CHAPTER ONE

INTRODUCTION

1.1 Background and Problem Statement

The vast majority of previous empirical studies which examined the role of financial markets on economic growth have largely ignored the effect of bond markets on the economic growth process. Bond markets were ignored in light of the notion that what matters is the state of a country's overall financial development, and that the differences in composition and institutions that make up a country's financial system are trivial, as long as an economy has access to a well-functioning financial system (Levine, 1997; Merton, 1992). This is because a well-functioning financial market enables economic agents to not only reduce transaction costs through hedging, trading and pooling risks, while also increasing the liquidity and size of the capital market, all of which are essential for economic growth (Fry, 1995; Goldsmith, 1969; King & Levine, 1993a, 1993b; McKinnon, 1973; Wachtel, 2001).

The bond market (also debt market or credit market) is a financial market where participants can issue new debt, known as the primary market, or buy and sell debt securities, known as the secondary market. This is usually in the form of bonds, but it may include notes, bills, and so on. The primary goal of the bond market is to provide a mechanism for the long term funding of public and private expenditures. An important part of the bond market is the government bond market, because of its size and liquidity. Government bonds are often used to compare other bonds to measure credit risk. Due to the inverse relationship between bond valuation and interest rates, the bond market is often used to indicate changes in interest rates or the shape of the yield curve. The yield curve is the measure of “cost of funding”.

The economy of South Africa has slowed down. Following a brief crisis-induced recession in 2009, economic growth recovered, but at lower levels than in the few years prior to the crisis. The economy grew by 3,5 per cent in 2011, but moderated to 2,5 per cent in 2012. The output gap remains negative, and economic growth was expected to remain below the potential 3,5 per cent in the 2013 year; the gap is not expected to be closed within the Bank’s forecast period,

which ends in 2014. Part of this disappointing growth story has been due to weak global demand for South Africa's exports, combined with the impact of low advanced economic interest rates on the exchange rate (Businessday, 2015).

For most of the 2000s, portfolio investment into South Africa was dominated by equity inflows, while inflows into the bond market were relatively small. However, as emerging economy bond markets became more attractive, this pattern changed. Inflows into the bond market were given additional impetus with South Africa's inclusion in the Citibank World Government Bond Index in 2012, when bond flows totaled R88 billion (compared to R47 billion in 2011), which is more than offsetting a net outflow of equities to the value of R3 billion. While bond inflows also declined in the last two months of 2012, both bond and equity inflows have resumed on a moderate scale, and totaled R18 billion in the first two months of 2013. Non-resident investors now hold 36 per cent of South African government bonds; this is up from 13 per cent in 2008.

Based on the above discussion, the following research questions have emerged:

- What has been the trends in bond market and economic growth in South Africa?
- What is the effect of the bond market on economic growth in South Africa?

To address these research questions, the following objectives will be established.

1.2 Research Objectives

The general objective of this research is to study the effect of bond markets on economic growth in South Africa (SA). However, the specific objectives of the proposed study are:

(1) To examine the trends in bond markets and economic growth in South Africa.
(2) To investigate the empirical effect of bond markets on economic growth in South Africa.
(3) To provide policy recommendations based on the findings.

1.3 Justification of the Study

This study seeks to add to the body of knowledge and fill the gap in the available literature on the effect of bond markets on economic growth in South Africa.

The findings of this study should also be of benefit to a number of stakeholders. These stakeholders are: investors, civil society, developmental partners, manufacturers, the banks and regulators, such as the Ministry of Industry and Commerce, the Competition Tariff Commission, the Ministry of Finance, and other Government Ministries, as well as the South African Reserve Bank (SARB).

The study will focus on investigating the relationship between these two variables in detail. In so doing, the study will focus on the effect of bond markets on economic growth, and vice versa. The results of this study will benefit South African stakeholders by providing extensive knowledge of the effect of bond markets on economic growth.

1.4 Structure of the Dissertation

The rest of this dissertation is organised as follows:

Chapter Two provides an overview of bond market performance and economic growth in South Africa. This intends to offer an outline of the financial markets in South Africa and to shed light on the bond market, equity market and banking sector in South Africa from 2000 to 2014.

Chapter Three reviews both the theoretical and empirical literature concerning the bond market, equity market and economic growth in South Africa. This chapter also includes a discussion of the views of the classical, neoclassical and the endogenous models/theories on the real sector of the economy.

The estimation methodology followed in this research is outlined in Chapter Four, which provides a model specification and a review of the relevant statistical estimation concepts and techniques for the study. The variables and their sources are also highlighted in this chapter.

Chapter Five presents and discusses the empirical findings of the study In conclusion, Chapter Six provides the summary, main findings and recommendations of the study; it also provides a discussion of the limitations of the study and suggestions for future research.

CHAPTER TWO

OVERVIEW OF BOND MARKET PERFORMANCE AND ECONOMIC GROWTH IN SOUTH AFRICA

2.1 Introduction

The existence of a relationship between financial development and economic growth has long been debated by economists. In the 19th century, economic theory held that the financial structure of an economy did not affect real economic variables, including economic growth. More recently, leading economists have come to believe that unregulated capital markets perform better than regulated markets. Hence, the existence of competitive financial markets should, in principle, enhance economic livelihood. Indeed, early empirical work by Goldsmith (1969), McKinnon (1973), and Shaw (1973) produced considerable evidence that liberal financial policies correlate positively with growth.

Financial markets are platforms where the channeling of funds from those who have excess funds (savers) to those with a shortage of funds (borrowers) takes places. These markets can be classified according to the way in which the trading of financial instruments takes place (Van der Merwe & Mollentze, 2010). The Bond Market Exchange of South Africa (BESA) is a self-regulatory body, which is licensed by the Financial Services Board (FSB) as a securities exchange. BESA regulates cash and derivatives markets in fixed-income securities and provides a range of other services to both the on-exchange and over-the-counter (OTC) markets. BESA offers listed bonds, listed interest-rate derivatives and unlisted derivatives.

This chapter is organized as follows: section two presents a brief overview of financial markets, section three provides an extensive explanation of bond markets in South Africa, section four explains economic growth in South Africa, and section five presents a discussion of the relationship between bond markets and economic growth.

2.2 The financial market in South Africa

The financial market in South Africa includes the following sub-markets: money market, derivatives market, foreign exchange market, commodities market, bond market, equity market, and credit market. The study will explain, in depth, the bond market, equity market and credit market. Hence, the study focuses on the impact of the bond market on economic growth in South Africa.

2.2.1 Money market

A money market is a segment of the financial market in which financial instruments with high liquidity and very short maturities are traded. The money market is used by participants as a means for borrowing and lending in the short term, from several days to just under a year (Business day, 2015).

In South Africa, a money market account is a type of investment issued by some bank that is an alternative to a savings account or fixed deposit. Unlike a fixed deposit, there is no defined investment term; funds can therefore be invested into the products indefinitely and the rate of return may change depending on the deposit balance. It is also likely to provide a lower rate of interest than a fixed deposit account and have a higher liquidity with quicker access to funds when required (South African Reserve Bank, 2015).

2.2.2 Derivatives

Derivatives markets can facilitate the management of financial risk exposure, since they allow investors to unbundle and transfer financial risk. In principle, such markets could contribute to a more efficient allocation of capital and cross-border capital flow, create more opportunities for the diversification of portfolios, as well as facilitate risk transfer, price discovery, and more public information (Tsetsekos & Varangis, 1997; Ilyina, 2004).

South Africa's derivatives market was established to further develop the financial system, enhance liquidity, manage risk, and meet the challenges of globalization. However, like other emerging derivatives markets, the development of South Africa's derivatives market — the only one in Sub-Saharan Africa (SSA) — stemmed primarily from the need to "self-insure" against

volatile capital flows and manage financial risk associated with the high volatility of asset prices.

The market comprises two broad categories of derivatives, namely, options and futures. Within these two categories, a wide range of instruments may be identified: warrants, equity futures and options, the agricultural commodity futures and options, interest rate futures and options, currency futures and fixed income derivatives. The fixed income derivatives are made up of bond futures, forward rate agreements (FRAs), vanilla swaps, and standard bond options.

South Africa's derivatives market has grown rapidly in recent years. While this has supported capital inflows and helped market participants to price, unbundle and transfer risk, the risks associated with its misuse have also increased. There are many derivative instruments traded with different institutional arrangements on the over-the-counter (OTC) markets and regulated exchanges. There are also tight regulations on asset allocations by insurance and pension funds to prevent excessive risk taking. Such regulations can constrain the potential benefits that they could bring to the local derivatives market. While the misuse of derivatives can lead to a financial crisis, accelerate capital outflows, and amplify volatility, their advantages should not be discounted (Adelegan, 2009).

2.2.3 Foreign exchange

The foreign exchange market is the single biggest market, in terms of 'turnover, of the South African financial markets. Given the openness of the South African economy, this market is an extremely important one.

The foreign exchange market is essentially an over-the-counter (OTC) market. The primary aim of the foreign exchange market is to facilitate international trade as well as international money and capital movements by providing a market where different currencies can be exchanged for one another.

In the South African foreign exchange market, there are mainly two types of participants: banks authorised by the Reserve Bank to deal in foreign exchange, known as Authorised Dealers, and brokers. It is the activities of the Authorised Dealers that are particularly relevant to this study.

During the past decade, turnover in the Rand market in foreign exchange in South Africa has increased significantly. Increases were particularly noticeable in 1995/6 and in 1998. Both those periods were characterised by crises in emerging markets. The 1998 emerging market crisis was very negative for South Africa from an economic point of view but, nevertheless, resulted in increased turnover in the foreign exchange market. Since turnover provides a measure of market activity, and it provides a rough proxy for market liquidity, the conclusion is that liquidity in the Rand market in South Africa increased significantly over time by virtue of the increase in turnover (Reserve Bank, 2016).

2.2.4 Commodity

South Africa is the second-largest economy within Africa. The path to this status has however not been an easy one, as the country languished under apartheid sanctions in the 1980s. While South Africa has a relatively well-developed manufacturing sector by the standards of African economies (and developing economies in general), a meaningful percentage of the country's economy still revolves around commodities.

Mining is arguably South Africa's most recognizable industry, although it is less than a third of the size of the country's manufacturing sector in terms of GDP contribution. It does, however, make up approximately 60% of the country's exports; eight of the 10 largest individual export categories are commodities (Commodity, 2016).

South Africa is a major player in platinum group metals, representing about 73% of the world's platinum mine production supply in 2013. Gold is even more important to SA's export base, as the country represents about 5% of global mining production and its gold accounts for about 11% of the world's gold reserves. Diamonds, too, are a significant part of SA's mining industry, as roughly 23% of the world's diamond supply came from the country's mines in 2014 (Commodity, 2016).

Although SA has a temperate climate and startlingly high biodiversity, it is not an especially significant player on the global stage in terms of commodity agricultural exports. It is, however, a meaningful player in niche categories like chicory and grapefruit, and does export a wide variety of cereal grains, nuts and fruits. The nation has also been working to increase the productivity and international profile of its wine industry (Commodity, 2016).

2.2.5 The bond market

A bond is a financial instrument that promises that the issuer (the borrower) will pay the holder interest and will repay the capital amount over a certain period of time. Bonds represent debt to the issuer. The buyer of the bond in the primary market provides a loan to the issuer. The loan will be repaid when the bond matures and, over the lifespan of the bond, the issuer will pay interest (called coupons) to the holder of the bond. This is sometimes called marketable debt because it can be traded. Any bond contract may include the following:

- *Principal*. This is the amount that the issuer will repay to the bondholder when the bond expires. It is sometimes also called the face value, par value or nominal value of a bond.
- *Coupon rate*. This is the interest that the issuer promises to pay to the bondholder during the lifespan of the bond. It is normally expressed as a percentage per annum and may be a fixed or variable interest rate. There is usually also an indication of the dates on which interest will be paid, usually semi-annually or, sometimes, annually.
- *Maturity date***.** This is the date on which the bond will expire; it is, thus, the date at which the issuer will repay the principal to the bondholder. A bond is usually a capital market instrument - it is issued for periods longer than a year. The lifespan of a bond can be any length of time, for example 5, 10, 30 years, etc. (Wyk *et al.,* 2012).

This section explains the broad view of bond markets in South Africa; it continues by stipulating the different types of bond markets in South Africa. There are outlined below.

2.2.5.1 The government bond

Government entities issue bonds and list them on the JSE Debt Board to raise funds for large capital projects such as roads, power stations and hospitals. They have done so since the Debt Board's inception in 1994; it was called the Bond Exchange of South Africa at that time.

Investors lend money to these entities by buying the bonds they issue and list on the JSE Debt Board. Listing the bond on the JSE Debt Board improves an entity's ability to raise finance because it allows investors to sell the loan to other investors, should they wish to. Investors buy Government Bonds in order to earn regular interest payments and receive the money they have lent back after a predetermined period.

More than R1 trillion is currently listed on the JSE's Debt Board and these instruments account for 90% of all liquidity reported to the JSE. In 1998, the National Treasury appointed 12 primary dealers to make a market in their listed debt. At the end of 2013, there were eight primary dealers permitted to bid at weekly debt auctions. Primary dealers are required to make a secondary market in qualifying RSA paper (Johannesburg Stock Exchange, 2015).

2.2.5.2 Different types of bond issued by the South African government

The majority of the bonds traded on the JSE are issued by the central government. The South African government issues different kinds of bonds, including

- Fixed rate bonds
- Zero-coupon bonds
- Inflation linked bonds
- Variable rate bonds
- Foreign currency bonds

The examples of issued government bonds are listed in Table 2.1, below. The different kinds of bonds are described in this section and examples are discussed, where applicable.

Table 2.1: Examples of government bonds

Bond Code	Coupon rate (%)	Issue date	Redemption date	Issue price (R)
R186	10,5	21-05-1998	21-12-2025/26/27	78,23
R197	5,5	30-05-2001	7-12-2023	97,051
Z109	0,0	24-11-1997	15-09-2016	7,710
R209	6,25	21-07-2006	31-03-2036	77,846
R205	Variable	06-07-2005	31-03-2012	100,004

Source: http://www.treasury.gov.za

2.2.5.2(a) Fixed rate bonds

Most fixed rate bonds are similar to a fixed coupon rate and a single redemption date or maturity date. The R209 is an example of such a bond. It was issued on 21 July 2006 and will expire on 31 March 2036. The coupon rate on the R209 bond is 6,25%. Fixed rate bonds can, however, also be of the sinking fund type, with more than one maturity date. This means that the entire principal will not be repaid on one date, but according to a set schedule. The R186 bond is an example of such a bond. It is redeemable in three equal amounts on 21 December 2025, 21 December 2026 and 21 December 2027. It is therefore called a three-legged bond. No interest is payable after each redemption date on the amount of the bond that has been redeemed already, and new bonds with new loan numbers are issued for the residual amount (Wyk, Botha & Goodspeed, 2012).

2.2.5.2(b) Zero-coupon bonds

Zero-coupon bonds are bonds that make only one cash payment, which is the nominal or principal amount, on the maturity date. These bonds are issued and traded at a (significant) discount and are, therefore, except for their long lifespan, similar to treasury bills (TBs). The Z109 in Table 2.1 is an example of a zero-coupon bond. The issue price of the Z109 bond is much lower than the all-in price of the interest-bearing bonds (Wyk, Botha & Goodspeed, 2012).

2.2.5.2(c) Inflation-linked bonds

Inflation-linked bonds are government bonds that will offer investors an inflation-protected investment opportunity by compensating holders for inflation. The inflation-linked bonds that have been issued by the South African government are indexed to headline inflation, with interest adjusted after a three-month lag. The R197 bond listed in Table 2.1, above, is an example of an inflation-linked bond. The coupon rate on this bond is 5,5% and the coupon is calculated as a percentage of the capital value (Wyk, Botha & Goodspeed, 2012).

2.2.5.2(d)Variable or floating-rate bonds

Variable rate bonds are bonds on which the coupon interest varies with some predetermined benchmark rate. At the time of writing, the R205 was the only variable rate bond issued by government that was still outstanding. The coupon rate on this bond will be equal to the ruling effective interest rate on the 91 day TBs, which is determined by the last 91 day TB tender on or before the commencement of the interest period. The only difference is that the R205 has an original maturity of more than one year and that its coupon rate is linked to the TB rate instead of the Johannesburg Interbank Agreed Rate (JIBAR) (Wyk, Botha & Goodspeed, 2012).

2.2.5.2(e) Retail savings bonds

Retail savings bonds are bonds that are available to the general public online or through various outlets, such as the South African Post Office, Pick n Pay, etc., and only require a minimum of R1000 to invest. As such, they do not really form part of the bonds market and are certainly not traded on the JSE. They are actually more like fixed deposits than bonds. The purpose of issuing these bonds is that the government wants to tap the savings of the general public, on the one hand, and provide an alternative risk-free investment vehicle to them, on the other. Investors can buy these bonds at fixed interest rates (the fixed rate at which they can be bought is adjusted regularly) or they can be linked to inflation, which is similar to the inflation-linked bonds discussed above, where the capital amount is adjusted according to the inflation rate (Wyk, Botha & Goodspeed, 2012).

2.2.5.2(f) Foreign currency bonds

The South African government taps international bond markets regularly and is an established issuer. Foreign currency bonds are issued by means of private placement or by listing on a foreign bond exchange. When they are issued by way of a listing, the issuing procedure is similar to that of domestic bonds. Lead managers are appointed and the bonds are issued to the highest bidders through an auction procedure. The lead managers act as primary dealers and market makers, although these bonds are often bought on a buy-and-hold basis, meaning that the primary buyers buy them and hold them to expiry. Private placement means that the new bonds are sold directly to one or a few investors rather than through public offerings. The South African government's foreign debt increased from 3,9% of total loan debt (i.e. domestic and foreign loan debt added together) for the 1995/96 financial year to 19% of total loan debt for the 2001/02 financial year. Between the 2002/03 and 2005/06 financial years, the percentage of foreign debt declined slightly but stayed well above 13%. In the 2006/07 financial year, foreign debt represented 14,9% of total government debt and this increased to 16,7%, in 2007/08. The net debt has grown from 21,8% at the start of the financial crisis in 2008/09 to 40,8% in 2014/15 (Wyk, Botha & Goodspeed, 2012).

2.2.5.3 The corporate bond

Since the first Corporate Bond was issued in 1992, there are currently more than 1500 corporate debt instruments listed on the JSE Debt Board.

These instruments provide a way for corporate entities to raise money for large capital projects. Investors lend their money in return for regular interest payments. After a predetermined period, the loans are paid back to the investors. Listing the bond on the JSE Debt Board improves the issuer's ability to raise finance because it allows investors to sell the loan to other investors, should they wish to (Johannesburg Stock Exchange, 2015).

Liquidity remains relatively low compared to government debt, but issuance keeps growing. Some of the instruments on this market are:

- Fixed Rate Bonds
- Variable Rate Bonds

- Inflation Linked Instruments
- Commercial Paper
- Credit Linked Notes
- Asset Backed Securities
- Mortgage Backed Securities.

2.2.5.4 Bond Market Participants

There is a large variety of players in the bond market, each trading some or all of the different instruments available to suit their own purpose. The main types of players can be group according to the time horizon of their investment activity:

- Short-term institution investors

  These include banks and building societies, money market fund managers, central banks and the treasury desks of some types of corporate. Such bodies are driven by short-term investment views, often subject to close guidelines, and will be driven by the total return available on their investments. Banks will have an additional requirement to maintain liquidity, often in fulfilment of regulatory authority rules, by holding a proportion of their assets in the form of easily tradable short-term instruments.

