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Effect of Stock Market development on Long-run Economic Growth-Case of South Africa

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ABSTRACT

This paper examines the long-run causal relationship between stock market development (Johannesburg Stock Exchange) and economic growth in South Africa by making use of the Autoregressive Distributed Lag Bounds method. The study also reviews South Africa's economic growth trajectory using World Bank data sets over the period between 1975 and 2013. Stock market development is proxied by stock market capitalization, stock market value traded and stock market turnover and economic growth is represented by gross domestic product (GDP). The study is predicated on the the puzzle of why there is such a large disparity between the economic growth rate experienced by South Africa and its peers in spite of South Africa having a world leading stock market in the form of the Johannesburg Stock Exchange? The study presupposes that a causal relationship between stock market development and economic growth exists in South Africa and questions why the effects thereof are not more emphatic. The purpose of the study is to seek answers to the question of whether there is a significant and positive correlation between the development of the Johannesburg Stock Exchange and economic growth in post-apartheid South Africa. The study would also examine and describe the economic growth trajectory of South Africa look prior to 1994 and post 1994. The study makes use of annual time series data, which covers the period from 1975 to 2013 obtained from different sources, including South African Reserve Bank annual reports, quarterly bulletins, International Financial Statistics (IFS) from the International Monetary Fund and World Bank Statistical Yearbook. In addition, data on real GDP growth rate for South Africa was obtained from Statistics South Africa whilst the Johannesburg Stock Exchange's stock market capitalization and total value of stocks traded was obtained from the Johannesburg Stock Exchange website, turnover ratio of stocks traded was calculated.

To accomplish the goal of this study, the autoregressive distributed lag (ARDL) methodology was employed with consideration of the existence of a structural break in the series due to the study considering the pre and post-apartheid eras in South Africa. The existence of a long-run relationship between the variables was tested after using lag length selection criteria from an estimated vector autoregression to select the optimal lags for the vector error correction model of the ARDL. The results obtained from the analysis confirmed that there is a long-run positive relationship between economic growth, stock market capitalization and stock market traded value. The existence of a positive long-run relationship between economic growth and two of the three

proxies for stock market development can be used to make a general inference of a positive long-run relationship between the development of the JSE and South Africa's growth rate post-apartheid. The empirical analysis further confirmed that the growth elasticity between stock market capitalization, stock market traded value and economic growth is less than 1 indicating a possible channelling of funds raised on the JSE to offshore investments or to non-productive sectors of the economy. It was also evident from regression analyses run on the post democracy era that post-apartheid South Africa has only had a positive statistically significant effect on the domestic stock market capitalization at the exclusion of stock market value traded and stock market turnover. The results of this study show that stock market development Granger-causes economic growth.

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Chapter 1
Introduction

1.1 Background of the study

Stock markets are arguably one of the most important parts of a financial system, they enable firms to raise capital by issuing their shares and also create an environment in which the shares are traded. As such the construct of stock markets as a driver economic growth have gained traction among empirical growth scholars (Adu, Marbuah, & Mensah, 2013). Schumpeter (1911) first proposed that financial intermediaries such as stock markets provide services which are necessary for economic development by enabling the optimum risk adjusted allocation of capital and resources. Schumpeter argued that the optimization of allocation was made possible by a reduction in the probability of loss due to adverse selection, moral hazard, or transaction costs. Levine (1991) also notes that stock markets contributed to the economic growth by making the ownership of firms tradable, thereby enabling investors to diversify away unsystematic risk resulting in a maximization of risk adjusted returns. Furthermore, Levine and Zervos (1996) suggest that stock markets can accelerate economic growth through savings mobility, liquidity, risk diversification, corporate control and by facilitating provision of information about traded firms. Bencivenga *et al.* (1996) also proposes that the development of equity markets determines the costs of transacting in equity markets and thereby affecting not only the levels of investment, but also the kinds of investments. Bencivenga *et al.* contend that economical levels of transaction costs favour the use of longer maturity investments.

