Model

The purpose of analysing the error correction model is to examine the short run effects of the series. Table 5.6shows the results of short run vector error correction model. These results depict the presence of a self-correcting mechanism on all variables except Botswana. For all the stock markets with a negative coefficient this is in line with the efficient market hypothesis as the market quickly corrects itself after disequilibrium.

Table 5. 6: Short Run VECM Results

Variable	Co-efficient	Standard error	t-ratio
D(LSA)	-0.025866	0.03510	-0.73701
D(LBotswana)	0.049567	0.01868	2.65334
D(LMauritius)	-0.073784	0.02243	-3.28938
D(LNamibia)	-0.044983	0.01449	-3.10378
D(LNigeria)	-0.030914	0.03459	-0.89380
D(Dum)	-0.085893	0.06317	-1.35981

(Source: Author's Computation).

5.5 Impulse Response Results

The impulse response function recognizes the effect of a one standard deviation shock in one stock exchange to one of the innovations on current and future values of other stock exchange. An estimate was made of the impulse response functions of the different stock markets considered to innovations in each one of the other markets. Appendix 3 shows the graphs that represent the impulse responses of each country to shocks in each one of the markets.

Observed results show that a one standard deviation shock to JSE has a positive impact to JSE. On the same note, standard deviation shocks to the BSE have a positive impact on the JSE, this is consistent with results of Adebola and Dahalan,(2012)possibly due to the rapid alignment of the two stock markets in terms of dual listings and the move towards total standardisation of the regulation systems (Mlambo & Biekpe, 2007). More so, a cholesky one standard deviation innovation to NSE, SEM and NSX insignificantly impacts on the JSE. A dummy variable was included in the estimation to take into account the period prior to the crisis (2008). Empirical results show the South African equity market did not respond instantaneously to the shock. In the same vein, the BSE responds positively to its own shocks and standard deviation shocks to the South African stock market, and Nigerian stock market. The BSE market negatively responds to Namibian stock market and almost insignificant to standard deviation shocks to SEM.

Also a one standard deviation shock to the NSX, BSE, and SEM impresses positively on SEM. Howbeit a negative response to the shocks applied to the JSE is evidenced in the impulse response results. Arbitrage opportunities exist between the two markets, that is, the markets are still segmented. These results corresponds the results of Yartey and Adjasi, (2007); Alagidede, (2008); Agyei-Ampomah, (2011) and Ntim, (2012). The Namibian stock market responds trivially to shocks applied to SEM and NSE; and positively to shocks applied to the BSE. Other portfolio diversification opportunities are shown in the response of NSX to shocks from the JSE. NSE responds positively to shocks from NSE, SEM and BSE and negatively to shocks applied to NSX. When standard deviation shocks are applied to the JSE, the NSE insignificantly responds.

As evidenced in the Johansen test results, there exists portfolio diversification opportunities within African stock markets. However, in the short-run as indicated by the impulse response results reveal a certain degree of the operation of the law of one price for small African stock markets. Mainly because most of the small African stock markets are adopting operational skills from the better developed African stock markets. Overall as evidenced by Alagidede, (2008), there is little feedback between African stock markets.

5.6 Variance Decomposition Results

Variance decomposition offers information about the relative importance of each random innovation in affecting the variation of the variables in the VAR, that is, it separates the variation in an endogenous variable into the component shocks to the VAR. Acquired results in table 5.7 (for the 12 months period, complete results are in appendix4) indicate some results from the response functions. The percentage variance of JSE due to random innovations to BSE is ten percent, and insignificantly less than one percent for the rest of the markets (i.e SEM, NSX, NSE). Thus, there is some considerable relationship between the JSE and the BSE. These results are consistent with the impulse response discussed in the previous section. As argued by Mlambo and Biekpe (2007), most of the listed companies in BSE are dual listed with the JSE and most of the trading occurs in the JSE instead of the BSE. In addition, variance decomposition results show that random innovations to JSE have a considerable impact (that is, thirty two percent for the period considered) to BSE which is more than the 31% of its own random innovations. In other words, there is a relationship between JSE and BSE as observed in the impulse response results.

Concurring the impulse response function results are the results for NSX and NSE. Also the BSE surprisingly seems to have a significant relationship with the other African stock markets. This is understandable as the market is still very small and is desperately trying to link itself with other stock markets in order to gain from them. Moreover the evidence for the dummy variable shows that the JSE being well-established and highly performing stock market and integrated to the world markets is the only market which responds to the 2008 crisis. This further supports the fact that small African stock markets to a larger extent are not affected by world events unlike bigger markets. However the rate of integration is still very small and insignificant.

Table 5.7: Variance Decomposition Results

Variance decomposition: LSA							
riod	S.E	LSA	LBOTS	LMAUR	LNAM	LNIG	DUM
1	0.05	100.00	0.00	0.00	0.00	0.00	0.00
2	0.08	97.17	0.51	0.03	0.00	0.14	2.16
3	0.09	95.90	1.32	0.02	0.01	0.16	2.60
4	0.11	94.84	2.23	0.01	0.01	0.15	2.76
5	0.12	93.87	3.14	0.01	0.01	0.14	2.83
6	0.13	93.00	4.00	0.01	0.01	0.13	2.85
7	0.14	92.23	4.77	0.01	0.01	0.12	2.86
8	0.15	91.57	5.45	0.01	0.01	0.11	2.86
9	0.16	90.99	6.04	0.01	0.01	0.11	2.85
10	0.17	90.49	6.55	0.01	0.01	0.10	2.84
11	0.18	90.06	6.99	0.01	0.01	0.10	2.84
12	0.19	89.70	7.37	0.004	0.01	0.09	2.83
Variance Decomposition: LBotswana							
Period	S.E	LSA	LBOTS	LMAUR	LNAM	LNIG	DUM
1	0.03	0.35	99.65	0.00	0.00	0.00	0.00
2	0.05	1.06	98.18	0.03	0.02	0.54	0.17
3	0.08	2.16	95.53	0.06	0.11	1.49	0.64
4	0.09	3.57	92.13	0.109	0.28	2.59	1.35
5	0.11	5.20	88.24	0.13	0.49	3.71	2.21
6	0.13	7.00	84.09	0.17	0.75	4.80	3.18
7	0.14	8.88	79.85	0.21	1.03	5.82	4.21
8	0.15	10.77	75.66	0.24	1.31	6.76	5.25
9	0.16	12.63	71.63	0.27	1.60	7.61	6.27

10	0.17	14.40	67.82	0.29	1.87	8.37	7.24
11	0.18	16.07	64.29	0.31	2.13	9.03	8.16
12	0.19	17.62	61.04	0.33	2.37	9.62	9.01

Variance Decomposition: LMauritius

Period	S.E	LSA	LBOTS	LMAUR	LNAM	LNIG	DUM
1	0.03	0.01	0.00	100.00	0.00	0.00	0.00
2	0.05	0.50	1.51	95.51	0.04	1.58	0.87
3	0.07	0.31	5.04	90.68	0.07	2.692	1.21
4	0.08	0.30	9.67	85.69	0.06	3.21	1.08
5	0.10	0.47	14.60	80.67	0.04	3.35	0.87
6	0.11	0.74	19.34	75.88	0.04	3.31	0.69
7	0.12	1.06	23.63	71.54	0.04	3.19	0.55
8	0.13	1.37	27.37	67.71	0.05	3.04	0.46
9	0.15	1.65	30.58	64.41	0.06	2.90	0.39
10	0.16	1.91	33.31	61.58	0.08	2.77	0.35
11	0.17	2.13	35.62	59.18	0.09	2.66	0.32
12	0.18	2.32	37.59	57.13	0.10	2.56	0.31

Variance Decomposition: LNamibia

Period	S.E	LSA	LBOTS	LMAUR	LNAM	LNIG	DUM
1	0.02	0.01	0.13	2.41	97.45	0.00	0.00
2	0.03	0.25	0.08	1.58	97.86	0.24	0.00
3	0.04	1.13	0.39	1.23	96.93	0.23	0.08
4	0.05	2.27	1.20	1.02	95.00	0.18	0.33
5	0.05	3.48	2.46	0.86	92.38	0.14	0.68
6	0.06	4.62	4.02	0.75	89.43	0.12	1.07
7	0.07	5.64	5.72	0.65	86.41	0.12	1.45
8	0.07	6.52	7.44	0.58	83.53	0.13	1.80
9	0.08	7.26	9.09	0.52	80.88	0.14	2.11
10	0.09	7.88	10.62	0.47	78.49	0.15	2.38
11	0.09	8.40	12.02	0.43	76.38	0.16	2.61
12	0.10	8.83	13.27	0.40	74.52	0.17	2.80

Variance Decomposition: LNigeria

Period	S.E	LSA	LBOTS	LMAUR	LNAM	LNIG	DUM
1	0.05	1.56	0.02	0.98	0.11	97.33	0.00
2	0.09	1.55	0.16	0.74	0.53	96.07	0.95
3	0.12	1.27	0.41	0.74	0.78	95.49	1.31
4	0.14	1.06	0.73	0.76	0.90	95.14	1.42
5	0.16	0.90	1.13	0.77	0.94	94.84	1.42
6	0.18	0.77	1.56	0.78	0.95	94.55	1.39

7	0.19	0.67	2.00	0.79	0.94	94.26	1.34
8	0.21	0.59	2.44	0.79	0.93	93.96	1.29
9	0.22	0.52	2.86	0.79	0.91	93.67	1.24
10	0.24	0.47	3.25	0.79	0.90	93.39	1.20
11	0.25	0.42	3.62	0.79	0.88	93.13	1.16
12	0.26	0.39	3.95	0.79	0.87	92.88	1.12
Variance Decomposition: Dum							
Period	S.E	LSA	LBOTS	LMAUR	LNAM	LNIG	DUM
1	0.10	1.40	2.04	0.29	1.13	0.11	95.03
2	0.14	3.71	3.48	0.21	2.63	0.19	89.77
3	0.17	4.99	4.15	0.20	3.04	0.25	87.36
4	0.19	6.41	4.22	0.20	3.15	0.23	85.80
5	0.21	8.01	3.96	0.19	3.13	0.20	84.52
6	0.23	9.69	3.57	0.18	3.04	0.17	83.34
7	0.25	11.38	3.17	0.18	2.94	0.15	82.19
8	0.26	13.03	2.82	0.17	2.82	0.14	81.02
9	0.27	14.61	2.55	0.16	2.70	0.14	79.85
10	0.29	16.07	2.36	0.16	2.59	0.14	78.68
11	0.30	17.43	2.25	0.15	2.48	0.14	77.55
12	0.31	18.66	2.20	0.15	2.38	0.14	76.47

(Source: Author's Computation)

5.7: Granger Causality Results

The main purpose of the research is to establish the relationship between the five African stock markets. A VAR Granger causality/Wald test is estimated and results are summarised in table 5.8 (complete results are shown in appendix 4). In examining the existence of causality, it is observed that the past values of stock markets such as JSE and NSE affect movements or granger causes small markets. This is consistent with Adebola and Dahalan (2012). However, unlike with the variance and impulse response results, there are no causal links between JSE and BSE. In general, the evidenced causation is towards small markets such as BSE, NSE and SEM signalling a relationship between big and small markets but lack of relationship between big markets.