- *Long-term institution investors*

  Typically, these types of investors include pension fund and life assurance companies. Their investment horizon is long-term, reflecting the nature of their liabilities; often they will seek to match these liabilities by holding long dated bonds.

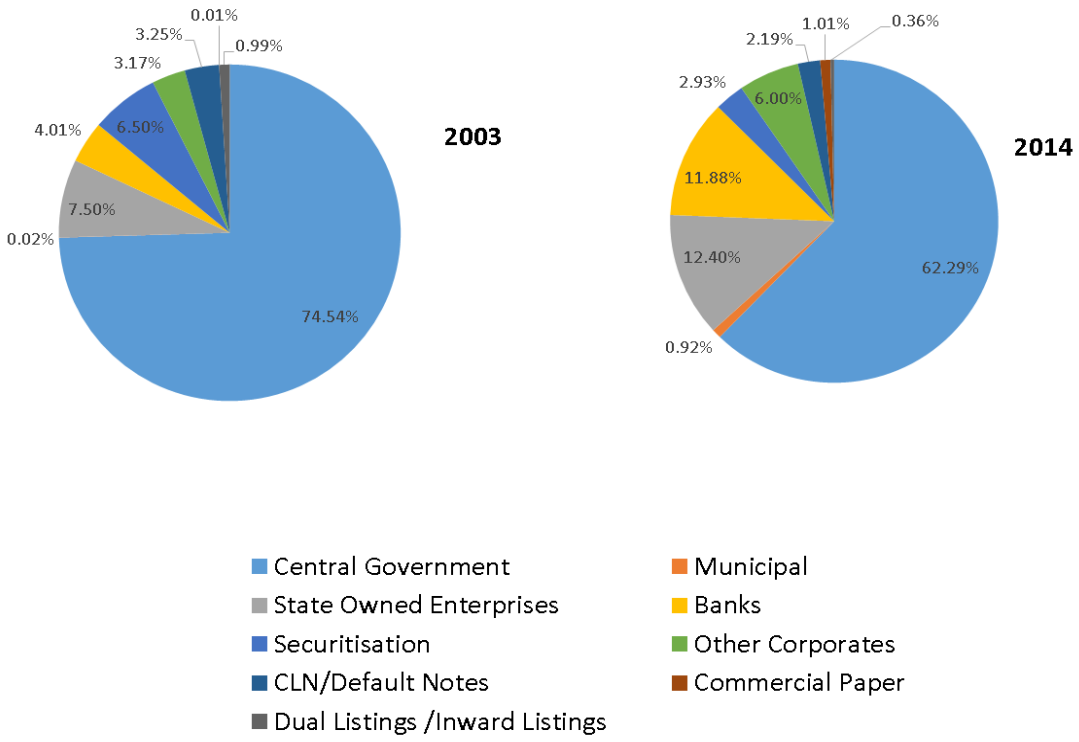
- *Mixed horizon institutional investors*

  This is possibly the longest category of investors and will include general insurance companies; they are also very active in the primary market, issuing bonds to finance their operations.

- *Market professionals*

  This category includes firms that one would not automatically classify as investors although they will also have an investment objective. Their time horizon will range from 1 day to the very long term. They include the proprietary trading desks of investment banks, as well as bond market makers in securities houses and banks who are providing a service to their customers. Proprietary traders will actively position themselves in the market in order to gain trading profit, for example, in response to their view on where they think interest-rate levels are headed. These participants will trade direct with other market professionals and investors, or via brokers.

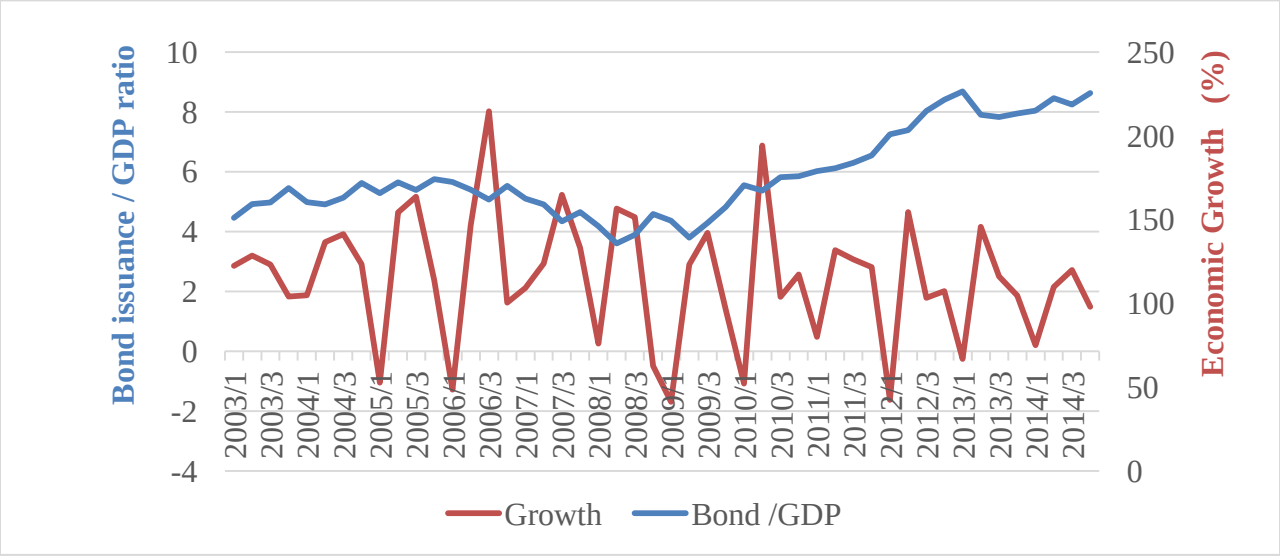
Figure 2.1 Bond market participants: 2003 and 2014



Source: http:\\www.jse.co.za

Figure 2.1, above, illustrates the issuance of bonds between 2003 and 2014. As Figure 2.1 shows, the issuance of central government bond has declined from 74,54% in 2003 to 62,29% in 2014; this suggests that interest for government bond decreases over time. In contrast, state owned enterprises show an increment from 7,5% in 2003 to 12,40% in 2014; this makes it clear that there is a demand for this bond.

Figure 2.2: Bond issuance to GDP Ratio versus RGDP Growth 2003-2014



Source: http:\\www.jse.co.za

Figure 2.2, above, illustrates the bond market to GDP ratio over economic growth in South Africa. The graph shows convergence, or the relationship between bond issuance to GDP with economic growth between 2006 until the first quarter of 2010. After the second quarter of 2010, the graph indicates a divergence between bond issuance to GDP and economic growth. In this graph, economic growth does not respond to higher amounts of bond issues.

2.2.6 Stock Market in South Africa

The equity market consists of the mechanisms and conventions that exist for the issuance of, investing in and trading of equity. Generally, the equity market is considered to be synonymous with the stock exchange. A stock exchange is defined as a place - physical or virtual - where buyers and sellers (the users or members of exchange) can meet and trade under rules that are mandated by a regulator such as the Financial Services Board in South Africa, the Securities

Exchange Commission in the USA and the Financial Services Authority in the UK. Most industrialised nations have at least one major stock exchange: the Johannesburg Stock Exchange (JSE) in South Africa, the London Stock Exchange (LSE) in the UK, the New York Stock Exchange (NYSE) in the USA, Euronext in Europe and the Tokyo Stock Exchange (TSE) in Japan. The JSE is the only securities exchange in South Africa (Wyk *et al.*, 2012).

The Johannesburg Stock Exchange (JSE) is the biggest and oldest stock exchange in Sub-Saharan Africa. It started operations in 1887 and, over the years, has gone through different economic and political regimes. Prior to 1994, the JSE was characterized by a series of challenges which include a rigid exchange control regime, thin financial trading and inadequate liquidity, peculiar economic structure of companies and political instability, and international economic sanction (Ndako, 2010). Although financial institutions trading on the JSE increased significantly following the constant cash flow from insurance and pension funds over the years, investors constantly faced difficulties in achieving smooth and efficient trade in shares. All these challenges explain why, in the pre-1994 era, the JSE performed poorly in comparison to other emerging markets. According to Falkena *et al*. (2001), there was a lack of competition on the JSE, and the market was heavily restricted in terms of single-capacity trading, fixed commission and the lack of corporate membership, among others. The first post-apartheid election took place in 1994; this eased the way for the lifting of international economic sanctions in 1995.

During this period, the government abolished the system of financial repression and adopted the policy of financial reforms based on liberalization framework. This increase in foreign direct investment inflow to foreign investment that has been accompanied by an increase in the level of market volatility in recent years (Tswamuno *et al.*, 2007). The lifting of international economic sanctions provided a basis for the integration of the South African economy into the global financial markets; therefore, by 13 March 1995, the South African government deregulated the entire financial system by lifting all controls on non-resident investors. This allowed foreign investors the full right and access to participate in the JSE Securities Exchange and the South African Bond Exchange (SABE). The JSE introduced a dual capacity trading structure that eliminated the problems of single capacity trading, in 1995. This allows stock

brokers to buy and sell shares on behalf of their investors while, at the same time, holding packages of shares in which they could deal. In 1996, the open outcry system was replaced by an automated trading system using the Centralized Automated System (ATS). This increased the level of efficiency in daily trading transaction. In addition, in 1996, the Johannesburg Equities Trading (JET) system was introduced. This is a single order screen-centralized trading system aimed at providing optimum services and fairness to investors. Significant improvement in transparency, price formation, security and the cost of trading, as well as liquidity has resulted from the introduction of JET (JSE, 2011).

The JSE also introduced the Share Transaction Totally Electronic (STRATE) in 1998. This is an electronic clearing and settlement system that helps to solve problems associated with paper-based settlement. All trading on the JSE was subsequently fully automated, thereby bringing about efficient settlement, and reducing operational risk and costs (JSE, 2011). In 2001, the JSE incorporated both the financial and agricultural derivatives of the South African Future Exchange (SAFEX). In May 2002, the JSE, in agreement with the London Stock Exchange (LSE), adopted the LSE stock exchange electronic trading system. This replaced the JET system, which has been in operation since 1996. This strategic alliance led to the launching of the JSE/FTSE which is a new series index that has helped to facilitate foreign investors to easily compare shares. The alliance has also allowed the LSE to provide trading system technology and technical support to the JSE. Another major change on the JSE was the launching of the Alternative Exchange (ALTx) in 2004. This was the first African ALTx; it provides opportunities for small and medium-sized companies with great potential to grow and covers all sectors of the economy. In 2005, the JSE extended its activity to interest rate products by launching the Yield-X Exchange, making it the fourth electronic clearing and settlement platform, after equities, financial futures and agriculture products. It is a single platform with automated trade machines and guaranteed settlement. This delivers cost efficiency in an environment that encourages a high level of transparency and integrity. Furthermore, in 2007, the JSE launched currency derivatives which provided opportunities for market participants to hedge against currency risk, and to diversify internationally as well as taking a view on the movement of the underlying exchange rates. In 2007, according to the South Africa Reserve Bank (2008), the JSE operated the 12^{th} largest derivatives exchange in the world, in terms of

volume, and remained the largest global participant in single-stock futures based on the number of contracts traded.

Stock market development is increasingly becoming an important aspect of financial market development in most emerging economies. The importance of stock markets lies in the contributions they make to a country's economic development in a number of ways. For instance, stock markets enable firms to acquire capital quickly and efficiently by creating an open-market platform for transparent and efficient business transactions to take place. The acquired capital can be channelled into profitable projects to help facilitate investment activities, thus leading to the promotion of sustainable investment growth. Tobin (1969) and Von Furstenberg (1977) have noted that stock market activity is positively correlated with investment.

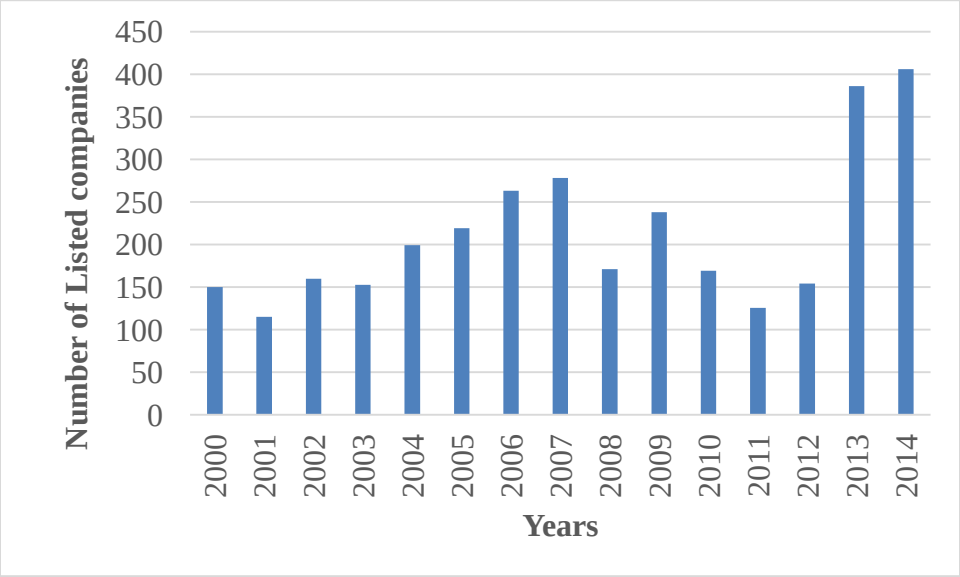
2.2.6.1 Characteristics of the JSE

The JSE is the largest stock exchange in Africa and, based on market capitalization, was ranked 19th in the World federation of exchanges in 2009. The market size and market liquidity are measures of stock market development as they characterize the stock market (JSE).

2.2.6.1(a) Market size

The size of the JSE is measured by the number of listed companies and market capitalization ratio, which is calculated as market capitalization divided by GDP. Figure 2.3, below, presents trends on a number of listed companies over the years, and it shows a decrease from 1990 to 1996. From 1997 to 1999, the number of listed companies started increasing. This may be attributed to the amendment of the Exchange Control Act to accommodate foreign participants in the JSE; this took place after 1995. However, the increase was less significant because the rate at which they were increasing was low compared to the decline that was experienced between 1990 and 1996. From 2000 to 2010, the number of listed companies has been fluctuating. In 2010, 379 companies were listed; this shows that the JSE has not managed to reach the number of listed companies that it had before 1990.

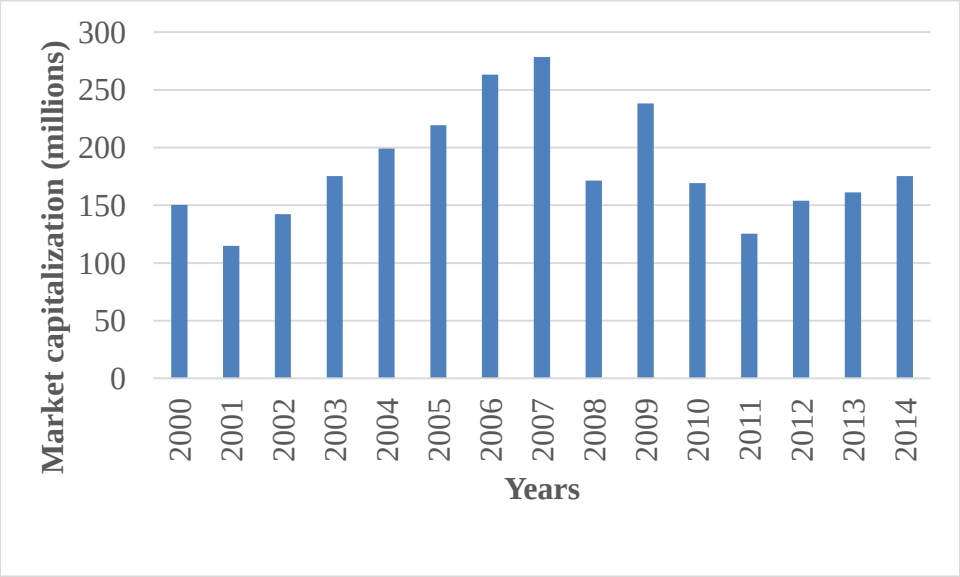
Figure 2.3: Number of Listed companies from 2000-2014



Source: www.worldbank.org.

Market capitalization as a percentage of GDP increased from 30.4 in 1990 to 46.4 in 1995, however, the increasing rate was so low in certain years that it was insignificant. As shown in Figure 2.4, below, after year 1995 it started fluctuating until 2008, since then the JSE experienced a rapid increase in its market capitalisation ratio from 44 in 2008 to 69 in 2010, with more than 360 listed companies. According to the JSE annual report (2003), in 2003, trade volumes and listings dropped due to weak global equities markets. Even though the number of listed companies has not yet recovered, the development in the JSE is still well reflected by market capitalization as it positively responds to major changes, such as the introduction of new systems.

Figure 2.4: Market capitalization for the JSE from 2000-2014

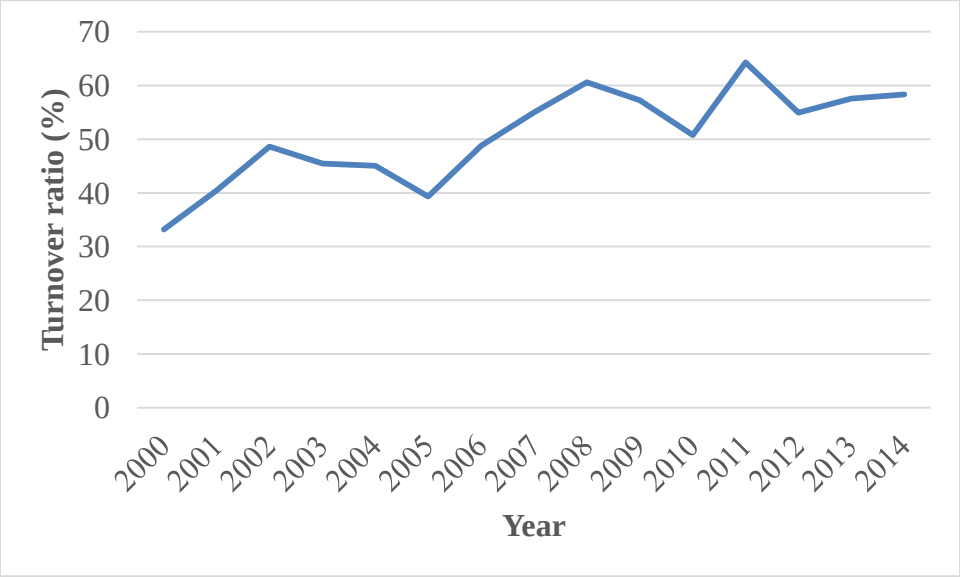


Source: www.worldbank.org.

2.2.6.1(b) Market liquidity

As shown in Figure 2.2, after the amendment that took place in 1995, the JSE started doing well in its turnover ratio, which measures liquidity in the stock market. This is because the JSE had managed to attract more foreign investors to participate in the South African stock market. The turnover ratio increased from 10.1% in year 2001 to 13.7% in year 2007. According to the financial year book (2006), the performance of the JSE in period 1995 to 2007 was influenced by a number of factors: low domestic interest rates, positive economic fundamentals, prudent fiscal and monetary policies, high commodity prices, expectations of continued higher corporate earnings, general optimism in global equity markets, and strong demand from foreign and local investors. These factors positively influenced liquidity in the JSE. Figure 2.5, below, also shows a continuous increase in this period, however, there are some factors that had a negative influence; hence, there were fluctuations between 2000 and 2014.