South Africa's gross domestic product (GDP) per capita has, as noted by Laubscher (2013), increased by 33% since 1994. Laubscher also states that this seemingly impressive expansion pales somewhat when viewed in comparison with South Africa's peers, namely, Brazil, India, Indonesia and Turkey whose GDP per capita has increased by an average of 115% over the same period. Laubscher also notes the high levels of inequality and unemployment in South African society and suggests sustained levels of high economic growth as a possible solution. In the same vein the JSE Limited (JSE) has also expanded considerably since its formation in 1887 at the height of the initial

South African gold rush. The JSE has since evolved to become the 19th largest stock exchange in the world by market capitalization ($1,007 Billion as at the end of 2013) and the largest in Africa (JSE, 2016a). To date the JSE has almost 400 companies listed on its main board as well as the Alternative Exchange[1] (AltX) (JSE, 2016a). So successful in fact has the JSE been in its expansion that it has experienced a 58% increase on prior year equity sales in 2014 to $13 Billion(Khanyile, 2014). Khanyile, however, is quick to point out that much of the capital raising was done for the purposes of executing corporate acquisitions in markets other than South Africa suggesting that off-shore acquisitions were an attempt by companies to avoid the slow pace of growth in South Africa. To further highlight the contrast between a burgeoning JSE and a faltering economy we note that as at December 2015 the JSE had a market capitalization in excess of USD 735 billion and liquidity of 49%, thus making the JSE one of the 20 largest stock markets by market capitalization in the world (JSE, 2016b) yet, between 1995 and 2015 the South African economy grew, as measured by GDP, by an average 2.85 % per annum to ZAR3,047 billion (Statistics South Africa, 2015) and is expected to grow by less than 1% in 2016 as forecast by the International Monetary Fund (IMF) (Vollgraaff, 2016).

1.2 Structure of South African Economy

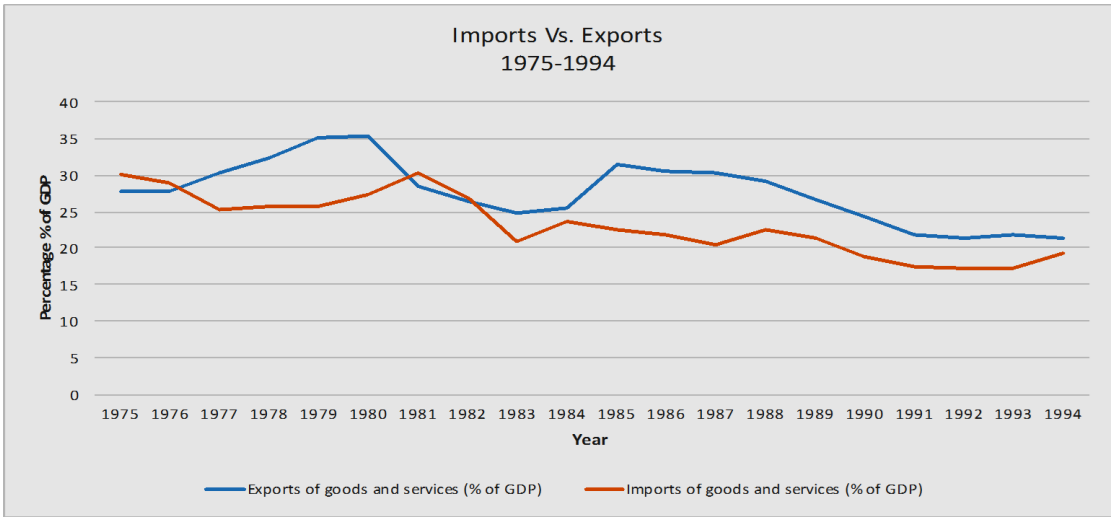
1.2.1 Structure on South African Economy Pre -1994

Rodrik (2008) chronicles the evolution of the South African economy by noting that prior to 1994; the South African economic and political landscapes were dominated by the white minority. Rodrik also describes how the majority black population remained economically marginalized despite the fact that the Apartheid regime had begun to unravel in the 1980s.Faulkner and Loewald (2008) confirm this narrative of South Africa's economic development being dominated by racially exclusionary political and economic systems established on the back of the exploitation of gold and other mineral resources. Faulkner and Loewald maintain that industry was geared towards commodities, building national capacity, and the development of import-competing products to counter the effects of isolation and economic sanctions. Figure 2 shows how

[1]The AltX was launched in 2003 comprises small and mid-sized listings, it was established as an incubator and feeder exchange for the main bourse (JSE, 2016a)