Table 5. 8: VAR Granger Causality/Block Exogeneity Wald Test Results

ariables	Excluded						
	D(LSA)	D(LBOTSWANA)	D(LMAURITIUS)	D(LNAMIBIA)	D(LNIGERIA)	D(DUM)	All
(LSA)	_	2.046425	0.007446	0.015304	0.142886	4.855308	0.3082
(LBOTSWAN)	0.014164	_	0.036065	0.000786	1.097007	0.142245	0.9182
(LMAURITIU	3.784468*	2.688929	_	0.808890	5.730464**	3.633585*	0.0064***
(LNAMIBIA)	0.128776	0.023724	0.537480	_	1.219885	0.273574	1.913947
(LNIGERIA)	0.180858	0.338221	0.007317	0.361376	_	3.024835*	3.713975
(DUM)	0.696119	2.196919	0.890849	1.195245	1.011880	-	5.521386

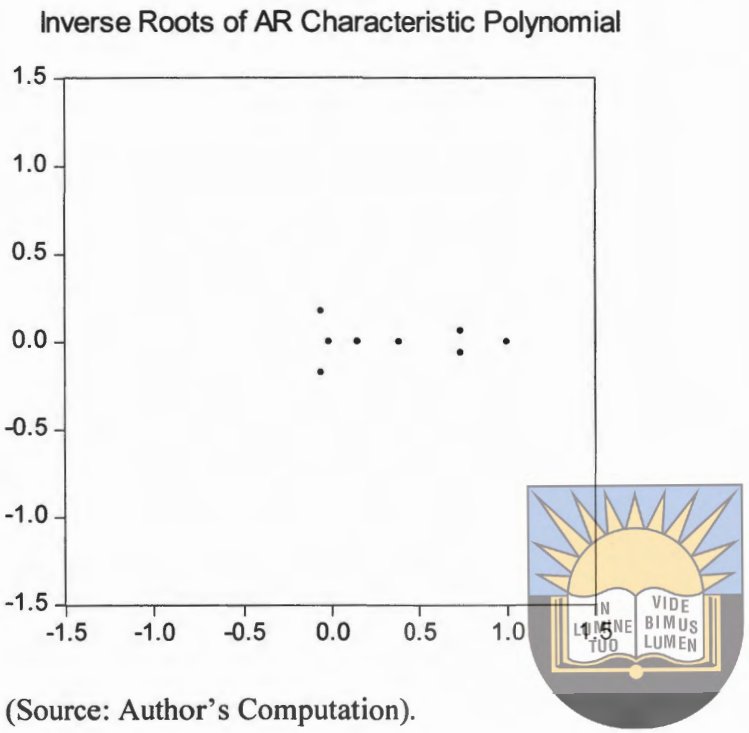
The stars *, **, *** imply 10%, 5% and 1% significance levels respectively.

(Source: Author's Computation).

5.8 Diagnostic Checks Results

The multivariate extensions of the residual test are applied in this study and are briefly discussed. After the estimation of the model using Eviews 7.0, an AR Roots test was used to test the stability of the model. The AR Roots (figure 5.1) show that the VAR model is stationary because all the roots of the characteristic AR polynomial have absolute values of less than one which lie inside the unit circle indicating that the model is stable and can therefore be used in the analysis.

Figure 5. 1: AR Roots Graph



(Source: Author's Computation).

5.8.1 Heteroscedasticity results

The heteroscedasticity test, tests the null hypothesis (H_0) of homoscedasticity against the alternative hypothesis (H_1) of heteroscedasticity for the White test. In the event that the null hypothesis is rejected the alternative hypothesis is accepted that there is heteroscedasticity.

As shown below (complete results are shown in appendix 5) the residual test of heteroscedasticity was performed using Eview 7 software, and the model is insignificant.

Table 5. 9: Residual Heteroscedasticity Test Results

Joint test:

Chi-sq	Df	Prob.
299.0026	273	0.1340

The stars *, **, *** imply 10%, 5% and 1% significance levels respectively.

(Source: Author's Computation).

Hence the null hypothesis (H_0), that there is homoscedasticity is not rejectedagainst the alternative hypothesis (H1) of heteroscedasticity. There by concluding that there is homoscedasticity. In simpler terms the error terms have a constant variance.

5.8.2: Normality Test Results

The most commonly applied tests for normality in time series analysisis the Jarque-Bera test.In the event that the residuals from the model are either significantly skewed or leptokurtic/platykurtic the null hypothesis of normality would be rejected. The normality results for the model are shown in table 5.10 (complete results are shown in appendix 6) below:

Table 5. 10: Residual Normality Tests Results

	Joint	Df	Probability
Skewness	13.59529	5	0.4184
Kurtosis	12.71188	5	0.2262
Jarque-Bera	26.30717	10	0.6533

The stars *, **, *** imply 10%, 5% and 1% significance levels respectively.

(Source: Author's Computation).

As shown above the normality test results are insignificant at all levels of significance, hence the null hypothesis is not rejected that the model is normally distributed.

5.8.2 Autocorrelation Results

Error terms are serially correlated when the error term in one time period is correlated with the error term in any other time period. In the event that there is evidence of a relationship between the successive residuals, the null hypothesis which states that the error terms are independent is rejected.

Table 5. 11: Residual Serial Correlation Test Results

Lags	LM-Stat	Prob
7	47.44739	0.0960
12	48.23816	0.0835

The stars *, **, *** imply 10%, 5% and 1% significance levels respectively.

(Source: Author's Computation).

As shown above, obtained results (full results are shown in appendix 7) shows that the model is significant at 10% level of significance for lags 7 and 12 though at a weaker level, hence the null hypothesis which states that the error terms are independent is rejected and the alternative hypothesis is accepted. As a result the error term in one time period is correlated with the error term in any other time period. This is due to the fact that one of the explanatory variables is contemporaneously correlated with the disturbance term.

5. 9 Are African stock markets related to the world?

Prior to determining any relationship between African stock markets and the world stock markets, the time series properties were estimated using the ADF and PP tests. The results are tabulated in the tables 5.1 and 5.2 and they reveal that the time series are I (1).Using the same lag length of one, the long run relationship between the African stock markets and the world stock markets is estimated using the Johansen cointegration test. The two long run test statistics employed in the series are formulated as follows:

$\lambda_{trace}(r)$ = -T $\sum_{i=r+1}^{g} \ln(1 - \hat{\lambda}_i)$ and,

$\lambda_{max}(r)$ = -Tln$(1 - \hat{\lambda}_{r+1})$

Where: r is the number of cointegrating vectors under the null hypothesis

$\hat{\lambda}i$ is the estimated value for the i^{th} ordered eigen value

Table 5. 12: Johansen-Julius Cointegration Test Results (World and African Stock Markets)

del	Null hypothesis	Statistical Trace	Critical Value (5%)	Maximum Eigen Statistical Trace	Critical Value (5%)	Variable	Long-term Coefficient Elasticity	Results
gth	$r \leq 0$	271.0225**	208.4374	65.35212**	59.24000	Log(SA)	1.000000	Statistical Trace showed a 2- way cointegration
	$r \leq 1$	205.6704**	169.5991	55.70347**	53.18784	Log(Botswana)	0.149236	
	$r \leq 2$	129.9669	134.6780	41.01934	47.07897	Log(Mauritius)	-1.067414	
	$r \leq 3$	102.9476	103.8473	29.62305	40.95680	Log(Namibia)	-0.515862	
	$r \leq 4$	75.32454	76.97277	24.57638	34.80587	Log(Nigeria)	0.241509	
	$r \leq 5$	54.74816	54.87904	22.13387	28.58808	Dum	0.502110	
	$r \leq 6$	32.61429	35.19275	16.71492	22.29962	Log(Germany)	-2.399383	
	$r \leq 7$	15.89937	20.26184	10.33445	15.89210	Log(Japan)	-0.468921	
	$r \leq 8$	5.564917	9.164546	5.564917	9.164546	Log(USA)	5.086750	
						C	-14.87276	

The star(s) *, **, *** imply 10%, 5% and 1% significance levels respectively.

(Source: Author's Computation).

Based on Johansen and Juselius Cointegration test (results shown in table 5.12), the first normalized co-integrated vector (LSA) variable using lag period proposed by Schwartz information criterion (SIC) indicate two cointegrating equations at 5% level for both the λ_{trace} and λ_{max} values. Having established that there are two cointegrating equations in the series the cointegration relationship can be re-expressed as depicted in table 5.12. Only the relationship towards world stock markets is of significance at this stage as those of African stock markets have already been explored.

Table 5. 13: Long Run Cointegration Relationship Results (World and African Stock Markets)

pendent iable A)	Independent Variables								
	LBotswana	LMauritius	LNamibia	Lnigeria	Dum	LGermany	LJapan	LUSA	C
fficien	0.080569**	-0.895829**	-0.541488**	0.194509**	0.477735**	-2.388187**	-0.427776**	4.890958**	-13.97913
ndard ors	(0.14049)	(0.24643)	(0.20906)	(0.14245)	(0.13303)	(0.35317)	(0.22176)	(0.61251)	
atistics	[0.57350]	[-3.63529]	[-2.59012]	[1.36544]	[3.59118]	[-6.76213]	[-1.92898]	[7.98515]	

The star(s) *, **, *** imply 10%, 5% and 1% significance levels respectively.

(Source: Author's Computation).

The cointegration relationship shows that JSE has a positive relationship with USA. Thus the JSE is positively linked with the USA and negatively linked with Germany and Japan as the test co-efficients of the latter markets are negative. The short run dynamics estimated using the Error correction model prove that there is a positive relationship between South Africa and German and Japan. Also in the short run, the USA stock markets and the JSE stock market have a negative relationship. Thus the model reveals a self-correcting mechanism. These short run relations are as follows:

Table 5. 14: Short Run VECM Results (World and African Stock Markets)

Variable	Co-efficient	Standard error	t-ratio
D(LSA)	-0.019901	(0.04190)	[-0.47500]
D(LBotswana)	-0.004299	(0.02410)	[-0.17840]
D(LMauritius)	0.078095	(0.02829)	[2.76051]
D(LNamibia)	0.030732	(0.01867)	[1.64570]
D(LNigeria)	-0.035739	(0.04339)	[-0.82376]
D(Dum)	-0.179240	(0.07701)	[-2.32735]
D(German)	0.070738	(0.05412)	[1.30715]
D(Japan)	0.122444	(0.04064)	[3.01254]
D(USA)	-0.078226	(0.01393)	[-5.61592]

(Source: Author's Computation).