Figure 2.5: Stock market turnover from 2000-2014



Source: www.worldbank.org.

2.2.6.2 Stock Market Participants

In the case of a formalised market, such as a stock exchange, the needs of market participants, users and intermediaries will have to be satisfied if the market is to be efficient in fulfilling its functions of raising the necessary capital and ensuring a sufficient degree of liquidity. The market participants operate within the formal structure of the exchange and, on the basis of their membership, are bound by conventions, rules and other restrictions imposed by the exchange. To ensure a sufficient degree of competence and business integrity, membership of an exchange is subject to entry restrictions such as proof that minimum capital level can be maintained, certification of a minimum capital level of skill, proof of adequate experience by way of apprenticeship and undertaking that business integrity will be upheld. The members of the stock exchange are classified into three major categories: brokers, jobbers, and market makers. Each category has a specific role to play on an exchange. Although the precise nature of their respective roles can to some extent be determined by whether the exchange is order-or-quote driven.

- *Broker (or Agents)*

  Brokers operate solely as agents for buyers and/or sellers; they can be active on both order- and quote-driven exchange. They facilitate direct financing between ultimate lenders and ultimate borrowers and/or financial intermediaries. They do not speculate or price movements in the market, as they concentrate solely on their roles as agents, for which they receive a commission. On a quote-driven exchange, brokers often assume full responsibility for retail investment business.

- *Jobber (or dealer)*

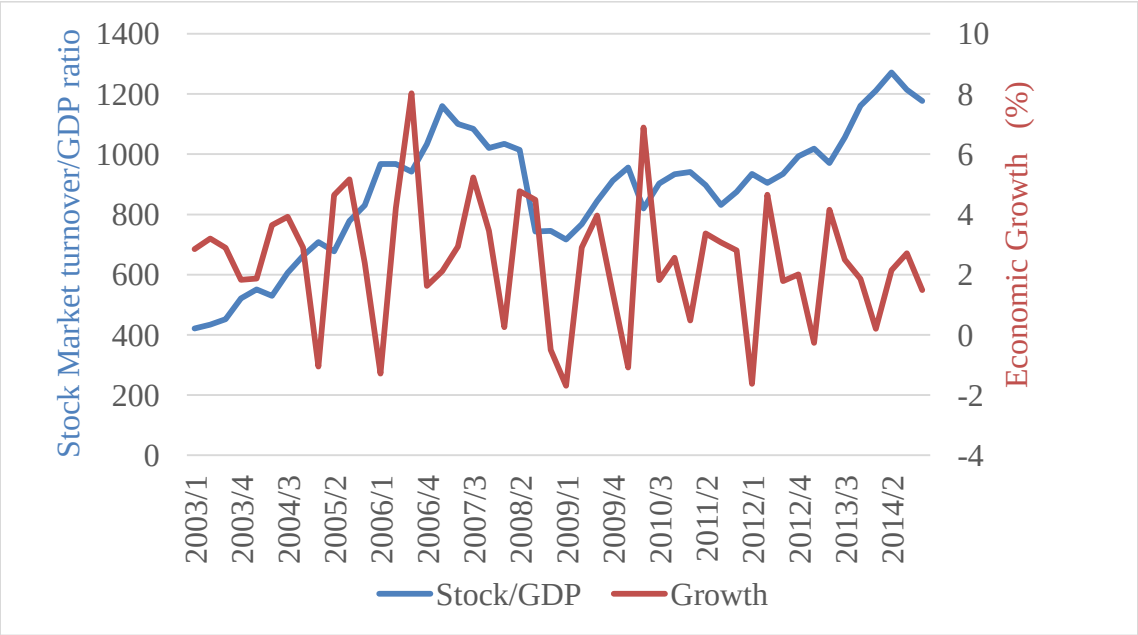
  Jobbers trade for their own account only and can trade on both order- and quote-driven exchanges (like brokers). Jobbers take a view of possible price movements and buy or sell for their own portfolio. They fulfil the role of wholesalers on the exchange, often buying and selling large quantities of securities from and to brokers.

- *Market-makers (or specialists)*

  Market-makers are specialists in certain securities traded on a quote-driven exchange. They create liquid markets in securities by continuously quoting buying and selling prices. In this regard, they ensure the existence of a two-way market as market liquidity is asymmetrical (it is high in a bull market but may be very low in a bear market); market makers are in need of sufficiently large capital resources. Market makers are, therefore, usually powerful securities firms and banks (particularly, merchant and investment banks). They often have to buy large quantities of securities during a bear market phase, which they hope to off-load at a later stage. Market making may thus be importable (or even costly) during a bear run. Exchanges normally grant certain privileges to market makers, such as the right to trade in dual capacity or to execute large orders away from the floor (so-called "block" trading). In some countries, the authorities have adopted a supportive attitude by exempting the trading of market makers from stamp duty. These privileges are granted to attract market makers with sufficiently large capital resources in order to increase market liquidity.

2.2.6.3 Trends in stock market capitalisation and economic growth from 2003-2014

Figure 2.6: Stock market capitalization to GDP ratio versus RGDP Growth



Source: http:\\www.jse.co.za

In Figure 2.6, above, the economic growth shows perpetual fluctuation overtime, since the 2003 first quarter, while the stock market capitalisation to GDP ratio illustrates a positive pattern from 2003 to 2007, and in 2008 there is a decline. Furthermore, there seems to be a correlation between stock market capitalisation to GDP and economic growth, as is evident in the graph. However, the graph also shows divergence from 2010 onwards, which is a concern.

2.2.7 Banking Sector in South Africa

Credit is the right granted by a credit provider (or lender or creditor) to a borrower (or debtor or obligor) to defer payment of a debt (or an obligation) or to incur debt and defer its payment. It results from a transaction between the two parties in terms of which the lender supplies the borrower with money, goods, services or securities in return for the promise of future rather than immediate payment, that is, the borrower receives something of value now and agrees to repay the lender at some future date, generally with interest. The concepts of creditworthiness and credit risk are inseparably linked to credit:

- *Creditworthiness* – reflects a lender's assessment of a borrower's ability to meet its debt obligations, that is, the payment of interest and repayment of capital.
- *Credit risk* – the probability or likelihood that a borrower will not meet its debt obligations in accordance with the agreed upon terms (Wyk *et al.,* 2012).

South Africa has developed a well-regulated banking system that compares favourably with many industrialised countries. Over the past 20 years, the sector has transformed through consolidated technology and legislation. Sector volatility in the early 1990s created scope for consolidation through the mergers of several banks, most notably the Allied Bank, Volkskas Bank and United Bank merger to form ABSA, and the failed merger between Nedcor and Stanbic.

The introduction of the Bank Act (94 of 1990) led to an industry growth spurt with a number of new banking licences being issued and, by the end of 2001, the number of registered banks totalled 43. In early 2002, Saambou and Regal Bank were placed under curatorship which resulted in a run on BOE and a number of smaller banks which were forced to seek financial assistance from foreign shareholders.

Despite the South African banking sector's volatility in the past, South Africa remains a strategic gateway with a solid democratic and legislative environment. The result has been a number of foreign banks establishing branches or representative offices in the country and others acquiring stakes in major banks such as the Industrial and Commercial Bank of China-Standard Bank and Barclays-ABSA deals.

Legislation, technology, products and the number of participants have changed the sector and, consequently, injected high levels of competition. This is especially true for smaller banks such as Capitec Bank and African Bank, which especially targeted the low-income and previously unbanked market.

According to the latest World Economic Forum Competitive Survey (2012/13), SA banks are rated 2nd out of 144 countries for soundness, while the country was rated 3rd for financial sector

development. Currently, the SA banking industry consists of 17 registered banks, 2 mutual banks, 12 local branches of foreign banks, and 41 foreign banks with approved local representative offices.

2.2.7.1 Banking Sector Participants

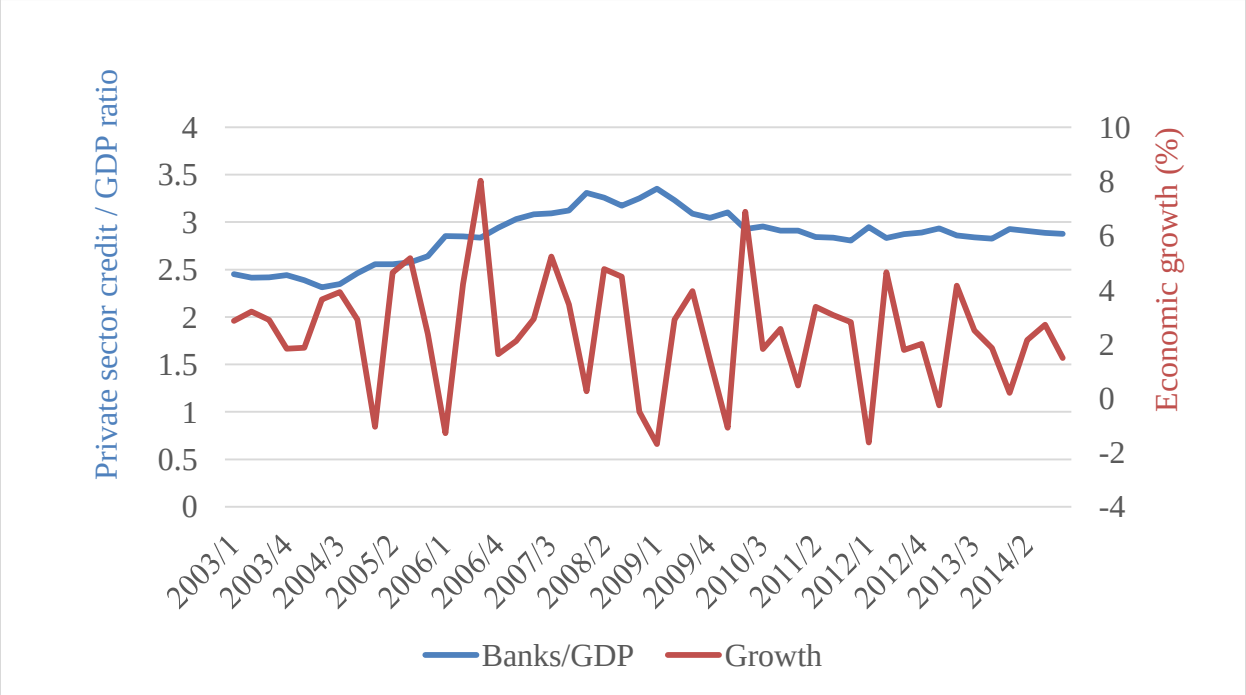
A market participant may either come from the Supply Side, hence supplying excess money (in the form of investments) in favor of the demand side; or come from the Demand Side, hence demanding excess money (in the form of borrowed equity) in favor of the Supply Side. This equation originated with Keynesian Advocates. The theory explains that a given market may have excess cash; hence, the supplier of funds may lend it, and those in need of cash may borrow the funds supplied. Hence, the equation: aggregate savings equals aggregate investments (Harris, 2010).

The demand side consists of: those in need of cash flows (daily operational needs); those in need of interim financing (bridge financing), and those in need of long-term funds for special projects (capital funds for venture financing).

The supply side consists of: those who have aggregate savings (retirement funds, pension funds, insurance funds) that can be used in favor of the demand side. The origin of the savings (funds) can be local savings or foreign savings. Pensions or savings can be invested for school buildings; orphanages; or for road networks (toll ways) or port development (capable of earnings). The earnings go to the owner (Savers or Lenders) and the margin goes to the banks. When the principal and interest are added up, it will reflect the amount paid for the user (borrower) of the funds and interest percentage for the cost of using the funds (Harris, 2010).

2.2.7.2 Trends in Private sector credit to GDP ratio vs RGDP from 2003-2014

Figure 2.7: Private sector credit and economic growth



Source: http:\\www.reservebank.co.za

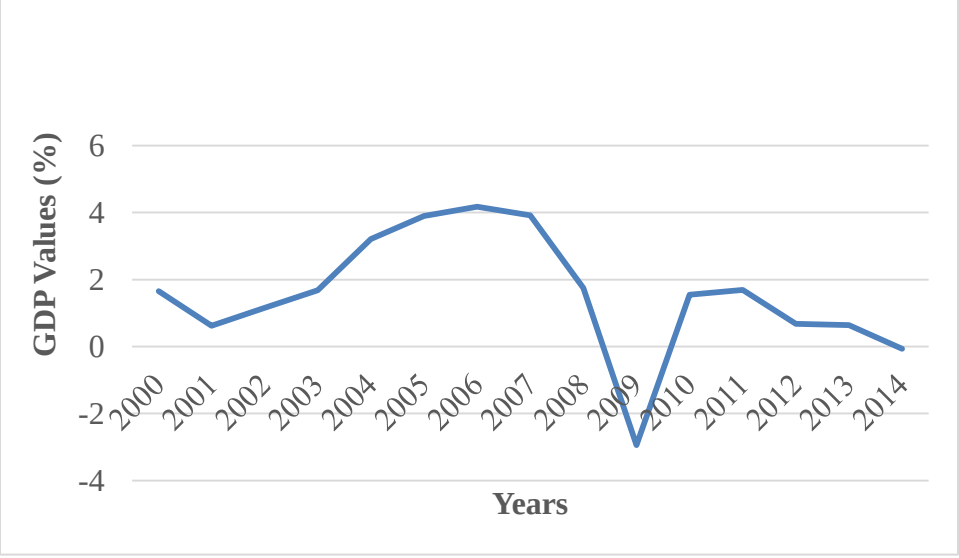
Figure 2.7 illustrates that the private sector credit to GDP has an upwards trend from 2003 to the 2008 first quarter. In the next year, 2009, there was a decline. In addition, the graph shows that the economic growth has perpetual fluctuation over time and that the economy will continue falling down. Figure 2.7 also shows the relationship between private sector credit to GDP ratio and economic growth, as evident in the graph above.

2.2.8 Economic growth

The main purpose of this study is to examine the impact of the bond market on economic growth, therefore, it is necessary to review the manner in which South African economic growth has been performing in response to development on the Johannesburg Stock Exchange (JSE). South African economic growth is determined by a number of factors, such as the labour force, capital, investments, etc. However, the effectiveness of all these factors is determined by the

strength of South African financial sectors, comprised of the banking sector and the financial markets. In recent times, the South African financial markets contributes a significant amount towards economic growth through its direct and indirect impact on investment and other factors. As highlighted in the World Competitive Report (2009-2010), the South African Economy is the largest in the Sub-Saharan African region and it is performing well in terms of quality institutions, resource allocation, accountability of private institutions and good market efficiency. South African financial markets have been highlighted as the engine of the South African sustainable economy. Even though the economic performance declined from the last quarter of 2008 to the last quarter of 2009, because of the financial crisis, it managed to pick up again in 2010; this was because of its sound financial system and strong macroeconomic policies. In 2011, the economy declined for many reasons, such as the workers' strike, specifically that of the mine workers. (Businessday, 2011). Figure 2.8, below, presents the trend of real GDP; it shows that there has been a positive trend even though there is currently a negative trend.

Figure 2.8: Real Gross Domestic Product from 2000-2014



Source: International Monetary Fund: www.imf.org.

2.2.9 Conclusion

This chapter presented an overview of the development of financial markets and economic growth in South Africa; the performance of financial markets, specifically bond markets; the background to financial markets; participants in financial markets; and trends in financial market indicators. This chapter exposed patterns in trends and patterns in the financial markets. The graphs presented in this chapter provide just a cursory look at these trends; the next chapter, will focus on both the theoretical and empirical literature underpinning the study.

CHAPTER THREE

LITERATURE REVIEW

3.1 Introduction

In this dissertation, the role of bond markets, banking sector development and stock market development in economic growth and the role of economic growth in the bond market, banking sector development and stock market development are investigated from a South African perspective, using time series data over the period 2003-2014.

The relationship between financial markets and economic growth has been an important topic of research debate for a long time. Developed financial systems can influence economic growth by improving information on firms and economic conditions, providing capital to investors and minimizing investor risks. Schumpeter (1934) explains that financial intermediaries improve economic development by shifting capital to entrepreneurs, mobilizing savings, managing risk, and facilitating transactions.

This Literature Review is organized as follows: Section 2 reviews the different theories that have been developed, so as to explain the economic growth; in other words, this section provides a review of the existing literature. In addition, the empirical studies that have been conducted on the effect of bond markets on economic growth are presented in Section 3 of this chapter.

3.2 Theoretical Literature

3.2.1 Classical growth theory

The term ‘classical economics’ is attributed to Karl Marx (1847) who used the term to describe David Ricardo’s formal economics. Generally, the term has been associated with economic thought pertaining to the period 1776 to 1870. Adam Smith’s work, *An enquiry into the nature and wealth of nations* (1776) marks the formal birth of classical economics.

The Classical Growth Theory (CGT) argues that real GDP growth is a transitory phenomenon and that a rise in real GDP per capita over the subsistence level is on the basis of this gloomy

prediction. There are various assumptions that the classical growth theory explains, such as savings and investment, machine depreciation, changing population, expectations and gestation period.

Zero profits in the stationary state are entailed by the J.R. assumption that savings and investment necessarily equal profit. When capitalists are given the rate of interest, they save a constant proportion of their income. However, this proportion may be changed by a change in the rate of interest. Zero savings and, hence, the stationary state may now emerge with a positive rate of profit. Owing to the unit elasticity of expectations for profit rates, investment becomes infinite elasticity at the level at which the interest rate equals the profit rate, and competition ensures the equality of the two rates. The profit rate is the natural rate of interest and, if the market rate exceeds it, no one will invest; if the market rate is below it, there is an infinite demand for loans so long as the rates are regarded as certain to continue. Thus, investment is very rapidly brought into equality with savings and savings may be regarded as determining investment via the interest mechanism.

The assumption that machines are everlasting, and give them a definite life. If savings assumptions are made, it can simply be assumed that all the gross profits are saved. However, on the relaxed assumption that savings are only a part of capitalists' income, then depreciation necessitates the capitalists' income. The assumptions that the capitalists' income, which enters into the savings function is whatever is left over after worn-out machines have been replaced (this causes no difficulty on a one technique model, but may be a paradoxical depreciation system when growth occurs and depreciations allowance are in excess of the sum required for replacement). The introduction of depreciation does not modify the essential form of the growth story, although growth is obviously slower than if machines did not need replacing and the stationary state output is lower. A constant rate of growth is still implied by a constant growth and a constant proportion of gross investment. As the wage rate rises, and growth slows down, replacement comes to form an ever higher proportion of gross investment, until there is no net investment.

In this assumption, the population grows at a constant rate; this rate is autonomous. The wage rate, it is assumed, does not become a function of the proportion of the population employed in the industrial sector. It is now possible to have a constant wage rate between the minimum rate and the maximum rate appropriate to a stationary state. This occurs when the rate of growth of capital and, consequently, employment and income equals the population growth rate. Initially the story starts with constant growth at a minimum wage rate, the growth rate is higher than the population growth rate. If the population falls, e.g. from a stationary state, then the wage rate rises and the rate of profit falls (perhaps becoming negative) until savings are sufficiently negative for the rate of decline of machines to equal that of population.