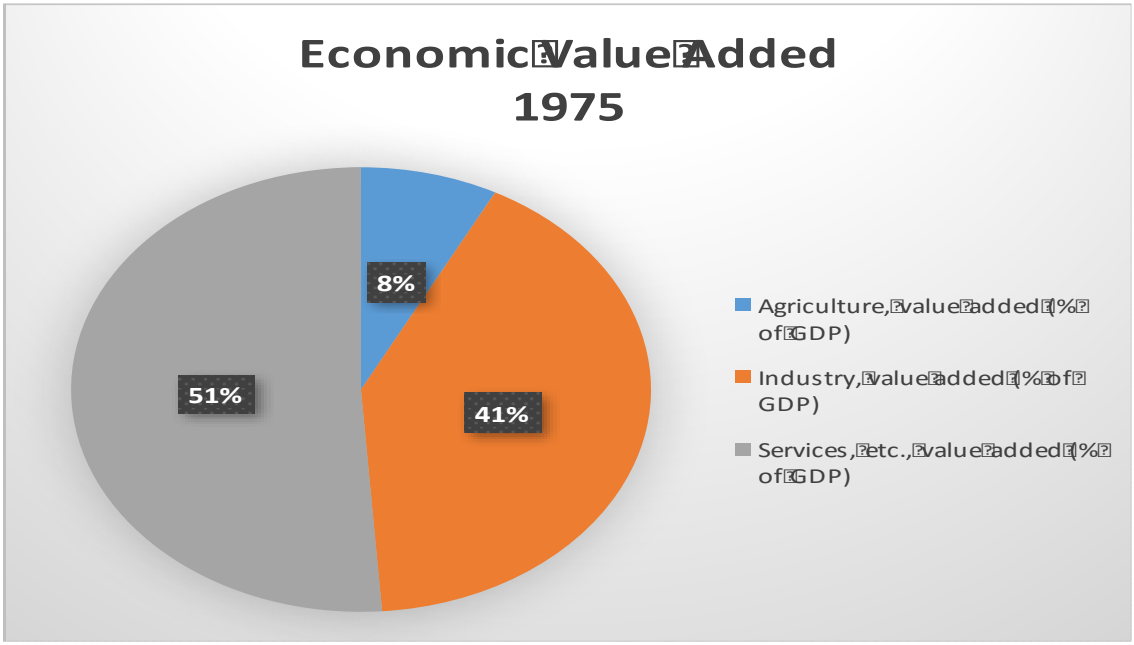
imports played a smaller role in the economy than exports as a result of the exclusion of South Africa from the global economy. Major services including electricity, telecommunications and transportation were dominated by heavily subsidized parastatals who in turn provided relatively cheap and often poor quality inputs to industrial and mining production, the lack of quality being a result of the absence of competition(Faulkner & Loewald, 2008).

Figure 1: Imports vs. Exports 1975-1994



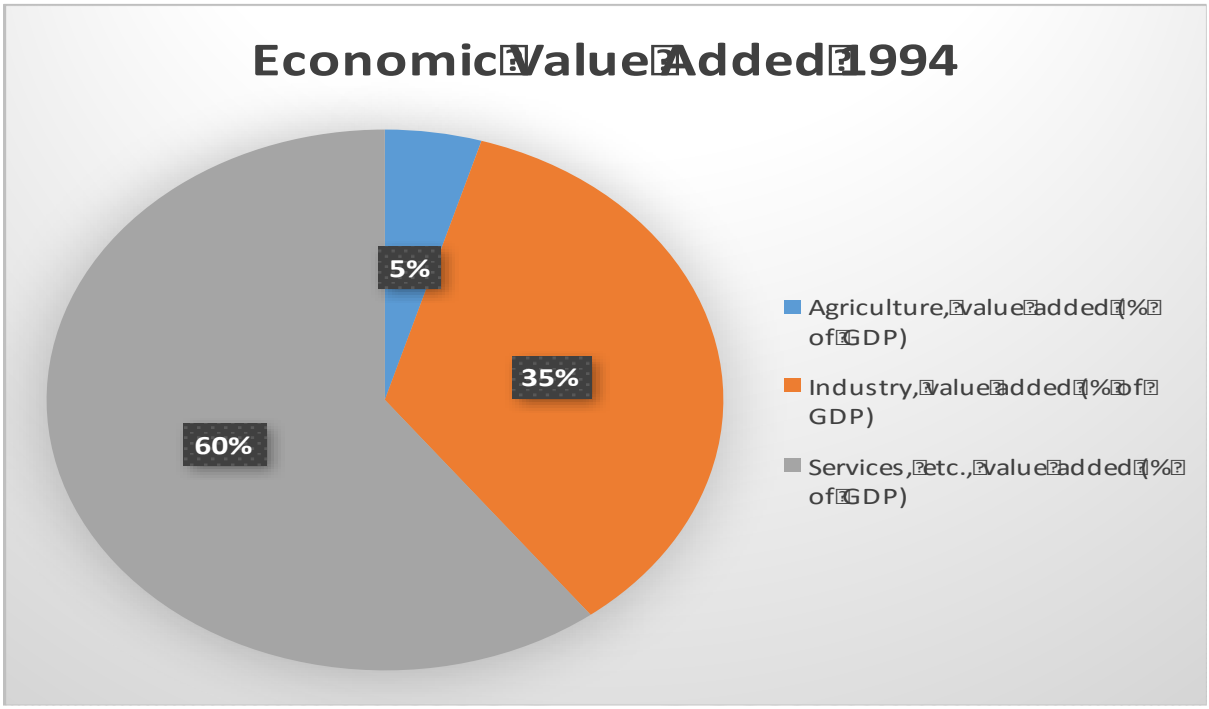
Source (The World Bank, 2016)