As shown in the impulse response results (in appendix 10) SEM and NSX respond positively to the world stock markets. However, the BSE and NSE trivially respond to the world stock markets. Probably as postulated by Alagidede, (2008), the latter African stock markets responds insignificantly to the world stock markets as most of the trading happens in the South African stock market.

Evidence from the impulse response function, somewhat concur with the evidence gathered by Alagidede, (2008), whilst the author investigated the relationship between African stock markets and the rest of the world. Although the countries under investigation differ with the ones investigated in this study, the South African stock market proves to be operating in an open economy and the level of macroeconomic coordination between the countries is very high. Also African stock markets such as BSE and NSX, stand a good chance to be linked with the world stock markets as the markets are linked to the JSE and most of their trading occurs in the JSE. This is supported with the findings of Mlambo and Biekpe, (2007).

5.10 Conclusion

This section of the study broadly explored the empirical results for the African stock markets. A long run cointegration equation is evidenced for the African stock markets; however the markets have proved to be segmented. More so, apart from investigating only the relationship between Africa stock markets, a sample of world stock markets (USA, Japan and Germany) were added into the model to fully determined whether African stock markets are segmented. The long run relationship between African stock markets and the rest of the world was established signifying that the markets are integrated with the world, and any innovations in the world markets are translated into African stock markets (as evidenced in the impulse response results. Also results form African markets show that, arbitrage profits are possible between African stock markets and the world stock markets. Although minor relationships are evidenced, African stock markets are still segmented from each other and a bit inclined to the rest of the world. This may be due to institutional frameworks from the different stock markets as discussed by Alagidede, (2008). The next section of the study focuses on the summary, conclusion, policy implications and limitations of the study as well as the area for further study.

CHAPTER SIX

SUMMARY, AND CONCLUSION, POLICY IMPLICATIONS AND LIMITATIONS OF THE STUDY AND AREA OF FURTHER STUDY

6.1 Summary

The study has attempted to answer most of the questions about the level of integration within the African stock markets. Trends and the overall characteristics of the African stock markets were explored in detail. Of importance on the trends and development of the African stock markets is that, considerable improvements can be noted and appreciated as more and more stock markets have and are being established. Market performance has grown as well, thanks to the trade liberalisation efforts from the concerned authorities. However, as much as the positive is evidenced, African stock markets are still illiquid, lack economies of scale and segmented. Markets such as the JSE are the African giants and perform considerably well compared to the world and regional stock ma

External investors find it hard to invest in African stock markets, except for the JSE, due to the illiquidity of the markets and the political ups and downs. Financial theories supporting integration between stock markets including, the CAPM, APT, LOOP and Markowitz portfolio diversification theory have been explored in detail. Based on these theories, well integrated stocks markets are characterised by the law of one price, and any lack of integration suggests portfolio diversification and arbitrage opportunities. Further empirical literature, has shown the advantages and disadvantages of stock market integration and few studies have been conducted in the case of Africa. Little or few studies link African stock markets with the rest of the world, more of the studies focus on the JSE and the world economy as it is the best performing market in Africa. However, organisations such as the ASEA (African securities Exchange Association), are trying all they can to ensure the development of more African stock markets and improve the competitiveness of the already existing ones.

Empirical results reveal that there is a single cointegration relationship in the series. The Vector error correction model was estimated and the short run positive relationship was noted between the JSE and BSE. Also the VAR Granger causality/Wald Exogeinity test revealed that African stock markets are still not fully integrated. These results concur with Alagidede, (2008), Agyei-Ampomah (2011) and Adebola & dahalan (2012). However, results show that arbitrage opportunities exist between the African stock markets. The variance decomposition and impulse response results reveal that the JSE index has much influence on the BSE index, but the markets are still segmented from each other, mainly because of the difference in operational capacity and efficiency in the markets. Nonetheless much is being done in the BSE as a growing market to harmonise all its trades with the African stock market giant.

Also a weak stochastic trend is evidenced between African stock markets and the rest of the world, except for the JSE as evidenced by the impulse response results. Further, obtained results show that African stock markets are not interlinked and they are not affected by world events as the well-established world stock markets. The weak link may be due to limited co-operation between Africa and the rest of the [illegible] through international trade. The study further notes that another possible cause of lack of integration between the African stock markets is the use of different currencies, and hence arbitrage profits emerge from exchange differentials. Thus exchange differential should be eliminated to achieve the law of one price within African stock markets. The null hypothesis that African stock markets are integrated, is somewhat rejected as the level and rate of integration is still weak, and at infancy.

6.2 Conclusion

A valuable analysis and scrutiny on the growth development, and performance of the selected African stock markets performed in this study show that, although segmented and illiquid African stock markets are improving, developing and growing. More information however on the performance of African stock markets is scanty, raising the need for such information to be made available for more valuable research. Although the main aim of the study is to investigate the long run relationship between African stock markets, world stock markets were included in the investigation in order to obtain proper relations portrayed by these African stock markets. Thus evidence show that the markets are still apart from each other and segmented from the rest of the world.

6.3 Policy Implications

Stock markets or financial markets play a vital role in the armament of financial resources for long term investment through financial intermediation. They also help to brace corporate financial structure and improve the general solvency of the financial system. Of the explored five African stock markets, the mediation of the markets is but to a lesser extent, hence a need for policy makers to focus much more on ensuring the success and growth of these markets. However, the relevant policy makers are faced with the challenges faced by the different African economies, such as political instability, civil wars and natural disasters which hinder foreign investments.

Obtained results further imply that African stock markets are still segmented, although there are considerable linkages within the markets. As in Agyei-Ampomah (2011), this therefore suggest that investors should also consider investing in other African countries as they offer opportunities rather than considering investing in the international markets only.

6.4Limitations and Area of Further Study

Having explored the dynamic relationship between the five African stock markets, obtained results prove that the markets are still segmented and more efforts need to be done to bring the markets into harmony and for the African stock markets to enjoy the economies of scale. Howbeit, more study needs to be done in which all the African stock markets are incorporated for policy makers to make more valuable strategic measures into ensuring stock market integration and participation in Africa.

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Appendixes

Appendix1

Date: 11/11/13 Time: 18:29
Sample (adjusted): 2000M04 2008M09
Included observations: 102 after adjustments
Trend assumption: No deterministic trend (restricted constant)
Series: LSA LBOTSWANA LMAURITIUS LNAMIBIA LNIGERIA DUM
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.310195	112.7556	103.8473	0.0113
At most 1	0.220101	74.87823	76.9727	0.0714
At most 2	0.187938	49.52203	54.07905	0.1199
At most 3	0.125007	28.28783	35.19275	0.2287
At most 4	0.089149	14.66686	20.26184	0.2461
At most 5	0.049167	5.142510	9.164546	0.2682

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**

None*	0.310195	47.87738	40.95680	0.0167
At most 1	0.220101	25.35620	34.80587	0.4222
At most 2	0.187938	21.23420	28.58808	0.3236
At most 3	0.125007	13.62097	22.29962	0.4972
At most 4	0.089149	9.524351	15.89210	0.3797
At most 5	0.049167	5.142510	9.164546	0.2682

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LSA	LBOTSWANA	LMAURITIUS	LNAMIBIA	LNIGERIA	DUM	C
2.358493	-2.709264	0.189974	-0.785979	-0.982984	2.316925	2.750361
5.451310	-5.926151	1.511833	-0.503618	1.005800	-4.141119	-20.87167
5.820754	-7.349294	-1.365489	-2.077861	7.748746	1.068300	-29.57978
1.596078	-0.759007	-4.559902	-1.45760	2.505844	-0.151832	-16.42583

Unrestricted Adjustment Coefficients (alpha):

D(LSA)	-0.006769	0.008995	-0.004631	-2.34E-05	0.001995	-0.010213
D(LBOTSWANA)	-0.001414	0.007782	0.009338	0.000119	-0.003279	-0.000153
D(LMAURITIUS)	-0.009479	0.001795	-0.005689	0.009123	-0.002520	0.001552
D(LNAMIBIA)	-0.010511	-0.006264	0.001527	-0.000552	-0.001732	-0.000735
D(LNIGERIA)	-0.008894	0.009591	-0.011779	-0.009775	-0.007105	0.001554
D(DUM)	-0.022367	0.008539	0.000175	-0.005334	0.022230	0.008753

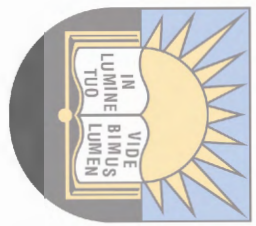
1 Cointegrating Equation(s): Log likelihood 1075.205

Normalized cointegrating coefficients (standard error in parentheses)

LSA	LBOTSWANA	LMAURITIUS	LNAMIBIA	LNIGERIA	DUM	C
1.000000	-1.148727	0.080549	0.333255	-0.416785	0.982375	1.166151
	(0.45858)	(0.49347)	(0.72988)	(0.61714)	(0.38604)	(1.65210)

Adjustment coefficients (standard error in parentheses)

D(LSA)	-0.015965
	(0.01269)
D(LBOTSWANA)	-0.003335
	(0.00712)
D(LMAURITIUS)	-0.022356
	(0.00829)
D(LNAMIBIA)	-0.024791
	(0.00532)
D(LNIGERIA)	-0.020977
	(0.01260)
D(DUM)	-0.052752
	(0.02266)



2 Cointegrating Equation(s): Log likelihood 1087.884

Normalized cointegrating coefficients (standard error in parentheses)

LSA	LBOTSWANA	LMAURITIUS	LNAMIBIA	LNIGERIA	DUM	C
1.000000	0.000000	3.748984	-7.601454	10.79239	-31.49230	-91.94795
		(8.23431)	(12.5370)	(9.16389)	(7.49435)	(32.5236)
0.000000	1.000000	3.193479	-6.907395	9.757912	-28.27015	-81.05853
		(7.47508)	(11.3810)	(8.31895)	(6.80335)	(29.5248)

Adjustment coefficients (standard error in parentheses)