There is an assumption that capitalists expect the current rate of profit to continue, which is all very well when it does, as when there is a reserve army of labor, or when there is a golden age. However, during the transition, it implies that capitalists are always losing money. They borrow at perhaps 10 per cent, expecting with certainty that the machines they build or buy will yield good returns, taken over the course of their lives is less.

Assume that the intervals between the application of at least some of the inputs of labor and the completion of the machine are of significant length. The first complication which this introduces is that the rate of interest enters into the prices of a machine. When the wage rate rises it is now possible for the price of the machine to fall, because the influence of a lower rate of interest may outweigh the higher wage. Nevertheless, the rate of profit on capital must fall when the wage rate rises. This can be shown by a reduction *ad absurdum.* Suppose the rate of profit does not fall with the rise in wages; this entails that the price of machines falls in the same proportion as profits per machine, which obviously fall with a rise in wages. However, when wages rise, the price of machines can fall only if the rate of profit falls contra hypothesis. Growth is complicated, but not materially altered, by the fact that positive or negative investment may now occur within the investment sector. When growth is at a constant rate, investment in the investment sector is positive and growing at the same rate. In every period inputs of labor increase by the same proportional amount; this increase is representative of investing in the investment sector. However, as the rate of growth of capital falls off, investment in this sector will also fall off, and then become negative when total profits begin to fall.

3.2.2 Classical growth Model

Goodwin's model is a one-sector, one-asset growth model in which the product market is always cleared and asset equilibrium is always maintained. Furthermore, Goodwin assumes a fixed output capital ratio (σ), full capacity utilization, and exogenous and constant exponential rates of labor augmenting technical progress (α), and growth of labor force (β). As such, this model resembles the Harrod / Domar growth model. Yet, by virtue of assuming a dynamic labor market reaction function, à la Marx / Friedman, and an extreme classical savings function, his model generates closed business cycles rather than Harrod explosive movement away from the 'Knife edge'(Goodwin, 1967).

3.2.3 Neoclassical growth theory

When thinking about economic growth, a natural starting point is the Solow–Swan growth model (1956). This model can be seen as the benchmark for what is now called the neoclassical theory of growth. The Solow-Swan model aims to provide a theoretical framework for understanding world-wide growth of output and the persistence of geographical differences in per capita output. Aggregate output (y) depends on capital (k) and labor (l) according to constant returns to scale production function. Technological progress is introduced in terms of an aggregate parameter (A) reflecting the current state of labor augmenting technological knowledge. The model assumes constant returns to capital (K) and effective labor input (AL), and perfect competition. The productivity parameter (A) is supposed to grow at an exogenously determined constant rate (g). The growth rate of the labor force (n) as well as the saving rate (s), are assumed to be constant and exogenous.

It takes as given the behavior of the variables that are identified as the driving force of growth. That is, it explains growth by simply postulating its existence. Furthermore, although the Solow- Swan model fits some stylized facts, when used for growth accounting, the model is unable to explain growth rate of output by relying on the accumulating of physical inputs (capital & labor), once output growth is corrected for the increase in physical inputs, a large and persistently positive residual remains: the so-called Solow-residual. Therefore, factors other than capital accumulation and an increasing labor force should be held responsible for most of the economic growth that has occurred. The Solow residual is often referred to as the "measure

of our ignorance". It captures the fundamental driving force behind economic growth, namely, technology progress.

3.2.4 Endogenous growth theory

Endogenous growth theory encompasses a class of models that goes beyond Solow-Swan, but an attempt to endogenize technology was made by Arrow (1962), who assumed that the growth rate of the effectiveness of labor is the result of workers' cumulative experience in producing commodities or, in other words, the result of "learning by doing". This implies that labor productivity is now endogenous, being an increasing function of a cumulated aggregate investment by firms. An important characteristic of the Arrow model is that learning is conceived as a public good, it is the level of experience at the level of the whole economy, and can be applied by all firms at no cost. This also means that in deciding how much to invest, firms ignore the fact of their investment in the total amount of knowledge in the economy because the effects are external to each individual firm. A major step forward in endogenizing technological progress was set by Romer (1986), who builds upon the contributions of Frankel (1962) and Arrow (1962). The basic idea of his approach is that technology grows in population to the macroeconomic capital stock, potentially offsetting the effect of diminishing returns. Capital, in such a setting, should be considered a broad concept, including human and intangible capital. This approach is currently known as the "AK approach" because it results in a production function of the form Y=AK with a constant. The essential idea of the Romer (1986) model is that knowledge can be considered as a kind of renewable capital good, where k should be interpreted as knowledge. Within the model, long-run growth is determined by the still unintended accumulation of knowledge through representative individuals who maximize intertemporal utility (Ramsey model).

The crucial assumption in the Romer model is that knowledge does have a nondecreasing marginal product, that is, $\alpha + \beta \geq 1$. This can be interpreted as allowing for nondecreasing social returns to capital (knowledge), which result in nondecelerating growth. In contrast to the Solow-Swan model of growth, a positive growth rate of output can be sustained without population growth and the exogenous growth of technology progress. It should be noted that this class of models has a knife-edge character due to the assumption of constant returns to scale with respect to reproducible factors. Any deviation from this assumption will have significant

effects in the (very) long run. With slightly decreasing returns, growth will have significant effects in the (very) long run; whereas, with slightly increasing returns, growth will accelerate indefinitely (Romer, 1986). As a consequence, the explanatory power of endogenous growth models, in respect of the changing technology variable for the long run, cannot be taken too literally. Endogenous growth models, despite their knife-edge character, yield useful insights into the process of endogenous technological change for long periods of time, although not indefinitely.

The endogenous growth theory tries to explain the link between financial development and economic growth. Financial systems may affect economic growth by providing such functions as facilitating the trading, hedging, diversifying, and pooling risk. These functions affect growth by influencing the rate of capital formation. Levine (2005) argues that "…financial systems influence growth by easing information and transaction costs and thereby improving the acquisition of information about firms, corporate governance, risk management, resource mobilization, and financial exchanges." Functions provided by financial systems are classified, by Levine (2005), as follows. In particular, financial systems produce information about possible investments and allocate capital accordingly, monitor investments and exert corporate governance, facilitate the trading, diversification, and management of risk, mobilize and pool savings, and ease the exchange of goods and services. McKinnon (1973) and Shaw (1973) show that countries with high economic growth also have developed financial markets and, in those countries, developed financial markets lead to higher economic growth by increasing the size of savings and improving the efficiency of investments.

Bond markets worldwide are increasingly being recognized as an important component of financial development. Accordingly, they should be analyzed as an integral part of any well-functioning financial market. In many ways, the banking sector and bond market complement each other (Eichengreen & Luengnaruemitchai, 2004; Fink, 2003; Herring & Chtusripitak, 2000; Wachtel, 2001). A well-functioning bond market sets benchmark interest rates for all debts with varying risk and maturities, which promotes the efficient use of resources for economic growth.

Furthermore, in their role as financial intermediaries, banks provide essential services. In addition to the obvious role of gathering deposits, banks help to reduce information asymmetries by issuing securities and holding sizeable volumes of bonds (Booth & Smith, 1986; Hawkins, 2002). In the absence of bond markets, banks tend to have reduced opportunities for investing deposits. These surplus deposits may then put the bank into a position where they may fund suboptimal or unsound loans. This scenario affects the risk profile in two ways: first, there is the risk of default on the portfolio of unsound loans; second, as the bank is involved in these riskier loan portfolios, their opportunity to manage overall risk through the use of derivatives, such as options, futures and swaps is reduced. To illustrate, in general, banks are constantly exposed to a problem of maturity mismatch because their deposits are largely short term while their loans are generally made with much longer maturities. In addition, banks often borrow in foreign currencies and make loans in their home currency, thus creating the problem of currency mismatch in addition to the maturity mismatch problem.

3.3 Empirical Literature

Most of the empirical studies give evidence of a positive relationship between financial development and economic growth; some of them show that the level of financial development is a good predictor of future rates of economic growth, capital accumulation, and technological change (Levine, 1997). The positive relationship between the development of the financial sector and economic growth, as predicted by endogenous growth literature, has received impressive empirical support in the recent years, particularly from cross-country studies. The studies show not only the consistent relationship between finance and growth but also the strong predictive power of the aggregate measures of finance and growth over a period of 10–30 years, while arguing that better financial systems stimulate faster growth in productivity by channeling society's resources to promising productivity-enhancing endeavors.

Atje and Jovanovic (1993) empirically tested the implications of their model on a sample of 40 developing and developed countries. Using two proxies of financial development, one measuring bank intermediation and the other approximating stock market activity; the authors found that, only the indicator of stock market activity performed well. Therefore, the authors concluded that stock markets improve long-term growth in per capita GDP. In contrast, Harris

(1997) concludes that stock market activity has, at best, weak explanatory power for long-term growth in per capita output. He used data from 49 of the 60 countries that had official stock markets in 1991, covering the period 1980-1991. His paper was a direct response to the work of Atje and Jovanovic (1993), and it criticised their methodology.

Rousseau and Wachtel (2000) confirmed these findings using data for 47 countries over the period 1980-1995. In order to account for potential endogeneity between growth and finance, they applied a two-stage least squares regression model. The findings of their cross-sectional regressions suggest an impact of value traded, but not of market capitalisation (both scaled by GDP), on growth. Using a panel vector-auto regression model, they found evidence for causality running from both stock market indicators (per capita value traded and market capitalisation, scaled by a price index) to economic activity.

Arestis, Demetriades and Luintel (2001) conducted a time-series analysis using data on five industrialised countries, covering the period 1968-1998. They used indicators such as stock market capitalisation (scaled by GDP) and volatility for all countries, but only value traded (scaled by GDP) and turnover ratio for the UK and the USA. They reported that stock markets have made significant contributions to growth in Germany, Japan and France. The effect of stock markets, however, is weaker than the impact of banking. In the USA and the UK, the link between finance and growth is not very robust, and seems to run from growth to finance.

Cheung and Lilian (1997) studied the link between stock market and aggregate economic activity using Johansen's cointegration approach and quarterly data for Canada (1957:1-1992:2), Italy (1970:1-1991:1), Germany (1960:1-1992:2), Japan (1957:1-1992:2) and the United States of America (1957:1-1992:2). To measure stock market activity, the market index was used, and to measure aggregate activity, crude petroleum price index, *M* money supply as defined by M1, GNP gross national product and total personal consumption were used. The results reveal that, generally, turns on stock indexes are related to changes in macro variables, however, this does not imply a very strong relationship between the two variables. This might result from the use of an inappropriate measure for stock market activity for the selected countries.

Harris (1997) also assessed the role played by stock market development on economic growth using the two-stage least squares for a sample of less developed countries and developed countries, over the period 1980-1991. The results reveal that stock market development has an insignificant effect on growth in less developed countries, while it does play a role in developed countries, even though its significance is low. Further, considerable evidence highlights the importance of liberalization for stock market development; therefore, the inability of the stock market to significantly influence growth in these countries might have been due to the view that some developed and underdeveloped countries were not liberalized during the period under study.

Rousseau and Wachtel (2000) conducted a panel study on the importance of the equity market on economic growth for a set of 47 developed countries, over the period 1980 to 1995, using the Vector Autoregression (VAR) model. To estimate VAR, the general method of moments was used and the ratio of M3 was used as a control variable. The results support the importance of stock market development for economic growth.

A similar study was carried out by Arestis (2001), for a sample of five developed countries: Japan (for the period 1974:2-1998:1); Germany (for the period 1973:3-1997:4); United States (for the period 1972:2-1998:1); United Kingdom (for the period 1968:2-1997:4) and France (for the period 1974:1-1998:1). The study employed market capitalization as a measure of stock market development and real GDP as a proxy for economic growth. The authors argued that, aside from stock market development, there are many variables that also have a significant influence, hence, stock market volatility and the commercial banking sector were employed as control variables. Johansen's Cointergration approach in a VAR frame was used to test the link between the two variables. For France, Japan and Germany, the findings reveal that both stock market development and banking sector development contribute to economic growth. However, the authors further indicate that the contribution of the stock markets to economic growth in these economies is, at best, a small fraction of that of the banking sector. For the United Kingdom (UK) and the United States (US), the results indicate that the link between financial development and economic growth is statistically weak and even the weak relationship that

exists may flow from economic growth to financial development. This may be attributed to high stock market volatility, which negatively impacts both financial development and economic growth in the UK and the US. In conclusion, the authors suggest that the importance of the stock market for economic growth must be viewed with caution, taking into consideration the specific aspects for every country.

Durham (2002) argued that the effect of stock market development on economic growth varies from country to country, depending on the initial level of income. This was proven when a study for a sample of 64 countries, over the period 1981 to 1998, was conducted; the results revealed that the influence of stock market development on economic growth is greater in high income countries than it is in low income countries. It has also been found that stock price appreciation improves private investment in rich countries.

Abu-Sharia and Junankar (2003) used a panel estimation technique to carry out a similar study for a sample of 11 Arab countries, for the period 1980 to 2002. Similar measures of stock market development and economic growth were used. Investment rates, labour force, government consumption, inflation rate and openness of the economy were employed as control variables. The study witnessed a positive relationship between stock market development and economic activities. Further, the authors highlighted that the liberalization of civil and public rights contributed towards economic growth, as it influences the main factors of economic growth such as the financial system.

A causal relationship between stock market development and economic growth was explored by Caporale, Howells and Solima (2004) for the period 1977:1 to 1998:4, using the VAR technique developed by Toda and Yamamoto (1995), for a sample of seven countries - Argentina, Chile, Greece, Korea, Malaysia, Philippines and Portugal. They used market capitalization and liquidity as measures of stock market development, GDP as a proxy for economic performance, and bank deposit liabilities and ratio of claims on the private sector as proxies for banking development. The results show that a well-developed stock market can foster economic growth in the long run; with both measures of stock market development, the results further indicate that stock market development causes economic growth in four countries (Chile, Greece, Korea,

and Malaysia). However, for the Philippines, only liquidity (turnover ratio) causes economic growth. According to the author, this proved liquidity of the stock market as a more significant measure of stock market development as compared to stock market size; this is because a country may have a relatively large stock market in terms of size, yet it may constitute only a small amount of its GDP.

Hodroyiannis and Lolos (2004) studied the impact of financial development for Greece, using both banks and stock market development to proxy financial development, for the period 1986 to 1999. The VAR model and Error correction models were used to test the link between the two variables. The two analyzed models revealed a link between the two variables, however, the direction of the relationship is different, and the VAR model shows a bidirectional relationship between financial development and economic growth for both bank and stock market development. The Error correction model confirms that financial development promotes economic growth in Greece, although their effect is weak in the long run. Further, the role played by stock market development is weaker in comparison to banking development. The insignificance of the contribution by the stock market, in Greece, is associated with the fact that it is less developed and this requires the development of policies that will encourage the development and involvement of the stock market in the economy, through policies such as stock market liberalization.

The importance of the creation of stock exchanges for economic growth was assessed by Baier *et al.* (2003) using yearly data from a sample of developed and developing countries, over the period 1871 to 1990. The results show that after a stock exchange opens, a country's growth tends to be faster relative to the rest of the world; this explains stock market development as a causal factor for growth. The results further indicate that the efficient allocation of financial resources is the primary channel through which the stock market impacts growth.

Using Johansen's cointegration approach, Nieuwerburgh *et al.* (2005) explored the case of Belgium, for the period 1830 to 2000, using similar measures of stock market development as the studies reviewed above. However, they also included bank development as another measure of financial development. The results indicate a strong link between the two variables,

especially in the period 1835 to 1973. Further, the author explained stock market development as a better forecaster of economic growth than a bank-based development, citing the removal of restrictions on trade and on the formation of limited liability companies as factors that enhanced the performance of the stock market in Belgium. The Granger causality results indicate a positive relationship between stock market development and economic growth.

Adjasi and Biekpe (2006) examined the impact of stock market development on economic growth for a sample of 14 African Countries using panel data analysis. The results reveal than stock market development plays a significant role in all these countries; however, this is only based on liquidity as a measure of stock market development. When including both market size and liquidity, the significance is more evident in countries that are classified as upper middle income. Furthermore, the author highlighted that there is still a need to improve the level of integration of stock markets and economic systems in African countries and that it can be done by promoting a need to raise capital in stock markets and through education.

A causal relationship between stock market performance and economic growth was assessed by Duca (2007), using quarterly data for a sample of five countries for different periods: France and Japan (1957:Q1-2004:Q1), Germany and the United Kingdom (1970:Q1-2004:Q4) and the United States of America (1957:Q1-2005:Q2). A unidirectional relationship between flow from stock market development measures to economic growth was found. However, for Germany, causality could not be found; according to the author, this is due to the fact that stock market capitalization for Germany is relatively small in relation to economic growth.

Deb and Mukherjee (2008) explored the causality between stock market development and economic growth for India using the Granger non causality test proposed by Toda Yamamoto (1995) for the study period (1996:Q4-2007:Q1). Stock market volatility, real market capitalizations and stock market activity were used as measures of stock market development. The results reported a bidirectional relationship between real market capitalization and economic growth, which is supported by a feedback hypothesis, while a unidirectional relationship flowing from both stock market activity and market volatility to economic growth is also suggested and this substantiates that for the Indian economy both the supply leading

hypothesis and the feedback hypothesis are applicable, depending on the variable that has been used to assess the development of the stock market.

Nowbutsing (2009) conducted a similar study for Mauritius, for the period 1989 to 2006, using the simple two step Engle-Granger cointegration technique. Trade liberalization, political stability, institutional factors, Human Capital and Foreign Direct Investment (FDI) were used as control variables. The results suggest a positive impact of stock market development on economic growth and the author further emphasized the importance of stock market development as a determinant of economic growth, thus suggesting that the country should continue to facilitate investment by accommodating stock market operation in their policy decisions.

Vazakidis and Adimopolous (2009) provided empirical evidence on the relationship between stock market development and economic growth, for the period 1965 to 2007, in France. The study used the Vector Error Correction Model (VECM) as an econometric model and the general stock market index to measure stock market development and interest rates as a control variable. The results confirm a long-run relationship between stock market development and economic growth. Furthermore, the results confirm a causal relationship flowing from economic growth to stock market development was found and the authors concluded that it can be inferred that economic growth positively impacts on stock market development while interest rates are negatively related to stock market development.

Ewah, Esang and Bassey (2009) studied the importance of capital market efficiency towards growth, over the period 1961 to 2004, for Nigeria. The results from the Ordinary Least Squares (OLS) reveal that the Nigerian capital market has not yet contributed much towards economic growth. However, it has the potential to do so, which depends on quite a number of factors, such as improving the level of market capitalization, liquidity and reducing the level of misappropriation of funds, amongst others. This, therefore, means that both monetary and fiscal policy makers still have a lot to do to ensure financial development in Nigeria.

Tachiwou (2010) provides empirical evidence of the importance of stock market development on economic growth for West African Monetary union countries, over the period 1995-2006. The author employed the Simple two step procedure of Engle and Granger for empirical investigations; further, human capital and foreign direct investment were used as control variables. A positive relationship between the two variables was found for both long run and short run; the results further indicate that foreign direct investments and human capital are also crucial determinants of growth in West African Countries.