Figure 2: Structure of the South African Economy-Economic Value Added (1975)



Source (The World Bank, 2016)

Figure 3: Structure of the South African Economy-Economic Value Added (1994)



Source (The World Bank, 2016)

1.2.2 Structure of South African Economy Post -1994

Bhorat, Hirsch, Kanbur and Ncube(2013) describe the period since 1994 as being defined by the re-entry of South Africa into the global economy and the rapid process of trade liberalization, which in turn resulted in a sharp increase in export and import volumes. Bhorat *et al.* cite statistics that indicate a doubling in the volume of non-gold exports between 1994- 2012 as evidence of the South Africa's reintegration into the global economy as well as the effectiveness of the processes of trade liberalization. Bhorat *et al.* also point to the fact that South Africa's export profile is still skewed in favour of commodities and that manufactured exports from South Africa also contain a high share of primary commodities as inputs. South Africa is therefore said to export primarily natural resources and capital-intensive goods as opposed labour-intensive, job-creating products (Bhorat *et al.*, 2013). Bhorat *et al.* identify a positive correlation between import demand with investment and GDP, this they claim, is because imported inputs finance South Africa's growth cycle. The unfavourable export profile is exacerbated by a growth cycle that is founded on running regular current account

deficits, financed through short-term capital flows (Bhorat *et al.*, 2013). Short-term capital flows have also been identified by Bhorat *et al*. (2013) as being a factor in the appreciation of the South African Rand, which in turn negatively affects the competiveness of South African exports. Figure 5 below illustrates the reversal that occurred between imports and exports, around about 2005 imports exceeded exports in spite of an overall increase in both imports and exports. Between 2008 and 2009 there is a notable drop-off in the relative imports and exports which may possibly be related to the global financial crisis of 2008 given the South African economy's sensitivity to global economic trends.