D(LSA)	0.033071	-0.034968
	(0.03148)	(0.03454)
D(LBOTSWANA)	0.039084	-0.042283
	(0.01728)	(0.01896)
D(LMAURITIUS)	-0.012570	0.015042
	(0.02084)	(0.02286)
D(LNAMIBIA)	-0.058937	0.065598
	(0.01284)	(0.01409)
D(LNIGERIA)	0.031307	-0.032741
	(0.03119)	(0.03422)
D(DUM)	-0.006203	0.009994
	(0.05684)	(0.06236)

3 Cointegrating Equation(s): Log likelihood 1098.501

Normalized cointegrating coefficients (standard error in parentheses)

LSA	LBOTSWANA	LMAURITIUS	LNAMIBIA	LNIGERIA	DUM	C
1.000000	0.000000	0.000000	172.8828	-210.1335	278.9810	1104.052
			(129.441)	(89.7633)	(73.3979)	(347.729)
0.000000	1.000000	0.000000	146.8337	-178.4323	236.1989	937.7242
			(109.563)	(75.9789)	(62.1267)	(294.330)
0.000000	0.000000	1.000000	-48.14219	58.92954	-82.81534	-319.0197
			(37.6368)	(26.1000)	(21.3415)	(101.107)

Adjustment coefficients (standard error in parentheses)

D(LSA)	0.006117	-0.000936	0.018637
	(0.04390)	(0.05185)	(0.01080)
D(LBOTSWANA)	0.093437	-0.110909	-0.001255
	(0.02285)	(0.02698)	(0.00562)
D(LMAURITIUS)	-0.045686	0.056855	0.008682
	(0.02877)	(0.03398)	(0.00708)
D(LNAMIBIA)	-0.050047	0.054373	-0.013552
	(0.01794)	(0.02118)	(0.00441)
D(LNIGERIA)	-0.037254	0.053824	0.028894
	(0.04250)	(0.05019)	(0.01046)
D(DUM)	-0.005187	0.008711	0.008422
	(0.07958)	(0.09399)	(0.01958)

4 Cointegrating Equation(s): Log likelihood 1105.311

Normalized cointegrating coefficients (standard error in parentheses)

LSA	LBOTSWANA	LMAURITIUS	LNAMIBIA	LNIGERIA	DUM	C
1.000000	0.000000	0.000000	0.000000	3.358304	-12.71808	-38.46553
				(1.02757)	(2.65790)	(9.92678)
0.000000	1.000000	0.000000	0.000000	2.891546	-11.54842	-32.64406
				(0.94779)	(2.45154)	(9.15606)
0.000000	0.000000	1.000000	0.000000	-0.520914	-1.586712	-0.866178
				(0.13774)	(0.35629)	(1.33067)
0.000000	0.000000	0.000000	1.000000	-1.234893	1.687265	6.608621
				(0.16697)	(0.43188)	(1.61299)

Adjustment coefficients (standard error in parentheses)

D(LSA)	0.006080	-0.000918	0.018743	0.022867
	(0.04470)	(0.05201)	(0.02638)	(0.03986)
D(LBOTSWANA)	0.093627	-0.110999	-0.001799	-0.070828
	(0.02326)	(0.02706)	(0.01373)	(0.02074)
D(LMAURITIUS)	-0.031125	0.049931	-0.032920	0.054336

	(0.02820)	(0.03281)	(0.01665)	(0.02515)
D(LNAMIBIA)	-0.050928	0.054793	-0.011034	-0.017275
	(0.01826)	(0.02124)	(0.01078)	(0.01628)
D(LNIGERIA)	-0.052855	0.061243	0.073465	0.047524
	(0.04243)	(0.04937)	(0.02505)	(0.03784)
D(DUM)	-0.013701	0.012760	0.032746	-0.036225
	(0.08090)	(0.09412)	(0.04775)	(0.07214)

5 Cointegrating Equation(s): Log likelihood 1110.073

Normalized cointegrating coefficients (standard error in parentheses)

LSA	LBOTSWANA	LMAURITIUS	LNAMIBIA	LNIGERIA	DUM	C
1.000000	0.000000	0.000000	0.000000	0.000000	-3.464978	-7.974210
					(0.78816)	(0.26827)
0.000000	1.000000	0.000000	0.000000	0.000000	-3.581370	-6.390612
					(0.80958)	(0.27556)
0.000000	0.000000	1.000000	0.000000	0.000000	-3.021980	-5.595753
					(0.48131)	(0.16382)
0.000000	0.000000	0.000000	1.000000	0.000000	-1.715223	-4.603441
					(0.39417)	(0.13417)
0.000000	0.000000	0.000000	0.000000	1.000000	-2.755290	-9.079380
					(0.49950)	(0.17002)

Adjustment coefficients (standard error in parentheses)

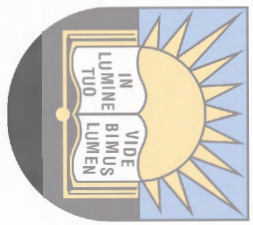
D(LSA)	-0.003451	-0.000736	0.032839	0.012561	-0.015852
	(0.05129)	(0.05197)	(0.04565)	(0.04826)	(0.04511)
D(LBOTSWANA)	0.109288	-0.111299	-0.024960	-0.053894	0.074663
	(0.02651)	(0.02686)	(0.02359)	(0.02494)	(0.02332)
D(LMAURITIUS)	-0.019089	0.049700	-0.050720	0.067350	-0.015640
	(0.03228)	(0.03271)	(0.02873)	(0.03038)	(0.02840)
D(LNAMIBIA)	-0.042656	0.054634	-0.023268	-0.008330	0.010677
	(0.02089)	(0.02117)	(0.01859)	(0.01965)	(0.01837)

D(LNIGERIA)	-0.018916	0.060592	0.023271	0.084222	-0.112993
	(0.04820)	(0.04884)	(0.04290)	(0.04535)	(0.04240)
D(DUM)	-0.119880	0.014795	0.189781	-0.151037	0.067426
	(0.09020)	(0.09140)	(0.08029)	(0.08487)	(0.07934)

Appendix 2

Vector Error Correction Estimates
Date: 11/11/13 Time: 18:28
Sample (adjusted): 2000M04 2008M09
Included observations: 102 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
LSA(-1)	1.000000
LBOTSWANA(-1)	-1.166689 (0.20662) [-5.64646]
LMAURITIUS(-1)	0.056124 (0.22235) [0.25242]
LNAMIBIA(-1)	-0.433565 (0.32887) [-1.31836]
LNIGERIA(-1)	0.376489 (0.27807) [1.35395]
DUM(-1)	0.240025 (0.17394) [4.37992]
C	-2.133859

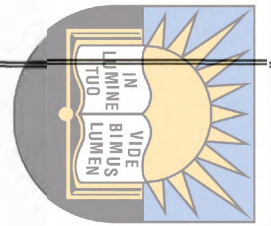


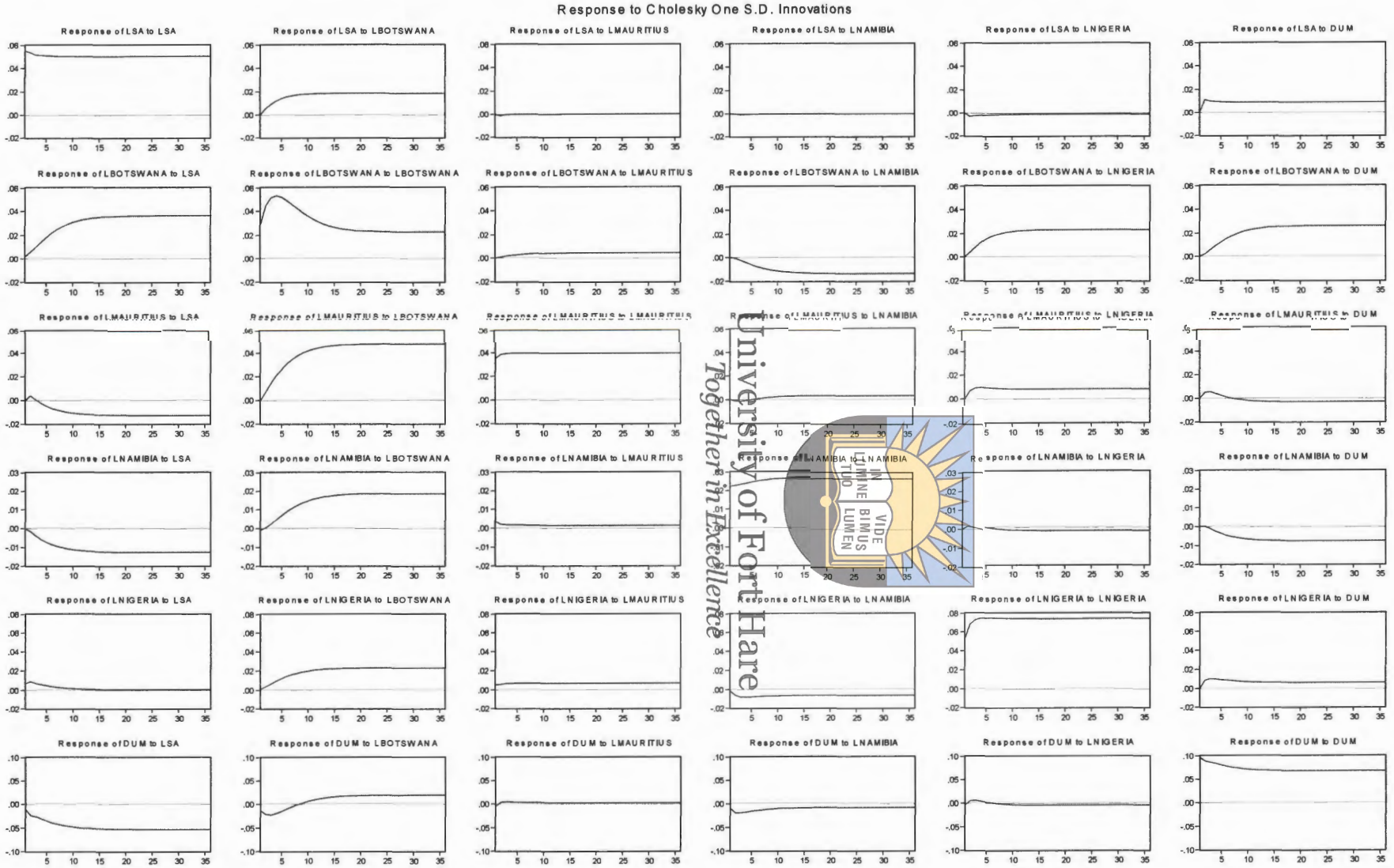
	(0.03510)	(0.01868)	(0.02243)	(0.01449)	(0.03459)	(0.06317)
	[-0.73701]	[2.65334]	[-3.28938]	[-3.10378]	[-0.89380]	[-1.35981]
D(LSA(-1))	0.030578	-0.006874	0.134926	0.016081	0.045480	-0.162954
	(0.10852)	(0.05776)	(0.06936)	(0.04481)	(0.10694)	(0.19531)
	[0.28178]	[-0.11901]	[1.94537]	[0.35885]	[0.42527]	[-0.83434]
D(LBOTSWANA(-1))	0.220137	0.596501	0.161282	-0.009788	0.088198	-0.410520
	(0.15388)	(0.08191)	(0.09836)	(0.06355)	(0.15166)	(0.27697)
	[1.43053]	[7.28227]	[1.63980]	[-0.15402]	[0.58157]	[-1.48220]
D(LMAURITIUS(-1))	-0.013340	0.015628	0.090856	-0.046805	-0.013033	0.262624
	(0.15460)	(0.08229)	(0.09881)	(0.06384)	(0.15236)	(0.27825)
	[-0.08629]	[0.18991]	[0.91950]	[-0.73313]	[-0.08554]	[0.94385]
D(LNAMIBIA(-1))	0.030099	0.003632	-0.044227	0.006577	-0.144140	-0.478742
	(0.24330)	(0.12951)	(0.15550)	(0.10047)	(0.23978)	(0.43790)
	[0.12371]	[0.02804]	[-0.28441]	[0.06544]	[-0.60115]	[-1.09327]
D(LNIGERIA(-1))	-0.038647	0.057000	0.156430	0.046633	0.303255	0.185106
	(0.10224)	(0.05442)	(0.06535)	(0.04222)	(0.10076)	(0.18402)
	[-0.37800]	[1.04738]	[2.39384]	[1.10448]	[3.00967]	[1.00592]
D(DUM(-1))	0.125176	0.011405	0.069212	0.012270	0.097372	-0.057571
	(0.05681)	(0.03024)	(0.03631)	(0.02346)	(0.05599)	(0.10225)
	[2.20348]	[0.37715]	[1.90620]	[0.52304]	[1.73923]	[-0.56307]
C	0.006096	0.005451	0.004494	0.012703	0.013091	0.018376
	(0.00732)	(0.00390)	(0.00468)	(0.00302)	(0.00721)	(0.01318)
	[0.83270]	[1.39889]	[0.96042]	[4.20194]	[1.81448]	[1.39462]
R-squared	0.066051	0.419466	0.240675	0.107091	0.126795	0.077918