A similar study was carried out by Boubaraki (2010) for a sample of five countries, Belgium, Portugal, France, the Netherlands and the United Kingdom, for the period 1995:Q1 to 2008:Q4. Foreign direct investment was used as a control variable. To empirically examine this, a Granger Causality test was used and the results exhibit a long-run relationship between stock market development and economic growth; this confirms that liquidity of the stock market enhances economic growth in the future, even for developed countries. The results provided by Hossain and Kamal (2010) also reported a strong influence of the stock market on economic growth in Bangladesh, for the period 1976 to 2008; this was empirically done by employing market capitalization as a proxy for stock market development and real GDP at constant market price as a measure of economic growth. Further, a similar economic technique was employed by Boubaraki (2010) and the causality test results reveal a unidirectional relationship flowing from stock market development to economic growth.

Zermeno *et al.* (2011) also explored a similar study for Latin American and Southeast Asian countries, for the period 1980 to 2009. The study used a nonparametric panel regression model in order to test the pool ability of data; in addition, liquidity and market size were utilized as measures of stock market development. Investment intensity, in respect of output, population growth rate, inflation rate, government spending and the real growth rate on exports were used as control variables. The results indicate a negative influence of both stock market development and financial development on growth for Latin American countries. However, for Southeast Asian countries, only stock market development measures had a positive impact, further, this is attributed to a deep recession and economic crisis that took place in Latin American countries

which had a negative effect on the strength of their financial system and it disturbed savings channeling and investment.

Wong and Zhou (2011) also studied the impact of financial development on economic growth by focusing on stock market development as a proxy. Their study employed yearly data for China, the United Kingdom, Japan and Hong Kong, over the period 1988-2008, using cross country data. The results from panel data parametric models substantiate the importance of stock market development as one of the key drivers for economic growth in these countries.

A two-way causation and strong link between stock market performance and economic growth was found by Tuncer and Alovsat (2000), when they carried out a panel study using Granger causality for a sample of 20 countries including both developing and developed countries, over the period 1981 to 1994. A time series analysis was also conducted for each country to test the direction of the causality between the variable, however, the results on the direction are not robust and, according to the authors, this is due to insufficient data from other countries.

Udegbunam (2002) examined the implications of openness and stock market development on industrial growth in Nigeria, using time series data for the period 1970 to 1997. The empirical results from the Ordinary least squares (OLS) method reveal that stock market development and openness are both important determinants of Nigerian economic growth. A number of researchers found liberalization as an ingredient for stock market development in many countries, therefore, having these two variables working together can make a strong contribution to a country's economic development.

Howells and Soliman (2005) looked at the impact of stock market development on economic growth using quarterly data for the period 1979:1 to 1998:4 from four countries, namely, Chile, Korea, Malaysia and Philippines. A VAR model to measure stock market development and economic growth was employed. However, the authors argued that the main purpose of their study was not only to examine the impact of stock market development on economic growth, but, also to examine the channels through which it impacted economic growth. Therefore, investment, which is measured by investment productivity and level of investment, is included

as a control measure. The results confirm a positive relationship between stock market development and economic growth, flowing from stock market development to economic growth through productivity investment as a channel for all included countries. In conclusion, they emphasize the importance of a well-developed stock market in less developed countries as it promotes efficient investment which, in turn, enhances economic growth.

Choong *et al.* (2005) used Johansen's cointegration technique to test the long-run relationship between stock market development and economic growth for Malaysia. Discount rate and trade openness were used as control variables. The empirical results reveal that all stock market development measures positively impact economic growth and that there is a causal relationship between the two variables, which runs from the stock market development to economic growth. Further, they highlighted that stock markets tend to stimulate the economy when investment and trade policies are liberalized, because liberalization contributes to improving the regulation of financial markets and the stabilization of the economy.

Azermi *et al. (2005*) argued that the stock market in India was a casino for the post liberalization period and for the ten-year event study period. This is supported by the results from a study that they conducted, over the period 1981 to 2001. The results reveal that, in the Indian stock market ,a positive link between the two variables only existed before liberalization for a period of ten years which is a sub-period, then, after liberalization, there was a negative correlation for another ten years.

Bahadur and Neupane (2006) examined the causal relationship between the stock market and economic growth for Nepal, using annual data for the period 1988 to 2005. The study employed the granger causality test to test the causality between the two variables; the results reveal that stock market development plays a prominent role in economic growth. Further, the authors highlighted that stock market fluctuations can predict future economic growth changes and its leading role has been proven by the causal relationship flowing from stock market development to economic growth.

Naceur and Ghazouani (2006) carried out a similar study for a sample of 11 countries in the Mena region, for the period 1979 to 2003. The results reveal an insignificant relationship between stock market performance and economic growth, and a negative relationship between bank performance and economic growth. Furthermore, the authors argued that this is due to the underdevelopment of the financial systems in the assessed countries, which necessitates action by policy makers towards the development of those systems in order to strengthen the link between their financial markets and economic growth. However, this is too generalized, considering that a country such as Egypt is one of the countries with the best performing stock markets. Therefore, this raises the need to assess a country as an individual, in order to avoid generalizing and overlooking some important aspects of individual countries.

Riman *et al.* (2008) used the VECM to investigate the empirical association between stock market performance and economic growth, for Nigeria, for the period 1970-2004. The authors also employed a measure of bank development as a control variable. The results provide evidence that there is a positive association between stock market development and economic growth in Nigeria and the causality flows from stock market development to economic growth. The authors further highlighted that a market based financial structure in an economy makes a significant contribution to the efficient mobilization of investable funds from both the private and public sector, increasing social marginal productivity of capital and influencing private savings. In supporting this view, Okpara (2010) also points out the contribution of stock market development towards investment growth in Nigeria. This was found after the author tested the importance of financial market performance towards investment opportunity set, using the Johanson's cointergration approach.

Brasoveanu *et al.* (2008) analyzed a correlation between capital market development and economic growth for Romania, using quarterly data from 2000:1 to 2006:2. The study employed stock market size, liquidity and market index as measures of capital market development. The findings from the vector autoregressive methods confirm a bidirectional relationship between the two variables; however, the authors further indicate that even though the two variables influence each other, the strongest causality flows from economic growth to

capital market, which implies that economic growth is a determinant of financial development in Romania.

Nurudeen (2009) also explored a similar study for the case of Nigeria, over the period 1981 to 2007, using the Error Correction Model. The study included the all-share index as a third measure for stock market performance. It was found that market capitalization positively affects economic growth, which implies that an increase in stock market size enables firms to raise funds; this stimulates investment which, in turn, promotes economic growth. A significant negative impact of market liquidity on economic growth was also found, which may be due to the difficulties involved in the trading of shares, such as high transaction costs and a delay in the issuance of the shares certificate. The results reveal an insignificant effect of the all share-index on economic growth. The author recommends that the government should liberalize the Nigerian stock market, because impediments discourage investment which, in turn, impacts economic activities. In addition, the study suggests that the Nigerian security and exchange commission should improve the trading system, as this will improve the performance of the stock market.

A positive long run relationship between the two variables was witnessed by Shafii and Aziz (2009) when they carried out a study, using the Johansen's cointegration approach for 20 Organization of Islamic Cooperation (OIC) countries, for the period 1989 to 2006. The results suggest a positive impact of market capitalization and turnover ratio on economic growth in six countries: Malaysia, United Arab Emirates, Turkey, Egypt, Bahrain, and Uzbekistan. It has been proven that for all these countries there is only one cointegrating vector, and this can also be used to further examine the causality between the variables, as a causality test explains the direction of the relationship between the two variables.

Furthermore, a relationship between stock market and macroeconomic variable levels was examined by Cagli *et al*. (2010) using the Gregory Hansen test for cointegration for the Istanbul Stock exchange, over the period January 1998 to December 2008. Exchange rates, oil price, inflation rate, gross domestic product and money supply were used as macroeconomic variables. To measure stock market performance, stock price changes were employed and the results

reveal that the stock market index level is cointegrated with gross domestic product, oil price and industrial production. However, the authors suggested that the macroeconomic policy in Turkey should be amended in order to make it appropriate for global macroeconomic and financial conditions. Further, improvements are also needed to reduce instabilities in the economy of Turkey.

Donwa and Odia (2010) analyzed the impact of the Nigerian capital market on socio-economic development using yearly data for the period 1981 to 2008. To measure socio-economic development, the study employed GDP and market capitalization, total new issues, volume of transaction and total listed equities as well as government stock as measures of capital market development. The results from Ordinary Least squares reveal that some measures of capital market development have an insignificant impact on growth; furthermore, the authors recommend that the Nigerian government should set up measures in order to stimulate investors' confidence and activities so that it can play a meaningful role in economic development.

Zivengwa *et al.* (2011) also carried out a similar study for Zimbabwe, using the VAR model and Granger causality test, for the period 1980 to 2008. Investment was used as a control variable. The results confirmed a strong relationship between stock market development and economic growth and a causal relationship was found: one running from stock market capitalization to economic growth and another flowing from economic growth to stock market turnover ratio. This shows that there are still uncertainties about which theory is valid for Zimbabwe, as both the Supply leading and Demand following hypotheses have been confirmed in this study. Further, the results reveal that stock market size only affects economic growth through investment, emphasizing it as the main channel through which the Zimbabwean stock market impacts economic growth.

A Granger causality test was carried out by Suliman *et al.* (2011) for Sudan, for the period 1995-2009. The results suggest a bidirectional relationship between stock market size and economic growth, whereas a unidirectional relationship was found to flow from stock market

liquidity to economic growth. However, according to the authors, the overall results indicate that stock market development plays an important role in economic growth.

The effect of stock market performance on economic growth in Nigeria was assessed by Ohiomu and Enabulu (2011), for the period 1989 to 2008, using the =OLS model. Furthermore, technology and labour were employed as control variables. The results reveal that a positive relationship exists between stock market development and economic growth; however, it is weak and insignificant. According to the authors, this resulted from the inflexibility of the Nigerian economy, policy instabilities and inefficiencies that were experienced during the period under study. This calls for reconsideration of a country's policies that are put in place, so as to ensure the development of crucial components of the economy.

Adam and Sanni (2005), cited in Kolapo and Adaramola (2012), examine the role of the stock market on Nigeria's economic growth, using the Granger-causality test and regression analysis, over the period 1992-2010. The authors discovered a one-way causality between GDP growth and market capitalization and a two-way causality between GDP growth and market turnover. Afees and Kazeem (2010) critically and empirically examined the causal linkage between the stock market and economic growth in Nigeria between 1970 and 2004, using the VAR model; the results showed that capital market development drives economic growth.

Osinubi and Amaghionyeodiwe (2003) also examined the relationship between the Nigerian stock market and economic growth, during the period 1980-2000, using ordinary least squares regression (OLS). The results showed that there is a positive relationship between stock market development and economic growth and suggests the pursuit of policies geared towards the rapid development of the stock market.

Ewah, Esang and Bassey (2009) appraise the impact of capital market efficiency on the economic growth of Nigeria, using time series data from 1963 to 2004. They found that the capital market in Nigeria has the potential to induce growth but it has not contributed meaningfully to the economic growth of Nigeria because of low market capitalization, low absorptive capitalization, illiquidity and misappropriation of funds, amongst others. Harris

(1997) did not find hard evidence that stock market activity affects the level of economic growth. Furthermore, Osinubi and Amaghionyeodiwe (2003) examine the relationship between the Nigerian stock market and economic growth, during the period 1980-2000, using VAR model. Their findings did not support the claim that stock market development promotes economic growth.

Ben, Naceur and Ghazouani (2007) carry out research on the influence of stock markets and bank system development on economic growth, with a sample of 11 Arab countries, over the period 1992-2012. It was discovered that financial development could negatively influence economic growth in countries with underdeveloped financial systems, and they stress the role of building a sound financial system. Chee, Zulkornia, Siong and Venus (2003) used a VAR model, over the period of 1985-1996. They discovered that stock market development has a significant positive impact on economic growth in Malaysia and they reported that stock market development Granger-causes economic growth. In the same vein, Liu and Hsu (2006) used the same methods of estimation, over the period 1990-2003, and indicated that capital market development has a positive impact on economic growth in Taiwan, Korea and Japan. These results were supported by Muhammed, Nadeem and Liaquant (2008) who used the same methods of estimation, over the period 1993-2011; they found that there is a long-run relationship between stock market development and economic growth.

Levine and Zervos (1998) have focused on the relationship between economic growth and financial system development using both banks and stock market indicators. They tested this relationship for a sample of 42 countries over the period 1976–1993 using cross-sectional regressions. They found that the initial level of stock market development liquidity and the initial level of banking development are positively and significantly associated with long term economic growth, productivity growth and capital accumulation. They also find that stock market size, as measured by market capitalization divided by GDP, is not correlated with growth indicators. However, Harris (1997) shows that this relationship is, at best, weak by estimating the same model for 49 countries, over the period 1980–1991.

Moreover, Hondroyiannis, Lolos and Papapetrou (2005) empirically evaluate the relationship between the development of the banking system and the stock markets, using the VAR model over the period of 1986-1999, in Greece. The empirical results show that both banks and stock market financing can promote economic growth in the long-run, although their effect is small. Furthermore, the contribution of stock markets in financing economic growth appears to be substantially smaller compared to bank finance.

Christopoulos and Tsianos (2004) investigate the long-run relationship between financial depth and economic growth. They used the data in the most efficient manner via the conduction of panel unit root tests and panel cointegration analysis, from 1975 to 2000. In addition, they used threshold cointegration tests, and dynamic panel data estimation for a panel-based vector error correction model. The long run relationship is estimated using fully modified OLS. For 10 developing countries, the empirical results provide clear support for the hypothesis that there is a single equilibrium relation between financial depth, growth and auxiliary variables, and that the only cointegrating relation implies unidirectional causality from financial depth to growth.

Harvey (1989) evaluated bonds markets and economic growth using VAR model over the period of 1995-2010 in the United States of America (USA). They found that the bond market is a better predictor of economic growth than the stock market. Moreover, Fink (2003) examined the impact of bond market development on real output using VAR model in 13 highly developed countries, over the period of 1950–2000, and found evidence that bond market development influences real economic activity. However, Abbas and Christensen's (2007) study, which evaluated the role of domestic debt makers for 93 low-income countries and emerging markets over the 1975–2004 period, using VAR model, shows little statistical evidence linking the growth of corporate bond markets to economic growth.

3.4 Conclusion

This chapter examined the effect of bond markets on economic growth, which is a subject that has largely been ignored in the empirical literature. It stands to reason that bond markets complement banks and stock markets in deepening the financial market of an economy. For instance, in the absence of bond markets, banks tend to become overcapitalized, which may lead

them to make suboptimal or unsound loans. With well-developed bond markets, banks invest in bonds and, in so doing, reduce information asymmetries which promote the efficient use of resources. This is the reason that the World Bank urged developing countries to accelerate the deepening of their domestic bond markets long before the financial crises in Asia, Russia and Latin America, in the late 1990s (Dalla, Khatdhate, Rao, Kondury, Jun & Chuppe, 1995).

It is evident, through a review of previous studies, that the impact of the bond market on economic growth is an area which is still at its infancy, possibly because the market has been an insignificant portion of financial markets in Africa, but more specifically in South Africa. Most studies in this area have focused on either the impact of the banking sector or the stock market on economic growth (Easterly & Levine, 1997; Harris, 1997; Beck, 2003; Dailami & Atkin, 1990) and less attention has been paid to the impact of the bond market on economic growth.

The chapter discussed some theories on economic growth, while an empirical literature review illustrated the discussions in this chapter. Most of the empirical studies presented in this chapter used a VAR analysis and Vector Error Correction model, which has recently become a popular tool employed in empirical studies on the effect of financial markets and economic growth. This study employs an ARDL approach, primarily because it is efficient for limited sample data between 30 to 80 observations and a large sample. In addition, both short-run and long-run coefficients could be obtained simultaneously. Given these advantages, the current study uses ARDL methodology.

CHAPTER FOUR

METHODOLOGY

4.1 Introduction

This chapter consolidates both the theoretical and empirical literatures developed in the preceding chapters to formulate an empirical model of the study. The chapter is divided into three sections, with the first examining and constructing the model specification to allow the construction of variables to be estimated in the study. The second subdivision outlines the construction of variables and data sources, while the final segment outlines different econometric techniques to be used in performing the model estimation of the study. The chapter closes with a comprehensive and summative conclusion.

4.2 Model specification

The use of the bounds technique is based on three validations. First, Pesaran *et al*. (2001) advocated the use of the ARDL model for the estimation of level relationships because the model suggests that, once the order of the ARDL has been recognised, the relationship can be estimated by OLS. Second, the bounds test allows a mixture of I(1) and I(0) variables as regressors, that is, the order of integration of appropriate variables may not necessarily be the same. Therefore, the ARDL technique has the advantage of not requiring a specific identification of the order of the underlying data. Third, this technique is suitable for a small or finite sample size (Pesaran *et al*., 2001).

Following Pesaran *et al*. (2001), we assemble the vector autoregression (VAR) of order *p*, denoted VAR (*p*), for the following growth function:

$$Z_t = \mu + \sum_{i=1}^{p} \beta_i z_{t-i} + \varepsilon_t \quad \text{.....(1)}$$

Where z_t is the vector of both x_t and y_t , where y_t is the dependent variable defined as economic growth (GDP), x_t is the vector matrix which represents a set of explanatory variables i.e., bond market, equity (stock) market, banking sector and *t* is a time or trend variable.

According to Pesaran *et al*. (2001), y_t must be I(1) variable, but the regressor x_t can be either I(0) or I(1). A vector error correction model (VECM) was developed as follows:

Where Δz_t is the first-difference operator and λ is a long-run multiplier matrix

$$\Delta z_t = \mu + \lambda z_{t-1} + \sum_{i=1}^{p-i} \gamma_t \Delta y_{t-i} + \sum_{i=1}^{p-1} \gamma_t \Delta x_{t-i} + \varepsilon_t \quad \text{..... (2)}$$

$$\lambda = \begin{bmatrix} \lambda_{YY} \lambda_{YX} \\ \lambda_{XY} \lambda_{XX} \end{bmatrix}$$

The diagonal elements of the matrix are unrestricted, so the selected series can be either I(0) or I(1). If $\lambda_{YY} = 0$, then *Y* is I (1). In contrast, if $\lambda_{YY} < 0$, then *Y* is I(0).

The VECM procedures described above are imperative in the testing of, at most, one cointegrating vector between dependent variable y_t and a set of regressors x_t . To derive the model, we followed the postulations made by Pesaran *et al*. (2001) in Case III, that is, unrestricted intercepts and no trends. After imposing the restrictions $\lambda_{YY} = 0, \mu \neq 0$ and $\alpha = 0$, the GIIE hypothesis function can be stated as the following unrestricted error correction model (UECM):

$$\Delta(GDP)_t = \beta_0 + \beta_1 (GDP)_{t-1} + \beta_2 (BM)_{t-1} + \beta_3 (EQT)_{t-1} + \beta_4 (BS)_{t-1} + \sum_{i=1}^{p} \beta_5 \Delta(GDP)_{t-i} + \sum_{i=0}^{q} \beta_6 \Delta(BM)_{t-i}$$

$$+ \sum_{i=0}^{r} \beta_8 \Delta(SM)_{t-i} + \sum_{i=0}^{z} \beta_9 .\Delta(BS)_{t-i} + \text{.....(3)}$$

Where ΔGDP_t is the first-difference operator and u_t is a white-noise disturbance term

GDP = Gross Domestic Product

BM = Bond Market

EQT = Equity (Stock) Market

BS = Banking Sector

Equation (3) can also be viewed as an ARDL of order (p, *q*, *r*, *z*). Equation (3) indicates that economic growth tends to be influenced and explained by its past values. The structural lags are established by using the general to specific approach (ARDL). From the estimation of UECMs,

the long-run elasticities are the coefficient of one lagged explanatory variable (multiplied by a negative sign) divided by the coefficient of one lagged dependent variable (Bardsen, 1989). For example, in equation (3), the long-run banking sector, bond market and equity market elasticities are (β_2 / β_1) and (β_3 / β_1) respectively. The short-run effects are captured by the coefficients of the first-differenced variables in equation (3).