Adj. R-squared	-0.003499	0.376235	0.184129	0.040598	0.061769	0.009252
Sum sq. resids	0.281856	0.079859	0.115141	0.048067	0.273752	0.913042
S.E. equation	0.054758	0.029147	0.034999	0.022613	0.053965	0.098556
F-statistic	0.949697	9.702847	4.256301	1.610551	1.949920	1.134741
Log likelihood	155.7262	220.0439	201.3834	245.9348	157.2141	95.78152
Akaike AIC	-2.896593	-4.157724	-3.791831	-4.665389	-2.925767	-1.721206
Schwarz SC	-2.690712	-3.951844	-3.585951	-4.459509	-2.719886	-1.515326
Mean dependent	0.010756	0.016697	0.013276	0.013264	0.020071	0.009804
S.D. dependent	0.054663	0.036905	0.038747	0.023087	0.055713	0.099015

Determinant resid covariance (dof adj.)	4.05E-17
Determinant resid covariance	2.48E-17
Log likelihood	1081.566
Akaike information criterion	-20.14836
Schwarz criterion	-18.75866

Appendix3





Appendix 4

VEC Granger Causality/Block Exogeneity Wald Tests

Date: 11/11/13 Time: 23:44

Sample: 2000M02 2012M08

Included observations: 102

Dependent variable: D(LSA)

Excluded	Chi-sq	df	Prob.
D(LBOTSWANA)	2.046425	1	0.1526
D(LMAURITIUS)	0.007446	1	0.9312
D(LNAMIBIA)	0.015304	1	0.9015
D(LNIGERIA)	0.142886	1	0.7054
D(DUM)	4.855308	1	0.0276
All	5.979878	5	0.3082

Dependent variable: D(LBOTSWANA)

Excluded	Chi-sq	df	Prob.
D(LSA)	0.014164	1	0.9053
D(LMAURITIUS)	0.036065	1	0.8494
D(LNAMIBIA)	0.000786	1	0.9776
D(LNIGERIA)	1.097007	1	0.2949

D(DUM)	0.142245	1	0.7061
All	1.454969	5	0.9182

Dependent variable: D(LMAURITIUS)

Excluded	Chi-sq	df	Prob.
D(LSA)	3.784468	1	0.0517
D(LBOTSWANA)	2.688929	1	0.1010
D(LNAMIBIA)	0.080890	1	0.7761
D(LNIGERIA)	5.730464	1	0.0167
D(DUM)	3.633585	1	0.0566
All	16.15849	5	0.0064

Dependent variable: D(LNAMIBIA)

Excluded	Chi-sq	df	Prob.
D(LSA)	0.128776	1	0.7197
D(LBOTSWANA)	0.023724	1	0.8776
D(LMAURITIUS)	0.537480	1	0.4635
D(LNIGERIA)	1.219885	1	0.2694
D(DUM)	0.273574	1	0.6009
All	1.913947	5	0.8609

Dependent variable: D(LNIGERIA)

Excluded	Chi-sq	df	Prob.
D(LSA)	0.180858	1	0.6706
D(LBOTSWANA)	0.338221	1	0.5609
D(LMAURITIUS)	0.007317	1	0.9318
D(LNAMIBIA)	0.361376	1	0.5477
D(DUM)	3.024935	1	0.0820
All	3.713975	5	0.5913

Dependent variable: D(DUM)

Excluded	Chi-sq	df	Prob.
D(LSA)	0.696119	1	0.4041
D(LBOTSWANA)	2.196919	1	0.1383
D(LMAURITIUS)	0.890849	1	0.3452
D(LNAMIBIA)	1.195245	1	0.2743
D(LNIGERIA)	1.011880	1	0.3145
All	5.521386	5	0.3556

Appendix 5

VEC Residual Heteroskedasticity Tests: No Cross Terms (only levels and squares)

Date: 11/11/13 Time: 23:46

Sample: 2000M02 2012M08

Included observations: 102

Joint test:

Chi-sq	df	Prob.
299.0026	273	0.1340

Individual components:

Dependent	R-squared	F(13,88)	Prob.	Chi-sq(13)	Prob.
res1*res1	0.188716	1.574622	0.1079	19.24907	0.1156
res2*res2	0.064749	0.468647	0.9365	6.604425	0.9214
res3*res3	0.341219	3.506151	0.0002	34.80429	0.0009
res4*res4	0.122175	0.942135	0.5140	12.46183	0.4902
res5*res5	0.153777	1.230118	0.2722	15.68528	0.2665
res6*res6	0.092310	0.688417	0.7696	9.415638	0.7409
res2*res1	0.200675	1.699450	0.0749	20.46882	0.0841
res3*res1	0.097100	0.727977	0.7312	9.904176	0.7018
res3*res2	0.090352	0.672364	0.7847	9.215916	0.7564
res4*res1	0.085835	0.635590	0.8179	8.755135	0.7912
res4*res2	0.160180	1.291107	0.2336	16.33839	0.2313
res4*res3	0.050092	0.356967	0.9793	5.109404	0.9727
res5*res1	0.172994	1.415994	0.1681	17.64538	0.1715
res5*res2	0.136387	1.069036	0.3961	13.91146	0.3801
res5*res3	0.113399	0.865804	0.5909	11.56667	0.5635
res5*res4	0.120561	0.927981	0.5281	12.29719	0.5034

res6*res1	0.045055	0.319378	0.9875	4.595623	0.9831
res6*res2	0.077747	0.570656	0.8711	7.930216	0.8481
res6*res3	0.178550	1.471356	0.1444	18.21209	0.1496
res6*res4	0.077967	0.572401	0.8698	7.952584	0.8467
res6*res5	0.063009	0.455207	0.9433	6.426956	0.9292

Appendix 6

VEC Residual Normality Tests

Orthogonalization: Cholesky (Lutkepohl)

Null Hypothesis: residuals are multivariate normal

Date: 01/10/14 Time: 15:41

Sample: 2000M02 2008M09

Included observations: 96

Component	Skewness	Chi-sq	df	Prob.
1	0.348432	1.942478	1	0.1634
2	0.571636	0.228284	1	0.1222
3	0.546232	1.773905	1	0.3289
4	-0.278689	1.242682	1	0.2650
5	0.159675	0.407937	1	0.5230
Joint		13.59529	5	0.4184

Component	Kurtosis	Chi-sq	df	Prob.
1	3.826940	2.735321	1	0.4982
2	4.274006	6.492366	1	0.2108
3	3.774280	2.398041	1	0.1215
4	3.488943	0.956260	1	0.3281
5	2.819795	0.129896	1	0.7185
Joint		12.71188	5	0.2262

Component	Jarque-Bera	df	Prob.
1	1.677799	2	0.5964
2	0.720655	2	0.2529
3	2.171946	2	0.2277

4	2.198942	2	0.3330
5	0.537832	2	0.7642
Joint	26.30717	10	0.6533

Appendix 7

VEC Residual Serial Correlation

LM Tests

Null Hypothesis: no serial correlation at lag order h

Date: 11/11/13 Time: 23:46

Sample: 2000M02 2012M08

Included observations: 102

Lags	LM-Stat	Prob
1	29.16867	0.7830
2	32.80324	0.6214
3	27.70089	0.8377
4	42.04692	0.2255
5	29.77051	0.7585
6	27.42401	0.8471
7	47.44739	0.0960
8	46.92409	0.1051
9	42.10139	0.2237
10	30.93513	0.7081
11	19.60731	0.9881
12	48.23816	0.0835

Probs from chi-square with 36 df.

Appendix 8

Date: 11/11/13 Time: 18:33

Sample (adjusted): 2000M04 2008M09

Included observations: 102 after adjustments

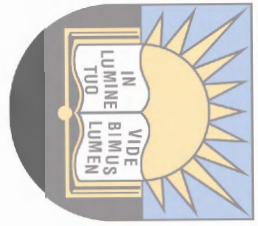
Trend assumption: No deterministic trend (restricted constant)

Series: LSA LBOTSWANA LMAURITIUS LNAMIBIA LNIGERIA DUM LGERMAN LJAPAN LUSA

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.473080	271.0225	208.4374	0.0000
At most 1 *	0.420803	205.6704	169.5991	0.0002
At most 2	0.331120	129.9669	134.6780	0.0046
At most 3	0.252052	102.9476	103.8473	0.0220
At most 4	0.214115	75.32454	76.97277	0.0327
At most 5	0.195069	54.74816	54.87904	0.0435
At most 6	0.151149	32.61429	35.19275	0.0925
At most 7	0.096354	15.89937	20.26184	0.1791



At most 8	0.053096	5.564917	9.164546	0.2271

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

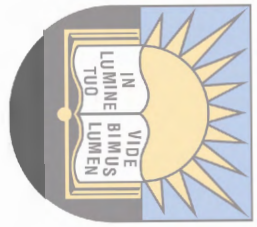
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.473080	65.35212	59.24000	0.0112
At most 1 *	0.420803	55.70347	53.18784	0.0271
At most 2	0.331120	41.01934	47.07897	0.1922
At most 3	0.252052	29.62305	40.95680	0.5073
At most 4	0.214115	24.57638	34.80587	0.4786
At most 5	0.195069	22.13387	28.58808	0.2671
At most 6	0.151149	16.71492	22.29962	0.2504
At most 7	0.096354	10.33445	15.89210	0.3049
At most 8	0.053096	5.564917	9.164546	0.2271

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level



**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LSA	LBOTSWANA	LMAURITIUS	LNAMIBIA	LNIGERIA	DUM	LGERMAN	LJAPAN	LUSA	C
-7.368323	-1.099620	7.865054	3.801035	-1.779519	-3.699710	17.67943	3.455159	-37.48081	109.5873
5.538063	-3.548170	4.672319	-4.795318	-1.075525	0.660840	-11.55136	-0.503930	14.87955	-24.18370
6.518700	-9.194015	8.174204	-2.764916	1.109483	[illegible].035486	8.749923	-11.90760	-7.140730	50.60518
-0.091042	-2.524650	-6.543375	4.477100	3.169072	[illegible].329117	11.85588	-0.481386	-14.00865	12.99858
-3.891048	6.137949	-8.728261	9.588217	-4.053928	[illegible].108394	0.518019	0.227075	12.83693	-59.67046
5.707512	-3.973008	-1.136471	-9.342116	5.055647	[illegible].12[illegible]82	-13.30442	8.796543	13.98578	-88.44426
-6.063637	4.400689	2.280959	-2.914755	0.320479	[illegible].8[illegible]097	[illegible].740224	-0.638786	8.504024	-21.37476
-5.180515	2.687997	-7.757286	5.348557	4.042850	[illegible].42[illegible]86	4.619976	7.158401	-6.483098	-48.87320
-4.597554	-1.995192	0.837006	-1.120245	4.312249	[illegible].080647	1.361578	-1.166277	1.581128	5.375351

Unrestricted Adjustment Coefficients (alpha):

D(LSA)	-0.003755	-0.004750	0.002852	-0.010084	0.004953	0.005176	-0.003774	-0.001822	0.009357
D(LBOTSWANA)	-0.000143	-0.002055	0.005888	0.003261	-0.004489	0.008818	-0.005326	0.000549	-0.000496
D(LMAURIT	-0.010490	-0.003296	-0.003222	-0.008815	0.001161	-0.002564	-0.003892	0.006316	-0.002038

IUS)									
D(LNAMIBIA)	-0.005567	-0.008021	-0.005041	-0.004249	-0.005577	0.000853	0.002680	-0.001134	-4.08E-05
D(LNIGERIA)	0.002843	-0.006810	0.003026	-0.014124	0.008580	0.001820	-0.006304	-0.008900	-0.004410
D(DUM)	0.018044	-0.022429	0.035824	-0.008180	-0.005407	-0.016194	0.012804	0.005841	-0.002318
D(LGERMAN)	-0.005379	0.021860	0.000495	-0.019862	0.008501	0.006030	-0.000680	-0.005060	0.006011
D(LJAPAN)	-0.013994	0.007986	0.002592	-0.002662	0.001472	-0.006590	-0.010559	-0.005319	0.006065
D(LUSA)	0.010167	0.000878	-0.004726	-0.001571	0.002613	-0.001836	-0.002017	0.000489	0.000240

1 Cointegrating Equation(s):	Log likelihood	1704.436

Normalized cointegrating coefficients (standard error in parentheses)

LSA	LBOTSWANA	LMAURITIUS	LNAMIBIA	LNIGERIA	DUM	LGERMAN	LJAPAN	LUSA	C
1.000000	0.149236	-1.067414	-0.515862	0.241509	0.502110	-2.399383	-0.468921	5.086750	-14.87276
	(0.15174)	(0.26617)	(0.22581)	(0.15386)	(0.14369)	(0.38147)	(0.23953)	(0.66158)	(2.52266)

Adjustment coefficients (standard error in parentheses)

D(LSA)	0.027670
	(0.03862)
D(LBOTSWANA)	0.001054
	(0.02233)
D(LMAURITIUS)	0.077291
	(0.02571)
D(LNAMIBIA)	0.041016
	(0.01794)
D(LNIGERIA)	-0.020948
	(0.04029)
D(DUM)	-0.132955
	(0.07174)
D(LGERMAN)	0.039637
	(0.04983)
D(LJAPAN)	0.103109
	(0.03744)

D(LUSA)	-0.074916
	(0.01271)

2 Cointegrating Equation(s): Log likelihood 1732.288

Normalized cointegrating coefficients (standard error in parentheses)

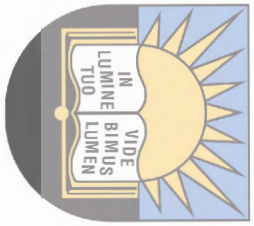
LSA	LBOTSWANA	LMAURITIUS	LNAMIBIA	LNIGERIA	.DUM	LGERMAN	LJAPAN	LUSA	C
1.000000	0.000000	-0.706363	-0.581989	0.159192	0.429793	-2.340142	-0.397521	4.633336	-12.88792
		(0.18712)	(0.19082)	(0.12050)	(0.09590)	(0.25138)	(0.19731)	(0.40965)	(1.67292)
0.000000	1.000000	-2.419332	0.443109	0.551591	0.4 582	-0.396963	-0.478434	3.038230	-13.29994
		(0.49300)	(0.50275)	(0.31748)	0.2 66)	(0.66229)	(0.51985)	(1.07930)	(4.40760)

Adjustment coefficients (standard error in parentheses)

D(LSA)	0.001365	0.020982
	(0.04809)	(0.01938)
D(LBOTSWANA)	-0.010325	0.007447
	(0.02787)	(0.01123)
D(LMAURIT	0.059039	0.023228

IUS)		
	(0.03201)	(0.01290)
D(LNAMIBI		
A)	-0.003403	0.034580
	(0.02108)	(0.00850)
D(LNIGERIA		
)	-0.058660	0.021036
	(0.04997)	(0.02014)
D(DUM)	-0.257169	0.059741
	(0.08711)	(0.03511)
D(LGERMA		
N)	0.160700	-0.071648
	(0.05868)	(0.02365)
D(LJAPAN)	0.147335	-0.012948
	(0.04620)	(0.01862)
D(LUSA)	-0.070056	-0.014294
	(0.01588)	(0.00640)

3 Cointegrating Equation(s):	Log likelihood	1752.797



Normalized cointegrating coefficients (standard error in parentheses)

LSA	LBOTSWAN A	LMAURITIU S	LNAMIBIA	LNIGERIA	DUM	LGERMAN	LJAPAN	LUSA	C
1.000000	0.000000	0.000000	-0.962825	-0.224648	0.831457	-3.859272	0.626059	5.335663	-13.80872
			(0.37288)	(0.22507)	(0.17492)	(0.54349)	(0.41190)	(0.89883)	(3.02914)
0.000000	1.000000	0.000000	-0.861276	-0.763082	1.860303	-5.600068	3.027384	5.443739	-16.45373
			(0.77948)	(0.47049)	(0.36565)	(1.13611)	(0.86105)	(1.87892)	(6.33214)
0.000000	0.000000	1.000000	-0.539151	-0.543404	0.568637	-2.150637	1.449085	0.994287	-1.303580
			(0.46795)	(0.28245)	(0.21952)	(0.68206)	(0.51692)	(1.12800)	(3.80147)

Adjustment coefficients (standard error in parentheses)

D(LSA)	0.019954	-0.005235	-0.028418
	(0.05881)	(0.05165)	(0.06390)
D(LBOTSWANA)	0.028058	-0.046688	0.037407
	(0.03342)	(0.02935)	(0.03632)
D(LMAURITIUS)	0.038033	0.052855	-0.124240
	(0.03902)	(0.03428)	(0.04241)
D(LNAMIBIA)	-0.036263	0.080927	-0.122463

	(0.02513)	(0.02207)	(0.02731)
D(LNIGERIA)	-0.038934	-0.006786	0.015278
	(0.06110)	(0.05367)	(0.06640)
D(DUM)	-0.023640	-0.269629	0.329957
	(0.09801)	(0.08609)	(0.10651)
D(LGERMAN)	0.163924	-0.076196	0.063871
	(0.07187)	(0.06313)	(0.07810)
D(LJAPAN)	0.164232	-0.036779	-0.051559
	(0.05650)	(0.04963)	(0.06140)
D(LUSA)	-0.100861	0.029154	0.045439
	(0.01864)	(0.01637)	(0.02025)

4 Cointegrating Equation(s):	Log likelihood	1767.609

Normalized cointegrating coefficients (standard error in parentheses)

LSA	LBOTSWANA	LMAURITIUS	LNAMIBIA	LNIGERIA	DUM	LGERMAN	LJAPAN	LUSA	C
1.000000	0.000000	0.000000	0.000000	1.486785	-7.838861	8.392836	-11.62201	0.402406	14.30091

				(0.65554)	(1.69421)	(4.00153)	(3.65822)	(7.96191)	(22.2387)
0.000000	1.000000	0.000000	0.000000	0.767845	-5.895551	5.359804	-7.928878	1.030796	8.691165
				(0.51650)	(1.33487)	(3.15280)	(2.88231)	(6.27318)	(17.5218)
0.000000	0.000000	1.000000	0.000000	0.414943	-4.286457	4.710142	-5.409434	-1.768175	14.43689
				(0.32539)	(0.84096)	(1.98624)	(1.81583)	(3.95206)	(11.0386)
0.000000	0.000000	0.000000	1.000000	1.777512	-9.005080	12.72516	-12.72097	-5.123730	29.19495
				(0.73541)	(1.90062)	(4.48903)	(4.10390)	(8.93191)	(24.9480)