4.3 General to specific approach

The general-to-specific methodology has a clear strategy in model specification, estimation, and selection that largely overcomes the data-mining problem. The general-to-specific approach starts with a general autoregressive distributed lag model (ADLM) containing a range of variables suggested by economic theory. This general dynamic model encompasses a number of specific models (simple autoregressive, static, growth rate, leading indicator, partial adjustment, finite distributed lag, dead start, and error correction) and is reduced to these models by imposing certain restrictions on the parameters in the model. The final models are selected on the basis of various restriction tests and diagnostic statistics. It is well documented that the error correction model solves the problem of spurious correlation. As the general-to-specific approach starts with a general dynamic ADLM with the error correction mechanism embedded in the model, the spurious regression problem can be overcome by following the general-to-specific approach. (Song & Witt, 2003).

4.3.1 Akaike Information Criterion

The Akaike Information Criterion (AIC) is computed as:

$$AIC = -2l/T + 2k/T \quad \text{.....(4)}$$

Where l is the log likelihood.

The AIC is often used in model selection for non-nested alternatives — smaller values of the AIC are preferred. For example, you can choose the length of a lag distribution by choosing the specification with the lowest value of the AIC (Gujarati, 2004).

4.4 Empirical Model

Finally, from the above analysis, the study puts together the empirical dynamic behavioral framework of the simulation model in the model specification. This has been done to formulate an aggregative dynamic model to investigate the impact of the bond market on economic growth in both the short run and long run. In order to convert the model specified above in the previous section into a practical econometric model, the study thus uses the above data to construct variables to choose an efficient form based on the properties of the error term; in this regard, the functional form is added to an error term (see Griffiths *et al.*, 1998). Thus, the study will test various error correcting techniques as outlined in this section below.

To estimate the Gross Domestic Product (GDP) equation, the study basically uses two interrelated but dissimilar econometric procedures, using an Auto Regressive Distributed Lagged (ARDL) framework. The first section of the empirical testing will largely test the theory of the effect of bond market on economic growth by testing the model stability and oscillations in the variables. The subsequent section explores the properties of the model behavior in terms of the multiplier effect and dynamic response of the model using the general-to-specific approach of the ARDL econometric technique and error correction model.

4.4.1 Avoiding spurious regressions: pre-testing unit roots and other tests

To avoid spurious results, the study will implement a broad spectrum of preliminary tests which includes the unit root tests, stationarity, and test for cointegration.

Unit root tests are carried out on individual variables; that is, the study will check for unit root tests because it takes into account any relationship that may exist between the variables being tested and any other variables selected in the model (Cameron, 2005:366).

4.4.1.1 Stationarity

"Stationarity of a stochastic process requires that the variance and auto-covariances are finite and independent of time" (Verbeek, 2000:235). A stationary time series can be defined as one with constant mean, constant variance and constant auto-covariance for each given lag (Granger & Newbold, 1974). Since the study will implement ARDL, it is important that the data should be stationary. ARDL allows the model coefficient to be efficient and that they will exhibit error terms that will not be a declining effect on the current value of the dependent variable (Brooks,

2008). The study will adopt the ARDL econometric technique, which requires stationary variables rather than their levels. For simplicity, the following autoregressive structure is assumed:

$y_t = \beta_0 + \beta_1 \Delta x_t + p\varepsilon_t + \mu_t$ ..... (5)

The study defines stationarity as, $\Delta y_t = y_{t-1} - y_t$, then the regression will look as follows:

$\Delta y_t = \beta_0 + \beta_1 x_t + \mu_t$ ..... (6)

In this regard, given a regression model where a time series is non-stationary, the ARDL model would give rise to a spurious regression, biased t-ratios, incorrect inferences and the R-squared would be artificially high - close to 1. Generally, non-stationary variables might be transformed into stationary through differencing. For example, if variable X is differenced, say d-times and get stationary series, it means that X, integrated of order d, denoted by X (1). The study will use both the Augmented Dickey-Fuller (ADF) and the Phillip-Peron (PP) unit root tests.

4.4.1.2 Phillip-Peron test

The Phillip-Peron test (or Peron test) seems to be the main alternative stationarity test to the Augmented Dickey-Fuller test used by many researchers (Cameron, 2005:371). This study will implement the Phillip-Peron test as complementary to the Augmented Dickey-Fuller (ADF) test in order to test for unit roots in the variables. The Phillip-Peron test deals with structural breaks in the time series. The most desirable element of the Phillip-Peron test is that the structural breaks in the time series will be biased towards the acceptance of the null hypothesis of a unit root when the variable is stationary. This could be explained by saying that a sequence of two I (0) and I (1) series when these are treated as all one series with the same mean. Another great quality of the Phillip-Peron test adds a dummy variable to the equation.

After satisfying the unit root condition it goes on to check long run association of the variables through various cointegration tests.

4.4.1.3 Bounds testing for Cointegration

After regression of equation (3), the Wald test (*F*-statistic) was computed to differentiate the long-run relationship between the concerned variables. The Wald test can be carried out by

imposing restrictions on the estimated long-run coefficients of the banking sector, bond market, equity market and economic growth. The null and alternative hypotheses are as follows:

$H_0 = \beta_1 = \beta_2 = \beta_3 = 0$ (There is no long-run relationship)

Against the alternative hypothesis

$H_0 \neq \beta_1 \neq \beta_2 \neq \beta_3 \neq 0$ (The long-run relationship exists)

The computed *F*-statistic value will be evaluated with the critical values tabulated in Table CI (iii) of Pesaran *et al.* (2001). According to these authors, the lower bound critical values assumed that the explanatory variables x_t are integrated of order zero, or I(0), while the upper bound critical values assumed that x_t are integrated of order one, or I(1). Therefore, if the computed *F*-statistic is smaller than the lower bound value, then the null hypothesis is not rejected and we conclude that there is no long-run relationship between bond market and its determinants (i.e stock market, banking sector and GDP). Conversely, if the computed *F*-statistic is greater than the upper bound value, then bond market and its determinants share a long-run level relationship. Further, if the computed *F*-statistic falls between the lower and upper bound values, then the results are inconclusive. **4.5 Testing Model Behaviour: Multiplier and Dynamic Response**

It is imperative that the study conducts a fundamental analysis on the dynamic response of the model and is able to quantify the response by being able to calculate and examine the multipliers associated with the original model's exogenous variable (Pindyck & Rubinfeld, 1998:429).

4.5.1 Auto-Regressive Distributed Lag (ARDL) Model

In order to test both the theoretical and the empirical underpinnings of the study, the study uses an Autoregressive Distributed Lag model. The ARDL model enables the study to test the dynamic econometric analysis of the long run relations of the variables in the model. The ARDL are dynamic models that consist of distributed lag models and autoregressive models. The study adopted the ARDL model for a number of reasons, since economic growth portrays the time path of the dependent variable's (that is, GDP) relation to its past variables (Gujarati,

2004). The incorporation of the distributed lag model in the study is a result of the increased importance of lags in econometric models. These lags may arise from both technological and institutional factors; for example, suppose the price of capital relative to investment or adjustment cost, thus making investment feasible (Greene, 2012). If a drop in price of capital is expected to be temporary, firms may not rush to substitute capital or investments (Gujarati, 2004). Some institutional factors that might affect business and housing investment are contractual obligations that may prevent firms from switching from one source of capital or raw materials to another (Gujarati, 2004). The study then performs most of its analysis making use of ARDL techniques; ARs, in fact, have two major advantages. First, all the variables can be treated as endogenous. Second, it becomes possible, under certain conditions, to model at the same time both a stationary and non-stationary series.

The study employs the ARDL approach to capture the different fundamental parts to the dynamic model. The econometric estimation uses the general to specific ARDL technique.**4.6 Diagnostic Tests**

A significant role of hypothesis testing in econometrics involves diagnostic checking (King, Zhang & Akran, 2007). To test the model constructed in the earlier section of this chapter, the study adopts a typical test procedure involving the use of a test statistic and critical values in order to control the probability of wrongly rejecting the null hypothesis (King *et al.*, 2007). The study acknowledges the major problem of any econometric procedure on how best to control the overall probability of rejecting the model when its true and multiple test statistics are used. The study adopts various diagnostic tests on the coefficient, residual and stability diagnostics of the model. The proposed testing procedure of applied econometric tests is applied to test for serial correlation in an observed time series, in the residuals, and significance of coefficients in a dynamic regression model (King *et al.*, 2007).

4.6.1 Testing the significance of serial correlations

Gujarati (2004) defined autocorrelation or serial correlation as the correlation between members of a series of observation in time. In other terms, correlation is the observed relationship that exists between the disturbance terms in relation to any observed parameter in the model. The presence of autocorrelation can be shown as $cov\left(\mu_i, \mu_j\right) \neq 0$ for all $i \neq j$. In empirical literature, a frequently encountered problem is to test the null hypothesis that a time series is

white noise (King *et al.*, 2007); that is to say, the first level differenced serial correlation of a time series are zero. Basic econometric procedures such as the use of lagged values of variables in the regression through the constructing a series of lagged values and first differences. The process of lagged values can be constructed by shifting all the observations to one period in a spreadsheet (Brooks, 2008:143). Another popular, but not formal, way to test correlation is the use of the graphical exploration of the sample error term and the plotted error term of the previous period over time.

4.6.1.1 The Breusch-Godfrey Test

Since the DW test rests on many restrictive assumptions such as that, for DW test to be effectively applied the regression must have a constant and the regressors must be stochastic; furthermore, there must be no lags of dependent variables (Brooks, 2008:145). The study performs a Breusch- Godfrey test for serial correlation, the Breusch-Godfrey test is a more general approach to test for autocorrelation and it tests to the r order. It is also referred to as the Langrange Multiplier (LM) test[1]. The Breusch-Godfrey test basically involves three stages: the first stage requires the study to estimate the linear regression using OLS and obtain the residual of the error term $\hat{\mu}_t$ (Brooks, 2008:149). The next stage requires the study to regress the residual $\hat{\mu}_t$ on all of the regressors, thus giving:

$$\hat{\mu}_t = \gamma_1 + \gamma_2 x_{2t} + \gamma_3 x_{3t} + \rho_1 \hat{\mu}_{t-1} + \rho_2 \hat{\mu}_{t-2} + \rho_3 \hat{\mu}_{t-3} + \ldots + \rho_r \hat{\mu}_{t-r} + \mu, \varepsilon \sim N(0, \delta^2) \ldots (7)$$

to obtain the R-squared from the auxiliary regression (Brooks, 2008:149). The final stage of the Breusch-Godfrey test is to let T denote the number of observations, and then the test statistic of the Breusch-Godfrey test is given as:

$$(T - r)R^2 \sim \mathcal{X}^2 r \ldots\ldots (8)$$

With the Breusch-Godfrey test, unlike the DW test, only one part of the null hypothesis of no autocorrelation has to be rejected to lead to the rejection of the hypothesis as a whole (Brooks, 2008:149).

[1] See Gujarati, 2004:473

4.6.1.2 Testing for Normality

Empirical findings have shown that many researchers have often assumed random variables to be normally distributed. Therefore, this study acknowledges that testing for normality is a vital issue. The study will conduct a Jarque-Bera test as well as the modified version of the Jarque-Bera (MJB).

4.6.1.3 Jarque-Bera (JB) test

The Jarque-Bera test has been used by many researchers to check for normality in the regression analysis. The assumption that the sample must be normally distributed, thus $\mu_t \sim N(0, \delta^2)$ is essential in order to apply as well as conduct a single or joint hypothesis (Brooks, 2008:161).

The Jarque-Bera test combines information from the skewness. Kurtosis is generally given as $\sqrt{b_1}$ and b_1 , respectively (King, Zhang &Akran, 2007); the simplest construction of the Jarque-Bera is given as:

$$JB = T[\frac{(\sqrt{b_1} + b_1)^2}{6} + \frac{(b_1 - 3)^2}{24}] \quad \text{.....(9)}$$

The Kurtosis for a normally distributed regression should be equal to three and the residual should be symmetric about the mean. The coefficient of skewness and the coefficient of excess Kurtosis must be jointly zero (Brooks, 2008:163). The null hypothesis is of normality, and this could be rejected if the residuals from the model were either significantly skewed or leptokurtic/platykurtic (or both) (Brooks, 2008:163).

4.6.2 Testing for Heteroscedasticity

In order to get consistent standard errors, the study will need to get a model that is dynamically complete. Essentially, this means that the model has to have white noise error. It is imperative that the study conducts tests for the presence of heteroscedasticity in the tested variables. To detect heteroscedasticity, the study adopts various techniques of detecting as well as for correcting this heteroscedasticity. The following tests are considered in this study:

4.6.2.1 Breusch-Pagan-Godfrey (BPG) test

Despite the success of the Goldfeld-Quandt test in terms of empirical studies, which depended on the value of the intercept but also it identifies the correct X variable with which to order the

observations (Gujarati, 2004:411). The basic idea behind the BPG test is given as follows; consider the k- variable linear regression (Gujarati, 2004:411):

$$Y_i = \beta_1 + \beta_2 X_{2i} + \cdots \ldots \ldots . + \beta_k X_{ki} + u_i \text{ ....} (10)$$

Assume that the error variance δ_i^2 is described (Gujarati, 2004:411) as:

$$\delta_i^2 = f\ (\alpha_1 + \alpha_2 Z_{2i} + \ \ldots + \ \alpha_m Z_{mi}) \text{ ....} (11)$$

That is, δ_i^2 is some function of the non-stochastic variable Z_i's, some or all of the X's can serve as Z's, (Gujarati, 2004: 411) specifically:

$$\delta_i^2 = \alpha_1 + \alpha_2 Z_{2i} + \ \ldots + \ \alpha_m Z_{mi} \text{ ....} (12)$$

Assume that δ_i^2 is some function of Z's. If$\alpha_1 = \alpha_2 = \alpha_m = 0$, $\delta_i^2 = \alpha_i$, which is a constant; One can test the hypothesis $\alpha_1 = \alpha_2 = \alpha_m = 0$ using the BPG test (Gujarati, 2004:411).

4.7 Stability test

The CUSUM test (Brown, Durbin & Evans, 1975) is based on the cumulative sum of the recursive residuals. This option plots the cumulative sum together with the 5% critical lines.
The test finds parameter instability if the cumulative sum goes outside the area between the two critical lines.

The CUSUM test is based on the statistic:

$$W_t = \sum_{r=h+1}^{t} \omega_r / \partial \text{ ....} (13)$$

For $t = k+1, \ldots, T$, where ω is the recursive residual defined above, and s is the standard deviation of the recursive residuals ω_t. If the β vector remains constant from period to period, $E(W_t) = 0$ but if β changes, W_t will tend to diverge from the zero mean value line. The significance of any departure from the zero line is assessed by reference to a pair of 5% significance lines, the distance between which increases with t. The 5% significance lines are found by connecting the points:

$$[k, \pm -0.948(T-k)^{1/2}] \quad \text{and} \quad [T, \pm 3 \times 0.948(T-k)^{1/2}]. \qquad \text{……..(14)}$$

4.7.1 CUSUM of Squares Test

The CUSUM of squares test (Brown, Durbin & Evans, 1975) is based on the test statistic:

$$S_t = \left(\sum_{r=k+1}^{t} w_r^2 \right) / \left(\sum_{r=k+1}^{T} w_r^2 \right). \qquad \text{……(15)}$$

The expected value of S_t under the hypothesis of parameter constancy is:

$$E(S_t) = (t-k)/(T-k) \qquad \text{…….(16)}$$

Which goes from zero at $t = k$ to unity at $t = T$. The significance of the departure from its expected value is assessed by reference to a pair of parallel straight lines around the expected value. See Brown, Durbin and Evans (1975), or Johnston and DiNardo (1997), for a table of significance lines for the CUSUM of squares test (Gujarati, 2004).

4.8 Data Description and Sources

This research attempts to empirically examine the impact of the bond market on economic growth in South Africa, using quarterly data, over the period 2003-2014. Data information is obtainable in the quarterly and annual reports of the South African Reserve Bank and the Johannesburg Stock Exchange. And a frequency conversion from annually to quarterly was conducted, to yield the right results.

Real income (REAL GDP): Real Gross Domestic Product (GDP) is the most important barometer of the performance of the economy. The quarterly Gross Domestic Product data from the first quarter of 2003 to the last quarter of 2014 was used in this study.

Bond market: Since the aim of this study is to investigate the impact of the bond market on economic growth, bond market issuance was used. The different types of bond markets have been explained and used in the study.

Stock market: This is another main variable that has been used in the study. The study used stock market capitalization, and the data was available from the Johannesburg Stock Exchange (JSE).

Banking sector: Bank credit to private sector has been used in the study. The information for this variable has been extracted from the South African Reserve Bank (SARB).

All variables are expressed in natural logarithms, which is already in percentage terms and therefore does not need any transformation. According to Maddala and Kim (1998:88), the transformation of macroeconomic time series data into the natural log form is standard practice, as the non-transformed data generally trends upwards and unit root tests undertaken on these time series may mistakenly conclude that they are non-stationary. Furthermore, a natural logarithm transformation of time series data enables the interpretation of results since, in the natural logarithm transformation, any responses are subsequently specified in percentage change instead of in measured units.

4.9 Conclusion

This chapter examined both the model specification as well as the econometric framework that the model will apply in an attempt to expose, empirically, the relationship within the variables of interest. This chapter provides background to the estimation and presentation of the results of the study, which will be presented in the ensuing chapter.

CHAPTER FIVE

ESTIMATIONS AND ANALYSIS OF RESULTS

5.1 Introduction

The preceding chapter outlined the model estimation techniques to be used in this study. This chapter augments and presents the empirical analysis of the tested results. The study applied the ARDL framework and its proposed analytical techniques on the annual South African data, covering the period 2003 to 2014. The data was computed using different statistical and econometric analysis software, basically Eviews 7. The first section of the chapter will outline the elements of stationarity and cointegration in the variables of interest, followed by the estimation results of the model behavior in terms of model stability and oscillations as the preliminary test of endogenity. The subsequent section of this chapter reports the results of model multipliers and dynamic response of the working empirical model together with the results of the necessary diagnostic tests of the model.

5.2 Unit roots/Stationarity Results

To avoid spurious regression and since the study uses an ARDL modeling technique which necessitates stationarity (Koop, 2000:149), the study requires a stationary time series analysis. This section explores both the graphical exposition and a formal analysis of each and every variable in the data, to check for stationarity. Figure 5.1, below, provides a graphical exposition of the variables at default. The variables of the annual data, from 2003-2014, show that banking sector, equity, bond market and Gross Domestic Product (GDP) are not stationary at level. Figure 5.1, below, shows that all the variables are stationary at first level.