Adjustment coefficients (standard error in parentheses)

D(LSA)	0.020872	0.020224	0.037568	-0.044531
	(0.05760)	(0.05220)	(0.07094)	(0.04117)
D(LBOTSWANA)	0.027761	-0.054920	0.016072	0.007627
	(0.03320)	(0.03009)	(0.04089)	(0.02373)
D(LMAURITIUS)	0.038836	0.075108	-0.066563	-0.054621
	(0.03762)	(0.03410)	(0.04633)	(0.02689)
D(LNAMIBIA)	-0.035877	0.091653	-0.094662	0.012219
	(0.02463)	(0.02232)	(0.03033)	(0.01761)
D(LNIGERIA	-0.037648	0.028872	0.107695	-0.028140

	(0.05880)	(0.05329)	(0.07241)	(0.04203)
D(DUM)	-0.022896	-0.248978	0.383481	0.040468
	(0.09754)	(0.08840)	(0.12013)	(0.06973)
D(LGERMAN)	0.165733	-0.026050	0.193838	-0.215567
	(0.06797)	(0.06160)	(0.08370)	(0.04858)
D(LJAPAN)	0.164474	-0.030059	-0.034141	-0.110569
	(0.05642)	(0.05113)	(0.06948)	(0.04033)
D(LUSA)	-0.100718	0.033120	0.055719	0.040470
	(0.01855)	(0.01681)	(0.02284)	(0.01326)

5 Cointegrating Equation(s):	Log likelihood	1779.897	

Normalized cointegrating coefficients (standard error in parentheses)

LSA	LBOTSWANA	LMAURITIUS	LNAMIBIA	LNIGERIA	DUM	LGERMAN	LJAPAN	LUSA	C
1.000000	0.000000	0.000000	0.000000	0.000000	-2.697500	1.085129	-4.513237	4.188441	-4.850336
					(0.46707)	(1.27209)	(1.23553)	(2.60805)	(7.49580)
0.000000	1.000000	0.000000	0.000000	0.000000	-3.240313	1.585763	-4.257574	2.986081	-1.199431

					(0.60895)	(1.65850)	(1.61083)	(3.40026)	(9.77271)
0.000000	0.000000	1.000000	0.000000	0.000000	-2.851569	2.670654	-3.425465	-0.711541	9.092025
					(0.42512)	(1.15785)	(1.12457)	(2.37383)	(6.82262)
0.000000	0.000000	0.000000	1.000000	0.000000	-2.858374	3.988503	-4.222141	-0.597372	6.298859
					(0.45407)	(1.23668)	(1.20113)	(2.53544)	(7.28713)
0.000000	0.000000	0.000000	0.000000	1.000000	-3.458040	4.915108	-4.781308	-2.546458	12.88098
					(0.61310)	(1.66980)	(1.62181)	(3.42344)	(9.83932)

Adjustment coefficients (standard error in parentheses)

D(LSA)	0.001601	0.050624	-0.005660	0.002957	0.037081
	(0.06061)	(0.06056)	(0.08332)	(0.06361)	(0.02873)
D(LBOTSWANA)	0.045228	-0.082473	0.055253	-0.035415	0.015528
	(0.03467)	(0.03464)	(0.04766)	(0.03638)	(0.01643)
D(LMAURITIUS)	0.034320	0.082232	-0.076692	-0.043494	0.014003
	(0.03977)	(0.03973)	(0.05467)	(0.04173)	(0.01885)
D(LNAMIBIA)	-0.014175	0.057420	-0.045982	-0.041257	0.022085
	(0.02511)	(0.02509)	(0.03452)	(0.02635)	(0.01190)
D(LNIGERIA	-0.071033	0.081535	0.032807	0.054127	-0.073919

	(0.06127)	(0.06122)	(0.08423)	(0.06430)	(0.02904)
D(DUM)	-0.001859	-0.282163	0.430670	-0.011371	0.027756
	(0.10295)	(0.10287)	(0.14153)	(0.10805)	(0.04879)
D(LGERMAN)	0.198811	-0.078229	0.268037	-0.297077	-0.041873
	(0.07111)	(0.07105)	(0.09775)	(0.07463)	(0.03370)
D(LJAPAN)	0.170201	-0.039092	-0.021296	-0.124679	0.016719
	(0.05965)	(0.05960)	(0.08200)	(0.06260)	(0.02827)
D(LUSA)	-0.090553	0.017084	0.078522	0.015420	0.018668
	(0.01935)	(0.01933)	(0.02659)	(0.02030)	(0.00917)

6 Cointegrating Equation(s):	Log likelihood	1790.964

Normalized cointegrating coefficients (standard error in parentheses)

LSA	LBOTSWANA	LMAURITIUS	LNAMIBIA	LNIGERIA	DUM	LGERMAN	LJAPAN	LUSA	C
1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.309038	-3.987622	1.280631	16.35666
						(1.19966)	(1.15918)	(2.54323)	(7.31232)
0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.653501	-3.626191	-0.506862	24.27501

						(1.53439)	(1.48261)	(3.25284)	(9.35261)
0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	1.850236	-2.869830	-3.785432	31.51027
						(1.34652)	(1.30108)	(2.85457)	(8.20749)
0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	3.166127	-3.665180	-3.678598	28.77061
						(1.24925)	(1.20710)	(2.64836)	(7.61460)
0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	3.920204	-4.107501	-6.274103	40.06713
						(1.85838)	(1.79567)	(3.93969)	(11.3274)
0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	-0.287707	0.194852	-1.077965	7.861723
						(0.66390)	(0.64150)	(1.40745)	(4.04671)

Adjustment coefficients (standard error in parentheses)

D(LSA)	0.031141	0.030061	-0.011542	-0.045395	0.0 915	-0.021465
	(0.06680)	(0.06347)	(0.08305)	(0.07889)	(0.0 30)	(0.04616)
D(LBOTSW ANA)	0.095556	-0.117507	0.045231	-0.117793	0.082108	-0.022169
	(0.03645)	(0.03463)	(0.04532)	(0.04305)	(0.02090)	(0.02519)
D(LMAURIT IUS)	0.019687	0.092418	-0.073779	-0.019542	-0.026965	0.026968
	(0.04393)	(0.04174)	(0.05462)	(0.05188)	(0.02519)	(0.03036)
D(LNAMIBI A)	-0.009307	0.054032	-0.046951	-0.049225	0.026397	0.026665

	(0.02781)	(0.02642)	(0.03457)	(0.03284)	(0.01594)	(0.01921)
D(LNIGERIA)	-0.060646	0.074305	0.030739	0.037125	-0.064718	-0.061379
	(0.06786)	(0.06448)	(0.08437)	(0.08014)	(0.03891)	(0.04689)
D(DUM)	-0.094288	-0.217823	0.449075	0.139919	-0.054117	-0.406588
	(0.11190)	(0.10632)	(0.13912)	(0.13215)	(0.06416)	(0.07732)
D(LGERMAN)	0.233226	-0.102185	0.261185	-0.353408	0.011388	-0.040395
	(0.07837)	(0.07447)	(0.09744)	(0.09256)	(0.04494)	(0.05415)
D(LJAPAN)	0.132586	-0.012908	-0.013807	-0.063112	0.016600	0.012875
	(0.06548)	(0.06222)	(0.08141)	(0.07733)	(0.03754)	(0.04525)
D(LUSA)	-0.101031	0.024379	0.080609	0.032572	-0.027950	-0.018420
	(0.02129)	(0.02023)	(0.02647)	(0.02515)	(0.01221)	(0.01471)

7 Cointegrating Equation(s):	Log likelihood	1799.322

Normalized cointegrating coefficients (standard error in parentheses)

LSA	LBOTSWANA	LMAURITIUS	LNAMIBIA	LNIGERIA	DUM	LGERMAN	LJAPAN	LUSA	C
1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-1.560516	-2.829599	25.26241

							(1.37118)	(1.99768)	(5.59410)
0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.506241	-9.198479	43.10737
							(2.25253)	(3.28171)	(9.18978)
0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	11.66147	-28.39373	84.82975
							(4.64317)	(6.76466)	(18.9430)
0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	21.20080	-45.78837	120.0110
							(7.48952)	(10.9115)	(30.5555)
0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	26.68081	-58.41316	153.0382
							(9.51089)	(13.8565)	(38.8022)
0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	-2.064731	2.748570	-0.429333
							(0.85778)	(1.24971)	(3.49956)
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	-7.853752	13.30009	-28.81766
							(2.32065)	(3.38097)	(9.46772)

Adjustment coefficients (standard error in parentheses)

D(LSA)	0.054027	0.013451	-0.020151	-0.034394	0.012124	-0.028323	-0.165859
	(0.07325)	(0.06704)	(0.08359)	(0.08000)	(0.03822)	(0.04692)	(0.14612)
D(LBOTSW ANA)	0.127853	-0.140946	0.033082	-0.102268	0.080401	-0.031848	0.001010
	(0.03927)	(0.03594)	(0.04481)	(0.04289)	(0.02049)	(0.02515)	(0.07833)
D(LMAURIT	0.043286	0.075291	-0.082656	-0.008198	-0.028212	0.019896	-0.238595

IUS)							
	(0.04796)	(0.04389)	(0.05473)	(0.05238)	(0.02502)	(0.03072)	(0.09567)
D(LNAMIBIA)	-0.025558	0.065825	-0.040838	-0.057036	0.027255	0.031535	-0.119144
	(0.03031)	(0.02774)	(0.03459)	(0.03311)	(0.01582)	(0.01941)	(0.06047)
D(LNIGERIA)	-0.022419	0.046561	0.016359	0.055500	-0.066739	-0.072834	-0.020848
	(0.07403)	(0.06775)	(0.08447)	(0.08085)	(0.03862)	(0.04741)	(0.14767)
D(DUM)	-0.171929	-0.161475	0.478281	0.102597	0.050014	-0.383321	0.984954
	(0.12154)	(0.11123)	(0.13869)	(0.13274)	(0.06341)	(0.07784)	(0.24245)
D(LGERMAN)	0.237348	-0.105177	0.259634	-0.351426	0.0[illegible]606	-0.041630	-0.662222
	(0.08620)	(0.07889)	(0.09836)	(0.09415)	(0.0[illegible]97)	(0.05521)	(0.17195)
D(LJAPAN)	0.196615	-0.059377	-0.037892	-0.032334	0.019984	-0.006312	-0.243230
	(0.07022)	(0.06426)	(0.08013)	(0.07669)	(0.03664)	(0.04497)	(0.14007)
D(LUSA)	-0.088804	0.015505	0.076009	0.038450	0.028596	-0.022084	0.136222
	(0.02322)	(0.02125)	(0.02650)	(0.02536)	(0.01211)	(0.01487)	(0.04632)

8 Cointegrating Equation(s):	Log likelihood	1804.489

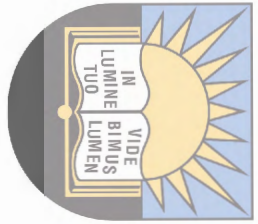
Normalized cointegrating coefficients (standard error in parentheses)

LSA	LBOTSWAN A	LMAURITIU S	LNAMIBIA	LNIGERIA	DUM	LGERMAN	LJAPAN	LUSA	C
1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-6.022559	33.22397
								(0.99558)	(7.05597)
0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-6.116570	35.42271
								(1.08196)	(7.66820)
0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-4.533295	25.33437
								(0.78622)	(5.57220)
0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	-2.409573	11.84711
								(0.76465)	(5.41928)
0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	-3.821755	16.91601
								(1.02047)	(7.23238)
0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	-1.476060	10.10467
								(0.37388)	(2.64979)
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	-2.769416	11.25122
								(0.26050)	(1.84626)
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	-2.046093	5.101878
								(0.19106)	(1.35411)

Adjustment coefficients (standard error in parentheses)

D(LSA)	0.063463	0.008555	-0.006021	-0.044137	-0.019488	-0.029098	-0.174274	-0.003658
	(0.07769)	(0.06834)	(0.09219)	(0.08435)	(0.04326)	(0.04693)	(0.14785)	(0.08463)
D(LBOTSWANA)	0.125010	-0.139471	0.028826	-0.099333	0.082620	-0.031614	0.003545	0.012736
	(0.04167)	(0.03665)	(0.04944)	(0.04524)	(0.02320)	(0.02517)	(0.07930)	(0.04539)
D(LMAURITIUS)	0.010565	0.092268	-0.131652	0.025584	-0.002677	0.022582	-0.209415	0.033442
	(0.04988)	(0.04387)	(0.05918)	(0.05415)	(0.02777)	(0.03013)	(0.09492)	(0.05433)
D(LNAMIBIA)	-0.019684	0.062777	-0.032042	-0.063105	0.022671	0.031052	-0.124382	0.043287
	(0.03212)	(0.02826)	(0.03811)	(0.03487)	(0.01789)	(0.01940)	(0.06113)	(0.03499)
D(LNIGERIA)	0.023687	0.022639	0.085397	0.007899	0.[illegible]720	-0.076620	-0.061965	-0.057703
	(0.07725)	(0.06795)	(0.09166)	(0.08387)	(0.04302)	(0.04667)	(0.14701)	(0.08415)
D(DUM)	-0.202190	-0.145774	0.432969	0.133839	0.026398	-0.380836	1.011940	-0.459045
	(0.12866)	(0.11317)	(0.15266)	(0.13968)	(0.07164)	(0.07772)	(0.24484)	(0.14014)
D(LGERMAN)	0.263560	-0.118777	0.298884	-0.378488	-0.032062	-0.043782	-0.685597	-0.010605
	(0.09113)	(0.08016)	(0.10813)	(0.09893)	(0.05074)	(0.05505)	(0.17342)	(0.09926)
D(LJAPAN)	0.224169	-0.073674	0.003367	-0.060782	-0.041487	-0.008575	-0.267803	-0.171594
	(0.07404)	(0.06512)	(0.08785)	(0.08038)	(0.04123)	(0.04472)	(0.14089)	(0.08064)

D(LUSA)	-0.091338	0.016819	0.072215	0.041066	-0.026619	-0.021876	0.138481	0.079761
	(0.02463)	(0.02167)	(0.02923)	(0.02674)	(0.01372)	(0.01488)	(0.04687)	(0.02683)



dix 9

Error Correction Estimates

11/11/13 Time: 18:34

e (adjusted): 2000M04 2008M09

ed observations: 102 after adjustments

rd errors in ( ) & t-statistics in [ ]

tegrating Eq:	CointEq1
LSA(-1)	1.000000
TSWANA(-1)	0.080569
	(0.14049)
	[0.57350]
URITIUS(-1)	-0.895829
	(0.24643)
	[-3.63529]
AMIBIA(-1)	-0.541488
	(0.20906)
	[-2.59012]
GERIA(-1)	0.194509
	(0.14245)
	[1.36544]
UM(-1)	0.477735
	(0.13303)
	[3.59118]
RMAN(-1)	-2.388187
	(0.35317)
	[-6.76213]

APAN(-1)	-0.427776
	(0.22176)
	[-1.92898]
USA(-1)	4.890958
	(0.61251)
	[7.98515]
C	-13.97913

r Correction:	D(LSA)	D(LBOTSWANA)	D(LMAURITIUS)	D(LNAMIBIA)	D(LNIGERIA)	D(DUM)	D(LGERMAN)	D(LJ
CointEq1	-0.019901	-0.004299	0.078095	0.030732	-0.035739	-0.179240	0.070738	0.1
	(0.04190)	(0.02410)	(0.02829)	(0.01867)	(0.04339)	(0.07701)	(0.05412)	(0.
	[-0.47500]	[-0.17840]	[2.76051]	[1.64570]	[-0.82376]	[-2.32735]	[1.30715]	[3.
(LSA(-1))	-0.203742	0.005852	0.002841	-0.035965	0.001667	-0.194193	-0.221221	-0.2
	(0.12992)	(0.07472)	(0.08772)	(0.05790)	(0.13453)	(0.23881)	(0.16780)	(0.
	[-1.56827]	[0.07832]	[0.03239]	[-0.62111]	[0.01239]	[-0.81318]	[-1.31834]	[-1.
TSWANA(-1))	0.215646	0.588016	0.170480	-0.000294	0.094870	-0.433580	0.279347	0.0
	(0.14864)	(0.08548)	(0.10036)	(0.06625)	(0.15392)	(0.27322)	(0.19198)	(0.
	[1.45085]	[6.87863]	[1.69865]	[-0.00444]	[0.61638]	[-1.58694]	[1.45507]	[0.
URITIUS(-1))	0.033192	-0.057067	0.141592	-0.018129	0.010027	0.492264	0.208518	0.3
	(0.14607)	(0.08401)	(0.09863)	(0.06511)	(0.15126)	(0.26851)	(0.18867)	(0.
	[0.22723]	[-0.67929]	[1.43557]	[-0.27845]	[0.06629]	[1.83335]	[1.10519]	[2.
MIBIA(-1))	-0.061937	-0.074147	0.113806	0.125729	-0.082627	-0.651925	0.253041	-0.1
	(0.23994)	(0.13800)	(0.16201)	(0.10694)	(0.24846)	(0.44105)	(0.30992)	(0.
	[-0.25813]	[-0.53731]	[0.70244]	[1.17565]	[-0.33255]	[-1.47810]	[0.81648]	[-0.

IGERIA(-1))	-0.075016	0.080000	0.120206	0.029595	0.295647	0.132626	-0.099185	-0.(
	(0.09767)	(0.05617)	(0.06595)	(0.04353)	(0.10114)	(0.17953)	(0.12615)	(0.
	[-0.76808]	[1.42422]	[1.82277]	[0.67986]	[2.92325]	[0.73874]	[-0.78625]	[-0.
DUM(-1))	0.161636	0.012341	0.067203	0.008614	0.103892	-0.023704	0.020452	0.(
	(0.05623)	(0.03234)	(0.03797)	(0.02506)	(0.05823)	(0.10337)	(0.07263)	(0.
	[2.87443]	[0.38159]	[1.76991]	[0.34369]	[1.78418]	[-0.22933]	[0.28159]	[0.
ERMAN(-1))	0.316119	-0.004355	0.212572	0.043715	-0.089326	-0.113593	0.108344	0.5
	(0.12994)	(0.07473)	(0.08774)	(0.05792)	(0.13455)	(0.23885)	(0.16783)	(0.
	[2.43283]	[-0.05828]	[2.42280]	[0.75482]	[-0.66386]	[-0.47558]	[0.64555]	[4.
JAPAN(-1))	0.106026	-0.001232	0.018372	0.025373	0.055333	-0.145318	0.318831	0.(
	(0.12622)	(0.07259)	(0.08523)	(0.05626)	(0.13070)	(0.23201)	(0.16303)	(0.
	[0.84001]	[-0.01698]	[0.21557]	[0.45102]	[0.42335]	[-0.62634]	[1.95567]	[0.
LUSA(-1))	-0.115630	0.128034	0.028706	0.048111	0.178232	-0.019167	-0.013840	-0.1
	(0.14418)	(0.08292)	(0.09735)	(0.06426)	(0.14930)	(0.26502)	(0.18622)	(0.
	[-0.80201]	[1.54407]	[0.29487]	[0.74868]	[1.19380]	[-0.07232]	[-0.07432]	[-1.
C	0.010924	0.007123	0.004307	0.011751	0.012689	0.018345	-0.007487	-0.(
	(0.00721)	(0.00415)	(0.00487)	(0.00321)	(0.00747)	(0.01326)	(0.00932)	(0.
	[1.51470]	[1.71726]	[0.88450]	[3.65582]	[1.69904]	[1.38381]	[-0.80370]	[-0.
red	0.163992	0.393334	0.241404	0.068931	0.137036	0.139066	0.103066	0.2
squared	0.072123	0.326668	0.158042	-0.033384	0.042204	0.044458	0.004502	0.1
resids	0.252298	0.083454	0.115030	0.050121	0.270541	0.852493	0.420914	0.2
ation	0.052655	0.030283	0.035554	0.023469	0.054525	0.096789	0.068011	0.(
ic	1.785062	5.900027	2.895842	0.673713	1.445047	1.469920	1.045673	2.6
lihood	161.3762	217.7984	201.4324	243.8006	157.8157	99.28098	135.2735	16
AIC	-2.948553	-4.054871	-3.733969	-4.564717	-2.878740	-1.731000	-2.436736	-3.(
SC	-2.665468	-3.771786	-3.450883	-4.281632	-2.595654	-1.447914	-2.153650	-2.7
pendent	0.010756	0.016697	0.013276	0.013264	0.020071	0.009804	-0.002597	-0.(
endent	0.054663	0.036905	0.038747	0.023087	0.055713	0.099015	0.068164	0.(

ninant resid covariance (dof	
	4.99E-26
ninant resid covariance	1.79E-26
kelihood	1721.002
e information criterion	-31.62749
rz criterion	-28.84811

Appendix 10