Figure 5.1 before Difference

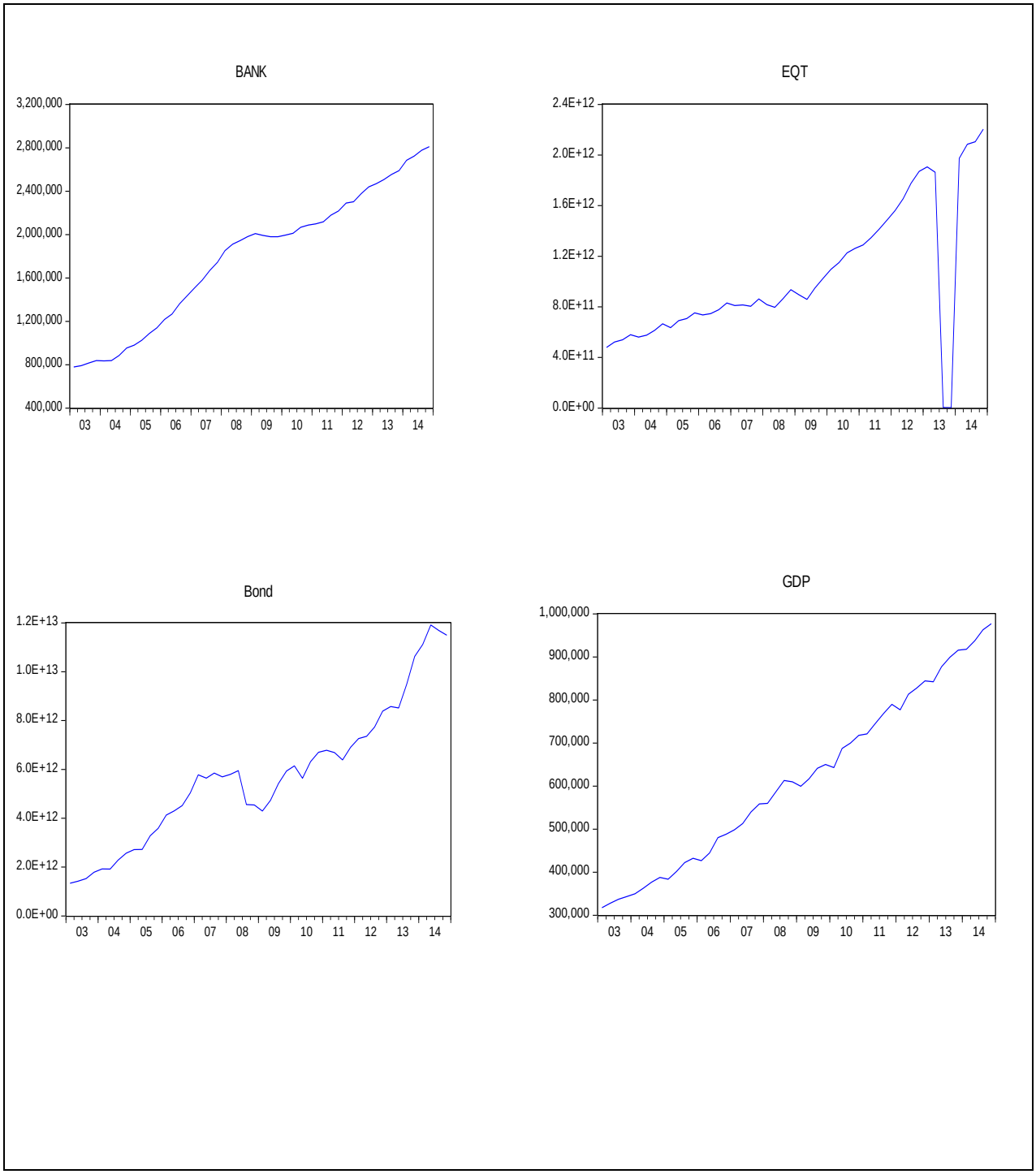
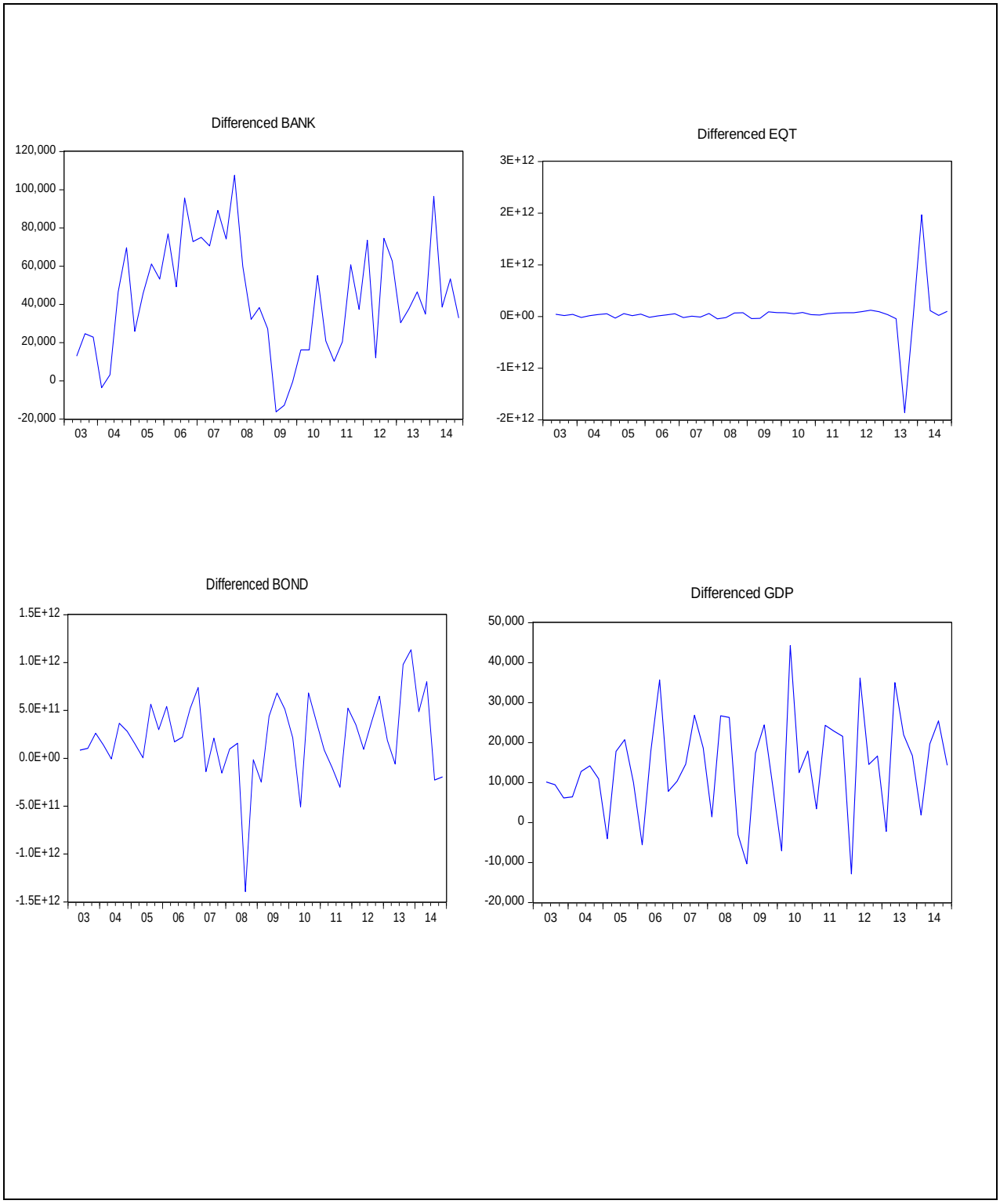


Figure 5.2 after Difference



The study performs a more formal analysis of stationarity using both the Augmented Dickey-Fuller (ADF) test and the Phillip-Peron (PP) test as a complement to the graphical

representation provided in Figure 5.1 and Figure 5.2, above. The results of the Augmented Dickey-Fuller test are shown in Table 5.1, below.

Table 5.1: Results of the Augmented Dickey-Fuller Unit Root Test

Augmented Dickey-Fuller Test						
	Level			First Difference		
Variables	**Constant**	**Trend and Constant**	**None**	**Constant**	**Trend and Constant**	**None**
BANK	-0.758	-2.363	1.385	-2.476	-2.445	-1.072
GDP	1.153	-2.061	1.975	-2.766	-3.048	-0.212
EQUITY	-1.126	-4.944*	0.835	-7.369*	-7.279*	-7.206*
BOND	0.398	-1.256	3.325	-5.502*	-5.484*	-4.607*

Notes

(1) The null hypothesis, H_0 : Variables have a unit root.
(2) *, ** and *** represent a stationary variable at 1%, 5% and 10% level, respectively.
(3) The critical values are obtained from MacKinnon's (1996) one-sided p-value.
(4) The appropriate lag lengths are selected by Akaike information criteria and the Eviews program automatically selected the appropriate lag length.

Table 5.1 shows that equity market was stationary both at level (under trend and constant) and first difference at 1% critical value, while bond market was only stationary at first difference. Banking sector and GDP were non-stationary on both level and first difference.

Table 5.2: Results of the Phillip-Peron Unit Root Test

Phillip-Peron Test Results						
Level				**First Difference**		
Variables	Constant	Trend and Constant	None	Constant	Trend and Constant	None
BANK	-0.199	-1.728	-4.420	-3.882*	-3.821*	-1.576
GDP	2.803	-3.058	-10.497	-8.949*	-15.673*	-3.957*
EQUITY	-2.100	-3.338	-0.254	-12.482*	-14.834*	-7.626*
BOND	0.398	-1.530	3.325	-5.501*	-5.486*	-4.605*

Notes

(1) The null hypothesis, H_0 : Variables have a unit root.

(2) *, ** and *** represent a stationary variable at 1%, 5% and 10% level, respectively.

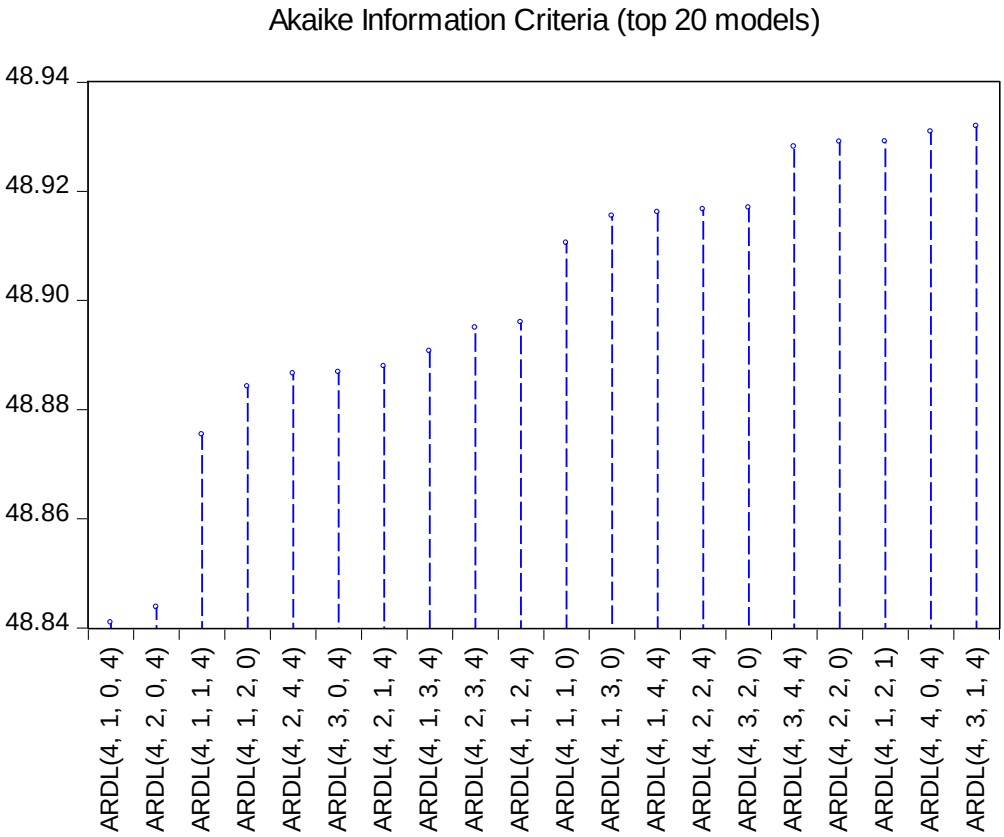
(3) The critical values are obtained from MacKinnon's (1996) one-sided p-value.

(4) The appropriate lag lengths are selected by Akaike information criteria and the Eviews program automatically selected the appropriate lag length.

The Phillip-Peron (PP) test results are different to Augmented Dickey-Fuller test results. The PP test indications that in all the four variables are stationary after first difference.

5.3 Model selection Criteria

Figure 5.3: Akaike Information Criteria (AIC)



The general to specific approach to cointegration for ADRL is an iterative approach to obtain the correct lag length for a model. Eviews 9 has an automated process that calculates the lag length that minimizes the AIC, as illustrated by Figure 5.3, above, which is the best model is an ARDL (4, 1,0,4).

5.4 Results using the Bounds Test for Cointegration Analysis

In Table 5.3, below, the results of the bounds co-integration test demonstrate that the null hypothesis of its alternative is easily rejected at the 1% significance level. The computed *F*-statistic of 20.3 is greater than the lower critical bound value of 3.65, thus indicating the existence of a steady-state long-run relationship between GDP, bond market, banking sector and equity market.

Table 5.4: Bounds Test for Cointegration Analysis

Critical value	Lower Bound Value	Upper Bound Value
1%	3.65	4.66
2.5%	3.15	4.08
5%	2.79	3.67
10%	2.37	3.2

Note: Computed F-statistic: 20.3 (Significant at 0.05 marginal values). Critical Values are cited from Pesaran *et al.* (2001), Table CI (iii), Case 111: Unrestricted intercept and no trend.

5.5 The Long run coefficients

Table 5.4, below, indicates that in the long run, the banking sector and gross domestic product have a negative impact on economic growth, while the bond market and equity market have a positive impact on economic growth. All the variables are in log order 1. If there is a 1% increase in current GDP, there would be -0.106% increase in the economy; this implies that economic growth has occurred at a reduced pace throughout the observation period. However, if current GDP falls, it would recover but at a slow pace. If there is a 1% increase in the bond Market, current economic growth would increase by 0.1195%. If there is 1% increase in banking sector, current economic growth would increase by -0.0973%, thus, implying that economic growth has occurred at a reduced pace throughout the observation period. Further, if there is a one percent increase in the equity market, current economic growth would increase by 0.0053%. As the study is currently investigating the effect of bond market on economic growth, it is evident, as it is been shown by the analysis in the long run, that the bond market and equity market have a positive impact on economic growth in South Africa, over a period.

Table 5.5: Long run coefficients

Variance	Coefficient	Std. Error	t-Statistic	Prob.
c	0.690369	0.265004	2.605125	0.0145
Log (GDP(-1))	-0.105993	0.017328	-6.116879	0.0000
Log (Bond(-1))	0.119526	0.033337	3.585364	0.0013
Log (Bank(-1))	-0.097388	0.047144	-2.065761	0.0482
Log (Equity(-1))	0.005319	0.002010	2.646761	0.0132

Note: *, ** and *** represent a stationary variable at 1%, 5% and 10% level, respectively.

5.6 Short run Cointegrating equation

Table 5.5, below, illustrates that, in the short-run, the GDP, equity market and bond market have a negative effect on economic growth (GDP). It is evident, in the table, that the current GDP and equity market are in lag order 1, 2 and 3. If there is 1% increase in current GDP, there would be -0.602% increase in the economy. This implies that economic growth has been occurring at a reduced pace throughout the observation period. However, if the current GDP falls, it would recover but at a slow pace. If there is a 1% increase in the bond market, current economic growth would increase by -0.007 %. If there is a 1% increase in the banking sector, current economic growth increases by 34 billion; this implies that economic growth has been occurring at a higher pace throughout the observation period. Further, if there is a 1% increase in the equity market, current economic growth increases by -0.001%. Since the focus of this study is the effect of bond market on economic growth, the analysis has shown that, in the long run, the bond market and equity market have a positive impact on economic growth in South Africa, over a period.

Table 5.6: Dependent Variable: D(GDP)

Variance	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP1(-1))	-0.602	0.123	-4.876	0.000
D(GDP1(-2))	-0.707	0.116	-6.082	0.000
D(GDP1(-3))	-0.691	0.127	-5.431	0.000
D(BOND)	-0.007	0.00348	-2.058	0.048
D(BANK)	34530.841…..	48444.364	0.712	0.481
D(EQT)	-0.001	0.004	-0.083	0.934
D(EQT(-1))	-0.024	0.004	-5.702	0.000
D(EQT(-2))	-0.016	0.004	-3.756	0.001
D(EQT(-3))	-0.015	0.004	-3.656	0.001
Coint Eq(-1)	-0.133	0.013	-10.137	0.000

Note: Economic growth (GDP)

5.7 Stability Model

Both figures below show that the cumulative sum and cumulative sum of square residuals lie within the 5% critical line. This implies that there is stability in the model.

Figure 5.4a: CUSUM

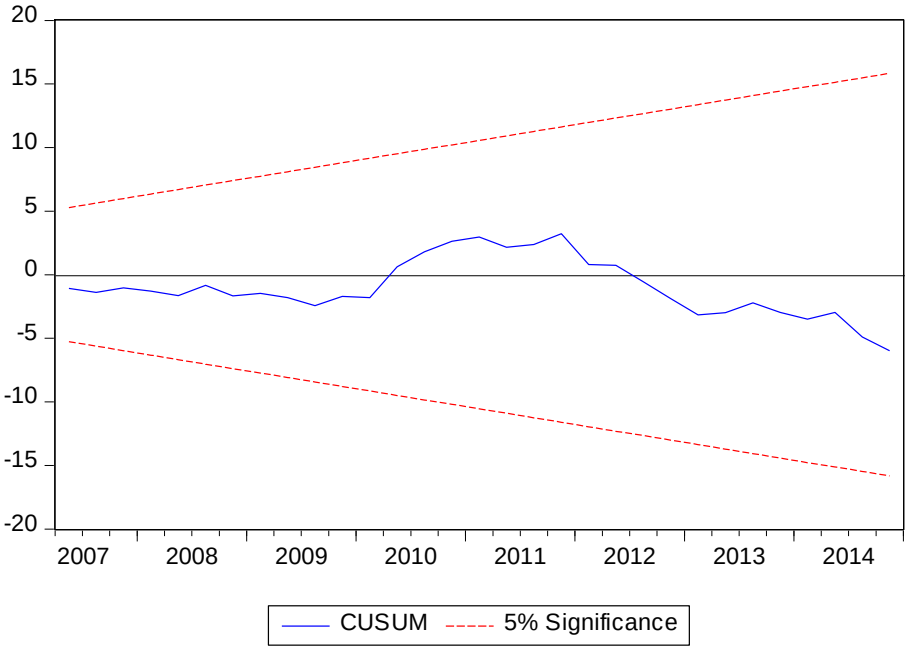
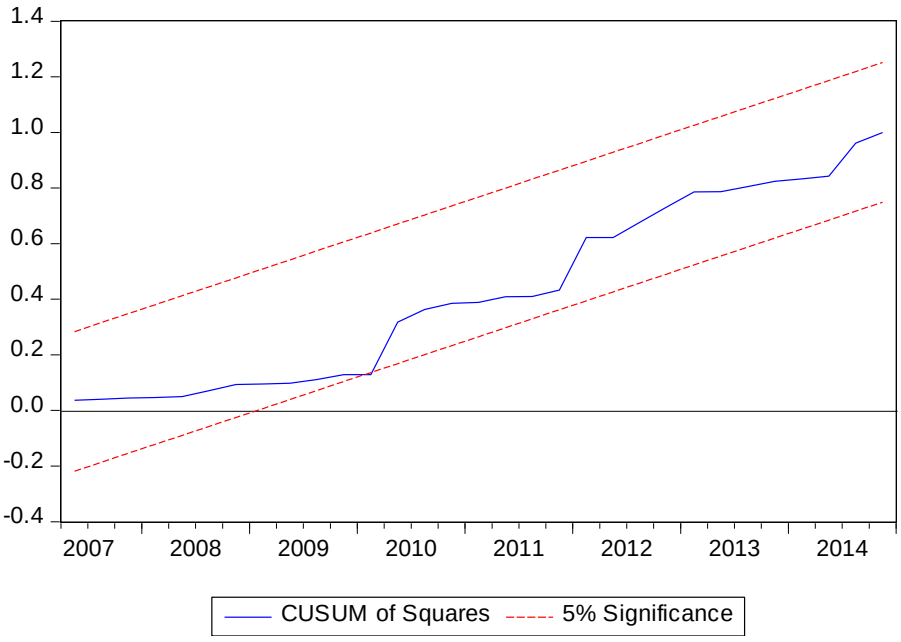


Figure 5.4b: CUSUM of squares



5.8 Diagnostics test results

The test statistic measures the difference of the skewness and kurtosis of the series with those from the normal distribution. Under the null hypothesis of a normal distribution, the Jarque-Bera statistic is distributed as χ^2 with 2 degrees of freedom. The Kurtosis residuals of the model is 2.36 and the skewness is -0.099. Under the null hypothesis, that kurtosis and skewness are 3 and 0 respectively, P-value of 0.666 implies that we do not reject the null hypothesis of normality in the residuals of the model.

The null hypothesis of the ARCH LM test tells us that there is no ARCH effect up to order q in the residuals of the model. The *F-statistic* is an omitted variable test for the joint significance of all lagged squared residuals. The Obs*R-squared statistic is Engle's LM test statistic, computed as the number of observations times the R^2 from the test regression.

The Breusch pagan test is a Lagrange multiplier test of the null hypothesis of no heteroscedasticity against heteroscedasticity. The *F- statistic* is 1.330 and obs*R-squared is 14.955 and the p-value for this statistics are 0.2518 and 0.2439, respectively. This implies that there is no heteroscedasticity in the residuals of the model.

The Ramsey Reset test for functional form misspecification and the Reset test showed that there is no evidence of misspecification in the data, the RAM (6) was equal to p-value of 0.007. The Breusch pagan correlation have an *F-statistic* of 1.075 and obs*R-squared 3.038, the statistics p-value of 0.354 and 0.219, respectively. This implies that there is no serial correlation in the residual of the model. A summary of some of these diagnostic results is provided in Table 5.6, below:

Table 5.7: Summary of diagnostic results

Test	Null Hypothesis	Test Statistic	p-value
JB	There is no normal distribution	0.828	0.66
ARCH (6)	There is ARCH process	1.257	0.589
BPG	Presence of heteroscedasticity	0.496	0.252
RAM (6)	No evidence of misspecification	4.037	0.007
LM	No serial correlation	7.923	0.354

Note: JB stands for Jarque-Bera, ARCH LM test, BPG: Breusch-Pagan Godfrey and LM: lagrangian multiplier.

5.6 Conclusion

This chapter gave the empirical results of the econometric model adopted in Chapter 4. The results have shown that the model has statistical properties that can be tested in a real economic situation using data. The following chapter provides the policy inference and recommendations based on the results reported in this chapter.

CHAPTER SIX

CONCLUSION

6.1 Introduction

This final chapter summarises the main findings of this study, in relation to the research questions and objectives articulated in Chapter One. It also provides possible recommendations based on the findings and highlights the limitations of the study, while providing suggestions for further study.

6.2 Summary

The main of objective of the study was to empirically examine the impact of the bond market on economic growth, using quarterly data for the period 2003:Q1 to 2014:Q4, in South Africa. The study reviewed the classical, neoclassical and endogenous growth theories, and it considered the endogenous growth model as the relevant theory in explaining the long run impact of stock market development on growth. The study found that there was not much research done in terms of the relationship between the bond market and economic growth. Bond markets were ignored under the notion that what matters is the state of a country's overall financial development, and the differences in composition and institutions that make up a country's financial system are trivial so long as an economy has access to a well-functioning financial system (Levine, 1997; Merton, 1992).

In order to conceptualize the topic, the following research questions were put-forward in the introductory chapter: What have the trends in bond markets and economic growth in South Africa been? What is the effect of bond markets on economic growth in South Africa?

Three specific objectives were formulated to address these questions, namely, to examine the trends in bond markets and economic growth in SA; to investigate the empirical effect of bond markets on economic growth in SA; to provide policy recommendations based on the findings.

In light of these objectives, this study adopted the empirical framework. The empirical framework focused on trend analysis, where a combination of conventional unit root (ADF and PP) tests and stationarity tests were used. In addition, bound tests for cointegration (ARDL) test were used. The results of this empirical framework are summarized below.

6.3 Main findings and recommendations

Based on the evidence gained from the estimation results of the empirical framework employed in this study, the highlights of the finding can be summarized as follows. The analysis demonstrates that in the long-run, bond market and equity (stock) market both increase economic growth by 0.12% and 0.01%, respectively. While the economic growth (GDP) and banking sector increase at a reducing pace by -0.11% and -0.10%, respectively. It is evident in the short run that bond market issuance and stock market capitalization increase at a reducing pace, while bank credit to private sector shows a positive relationship with economic growth. Previous studies found that real economic activity measured by GDP is influenced by the development of the bond market.

The government should realise effective macro-economic policies along with momentous improvements in the structure and functioning systems of governance for stabilising economic growth along with financial market institutions. It should put in place measures which develop the bond market.

6.4 Limitations of the study and areas for further research

The use of data from different sources might have influenced the results; also, for most variables used in this study, quarterly data was not available. This transformation might have contributed to the challenges that were experienced in the study.

In terms of future research, a lot still needs to be done in order to understand the nature of the impact of bond markets on economic growth in South Africa. There is still a need to explore the channels through which the bond market can better influence the economy, as this study only examined the relationship between the bond market and economic growth without intensely investigating the ways in which bond markets would change the lives of South African citizens (economy).

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APPENDIX

Appendix 1: Identification of cointegrating vectors in economic growth, ARDL

Dependent Variable: D(LOG(GDP1))
Method: Least Squares
Date: 09/11/15 Time: 10:36
Sample (adjusted): 2003Q4 2014Q4
Included observations: 45 after adjustments
Convergence achieved after 50 iterations
MA Backcast: 2003Q3

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.690369	0.265004	2.605125	0.0145
LOG(GDP1(-1))	-0.105993	0.017328	-6.116879	0.0000
LOG(BOND(-1))	0.119526	0.033337	3.585364	0.0013
LOG(BANK(-1))	-0.097388	0.047144	-2.065761	0.0482
LOG(EQT(-1))	0.005319	0.002010	2.646761	0.0132
D(LOG(GDP1(-1)))	-0.223388	0.152215	-1.467587	0.1534
D(LOG(BOND))	-0.014821	0.038150	-0.388485	0.7006
D(LOG(BOND(-1)))	-0.056230	0.049189	-1.143142	0.2627
D(LOG(BANK))	-0.059649	0.249984	-0.238610	0.8131
D(LOG(BANK(-1)))	0.025195	0.243634	0.103414	0.9184
D(LOG(GDP1(-2)))	-0.662603	0.153421	-4.318848	0.0002
D(LOG(BOND(-2)))	-0.045879	0.051717	-0.887122	0.3826
D(LOG(BANK(-2)))	-0.473905	0.173443	-2.732337	0.0108
D(LOG(EQT))	-0.001241	0.002354	-0.527381	0.6021
D(LOG(EQT(-1)))	-0.004963	0.002515	-1.973259	0.0584
D(LOG(EQT(-2)))	-0.004462	0.002600	-1.716111	0.0972
MA(1)	-0.958804	0.072988	-13.13647	0.0000

R-squared	0.748740	Mean dependent var	0.023644
Adjusted R-squared	0.605163	S.D. dependent var	0.021186
S.E. of regression	0.013312	Akaike info criterion	-5.519156
Sum squared resid	0.004962	Schwarz criterion	-4.836639
Log likelihood	141.1810	Hannan-Quinn criter.	-5.264721
F-statistic	5.214896	Durbin-Watson stat	2.145507
Prob(F-statistic)	0.000072		

Inverted MA Roots	.96

Appendix 2: Heteroskedasticty test: ARCH

Heteroskedasticity Test: ARCH

F-statistic	1.257898	Prob. F(6,32)	0.3041
Obs*R-squared	7.442923	Prob. Chi-Square(6)	0.2818

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 09/22/15 Time: 15:12
Sample (adjusted): 2005Q2 2014Q4
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000256	7.69E-05	3.325179	0.0022
RESID^2(-1)	-0.357752	0.176130	-2.031186	0.0506
RESID^2(-2)	-0.111437	0.183589	-0.606990	0.5481
RESID^2(-3)	-0.203016	0.176139	-1.152592	0.2576
RESID^2(-4)	-0.359472	0.178727	-2.011287	0.0528
RESID^2(-5)	-0.103288	0.186394	-0.554141	0.5833
RESID^2(-6)	-0.036486	0.175997	-0.207308	0.8371

R-squared	0.190844	Mean dependent var	0.000118
Adjusted R-squared	0.039127	S.D. dependent var	0.000136
S.E. of regression	0.000133	Akaike info criterion	-14.84622
Sum squared resid	5.69E-07	Schwarz criterion	-14.54763
Log likelihood	296.5013	Hannan-Quinn criter.	-14.73909
F-statistic	1.257898	Durbin-Watson stat	1.987606
Prob(F-statistic)	0.304149		

Appendix3: Breusch-Godfrey serial correlation LM test, ARDL

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.075358	Prob. F(2,29)	0.3544
Obs*R-squared	3.037860	Prob. Chi-Square(2)	0.2189

Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 11/26/15 Time: 10:44
Sample: 2004Q1 2014Q4
Included observations: 44
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP1(-1)	-0.032258	0.196593	-0.164084	0.8708
GDP1(-2)	-0.114462	0.201434	-0.568238	0.5742
GDP1(-3)	0.103583	0.163985	0.631664	0.5326
GDP1(-4)	0.033539	0.144551	0.232023	0.8181
BOND	0.001239	0.004074	0.304039	0.7633
BOND(-1)	-0.000654	0.004303	-0.151959	0.8803
BANK	2236.058	12965.64	0.172460	0.8643
EQT	-0.001640	0.005214	-0.314447	0.7554
EQT(-1)	0.000144	0.005526	0.026133	0.9793
EQT(-2)	-0.000908	0.006584	-0.137972	0.8912
EQT(-3)	0.001043	0.005667	0.183993	0.8553
EQT(-4)	-0.000571	0.005746	-0.099352	0.9215
C	2.85E+09	7.42E+09	0.384331	0.7035
RESID(-1)	0.093936	0.270058	0.347834	0.7305
RESID(-2)	0.338647	0.256536	1.320077	0.1971

R-squared	0.069042	Mean dependent var	0.000128
Adjusted R-squared	-0.380386	S.D. dependent var	7.35E+09
S.E. of regression	8.63E+09	Akaike info criterion	48.86032
Sum squared resid	2.16E+21	Schwarz criterion	49.46856
Log likelihood	-1059.927	Hannan-Quinn criter.	49.08588
F-statistic	0.153623	Durbin-Watson stat	1.946345
Prob(F-statistic)	0.999691		

Appendix 4: Ramsey test, ARDL

Ramsey RESET Test
Equation: SIYAOUTPUT2
Specification: D(LOG(GDP1)) C LOG(GDP1(-1)) LOG(BOND(-1)) LOG(BANK(-1)) LOG(EQT(-1)) D(LOG(GDP1(-1))) D(LOG(BOND)) D(LOG(BOND(-1))) D(LOG(BANK)) D(LOG(BANK(-1))) D(LOG(GDP1(-2))) D(LOG(BOND(-2))) D(LOG(BANK(-2))) MA(1) D(LOG(EQT)) D(LOG(EQT(-1))) D(LOG(EQT(-2)))
Omitted Variables: Powers of fitted values from 2 to 7

	Value	df	Probability
F-statistic	4.037847	(6, 22)	0.0071
Likelihood ratio	33.41355	6	0.0000

WARNING: the MA backcasts differ for the original and test equation. Under the null hypothesis, the impact of this difference vanishes asymptotically.

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.002601	6	0.000433
Restricted SSR	0.004962	28	0.000177
Unrestricted SSR	0.002362	22	0.000107

LR test summary:

	Value	df
Restricted LogL	141.1810	28
Unrestricted LogL	157.8878	22

Unrestricted Test Equation:
Dependent Variable: D(LOG(GDP1))
Method: Least Squares
Date: 09/22/15 Time: 15:15
Sample: 2003Q4 2014Q4
Included observations: 45
Convergence achieved after 16 iterations
MA Backcast: 2003Q3

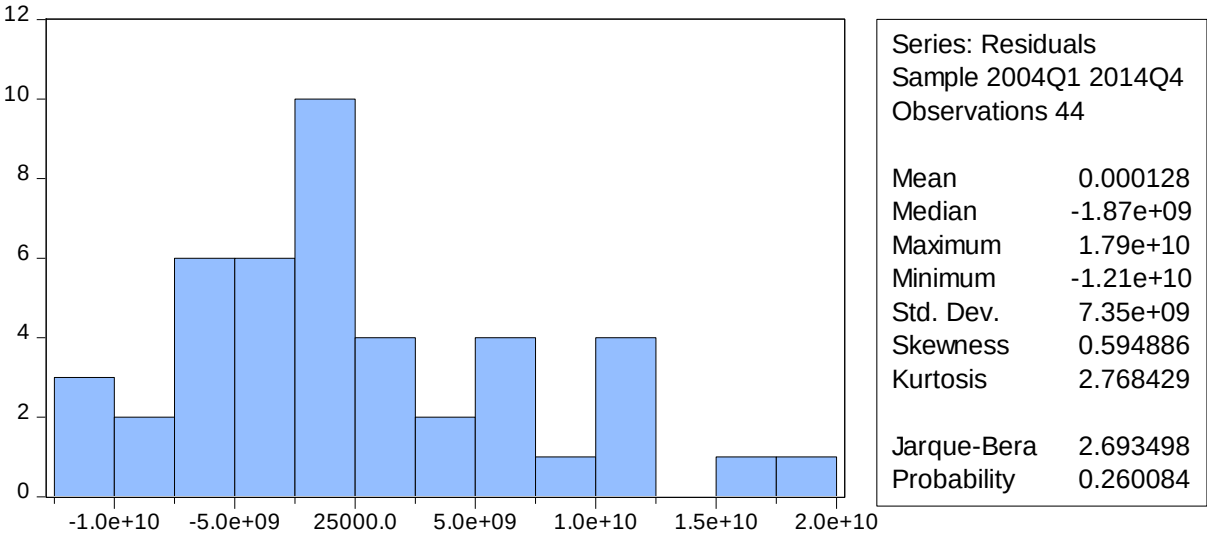
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.527965	0.350883	-1.504678	0.1466
LOG(GDP1(-1))	0.037426	0.032594	1.148257	0.2632
LOG(BOND(-1))	-0.010443	0.042856	-0.243681	0.8097
LOG(BANK(-1))	-0.009897	0.051936	-0.190558	0.8506
LOG(EQT(-1))	-0.001826	0.002939	-0.621442	0.5407
D(LOG(GDP1(-1)))	0.096367	0.145984	0.660122	0.5160
D(LOG(BOND))	0.006015	0.032100	0.187380	0.8531
D(LOG(BOND(-1)))	0.064504	0.061718	1.045144	0.3073
D(LOG(BANK))	0.029161	0.207968	0.140217	0.8898
D(LOG(BANK(-1)))	-0.055948	0.200533	-0.278998	0.7829
D(LOG(GDP1(-2)))	-0.021378	0.179995	-0.118768	0.9065
D(LOG(BOND(-2)))	-0.005997	0.052868	-0.113439	0.9107
D(LOG(BANK(-2)))	0.288552	0.208236	1.385697	0.1797
D(LOG(EQT))	-0.000330	0.002173	-0.151766	0.8808
D(LOG(EQT(-1)))	0.001618	0.002664	0.607260	0.5499

D(LOG(EQT(-2)))	0.001390	0.002708	0.513369	0.6128
FITTED^2	6.042185	72.51469	0.083324	0.9343
FITTED^3	3407.170	2656.563	1.282548	0.2130
FITTED^4	-18558.88	67327.93	-0.275649	0.7854
FITTED^5	-4016088.	4300785.	-0.933804	0.3605
FITTED^6	87721616	72640663	1.207610	0.2400
FITTED^7	-5.17E+08	3.99E+08	-1.296700	0.2082
MA(1)	-0.999989	0.230663	-4.335271	0.0003

R-squared	0.880422	Mean dependent var	0.023644
Adjusted R-squared	0.760845	S.D. dependent var	0.021186
S.E. of regression	0.010361	Akaike info criterion	-5.995013
Sum squared resid	0.002362	Schwarz criterion	-5.071608
Log likelihood	157.8878	Hannan-Quinn criter.	-5.650777
F-statistic	7.362774	Durbin-Watson stat	2.208153
Prob(F-statistic)	0.000008		

Inverted MA Roots	1.00

Appendix 5: Graph to show Jarque-Bera, ARDL



Appendix 6: Heteroskedasticity Test: Breusch-Pagan-Godfrey

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.330231	Prob. F(12,31)	0.2518
Obs*R-squared	14.95572	Prob. Chi-Square(12)	0.2439
Scaled explained SS	6.564216	Prob. Chi-Square(12)	0.8850

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 11/26/15 Time: 10:44
Sample: 2004Q1 2014Q4
Included observations: 44

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.20E+19	5.35E+19	-1.158841	0.2554
GDP1(-1)	-3.18E+08	1.04E+09	-0.306268	0.7614
GDP1(-2)	2.65E+09	1.09E+09	2.432454	0.0210
GDP1(-3)	-4.36E+08	1.12E+09	-0.389596	0.6995
GDP1(-4)	-1.78E+09	1.05E+09	-1.697004	0.0997
BOND	14209870	31201210	0.455427	0.6520
BOND(-1)	-47057994	33665655	-1.397804	0.1721
BANK	8.34E+13	1.00E+14	0.834012	0.4107
EQT	19698236	40006099	0.492381	0.6259
EQT(-1)	12141897	43325527	0.280248	0.7811
EQT(-2)	22282331	51531888	0.432399	0.6684
EQT(-3)	-8693509.	43338783	-0.200594	0.8423
EQT(-4)	-19327123	45043422	-0.429078	0.6708

R-squared	0.339903	Mean dependent var	5.28E+19
Adjusted R-squared	0.084381	S.D. dependent var	7.10E+19
S.E. of regression	6.79E+19	Akaike info criterion	94.40783
Sum squared resid	1.43E+41	Schwarz criterion	94.93498
Log likelihood	-2063.972	Hannan-Quinn criter.	94.60332
F-statistic	1.330231	Durbin-Watson stat	2.085242
Prob(F-statistic)	0.251776		