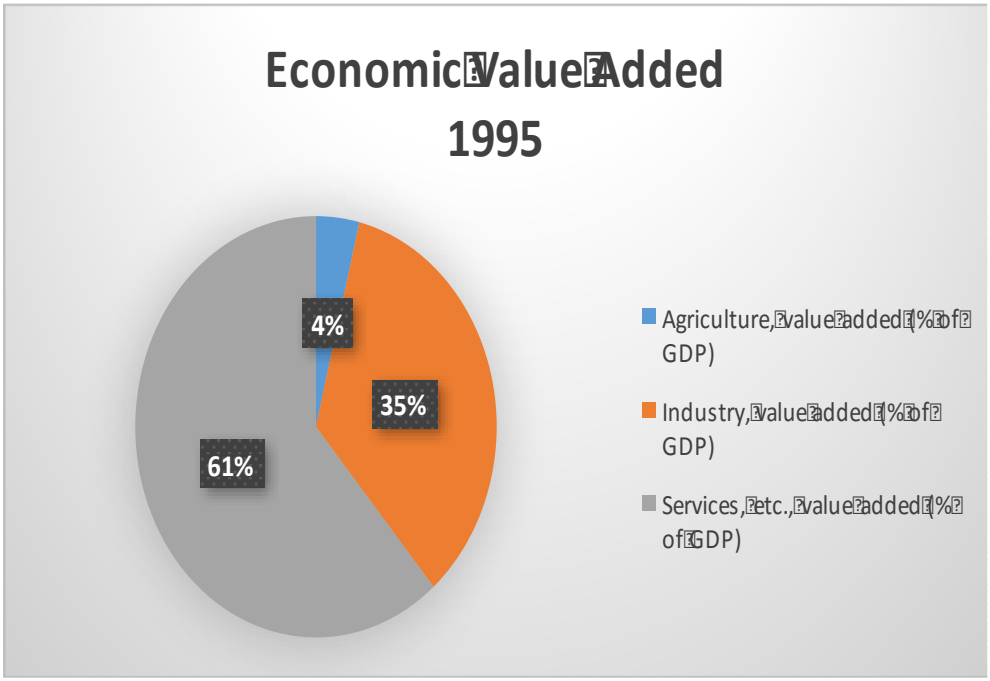
Figure 4: Imports vs. Exports 1995-2013

Source: (The World Bank, 2016)

Regarding the Fedderke (2014) South Africa has an unbalanced growth structure which is characterized by service sectors contributing in excess of 60% of GDP whereas typically, for emerging markets this proportion would be distributed around 50% of GDP. Figure 5 illustrates how between 1994 and 2013 the dominance of service sectors has grown in contribution from 60% of GDP to 68% of GDP, it also shows how over time the contribution of industry has declined from 35% of GDP at the advent of democracy to 30% of GDP in 2013.Fedderke likens South Africa's distribution of output and employment to that of High Income countries than its peer group of middle Income countries, he also notes how for the South African economy the contribution of Industry has been in decline over time which he argues is inconsistent with five decades

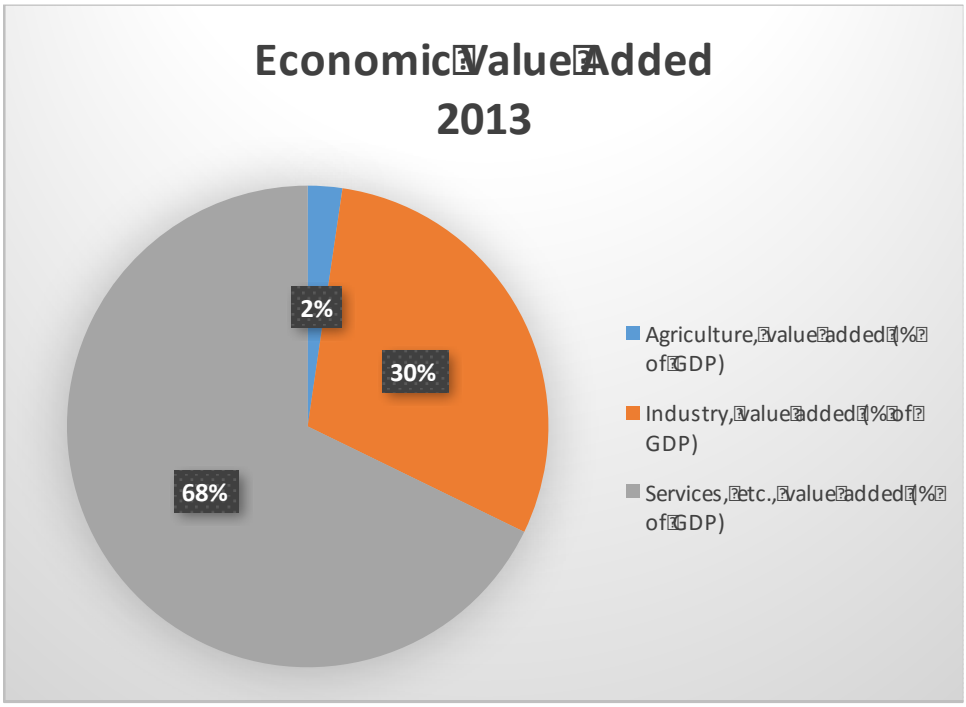
of evidence collected from emerging market economies such as China, Colombia, Ecuador, Egypt, Indonesia, Korea, Malaysia and Thailand which exhibited growth in the contribution of Industry to GDP. He further notes how the proportion contributed by Industry has remained constant in seven emerging countries namely, Brazil, Chile, India, the Philippines, Mexico, Singapore and Turkey also noting how Argentina and South Africa are the only emerging market economies with a falling proportion of GDP arising from the industrial sectors. Fedderke ultimately attributes South Africa's unusual economic structure to a complex interplay between supply-side, demand-side, labour market and output market forces.

Figure 5: Structure of South African Economy-Economic Value Added (1995)



Source (The World Bank, 2016)

Figure 6: Structure of South African Economy-Economic Value Added (2013)



Source (The World Bank, 2016)

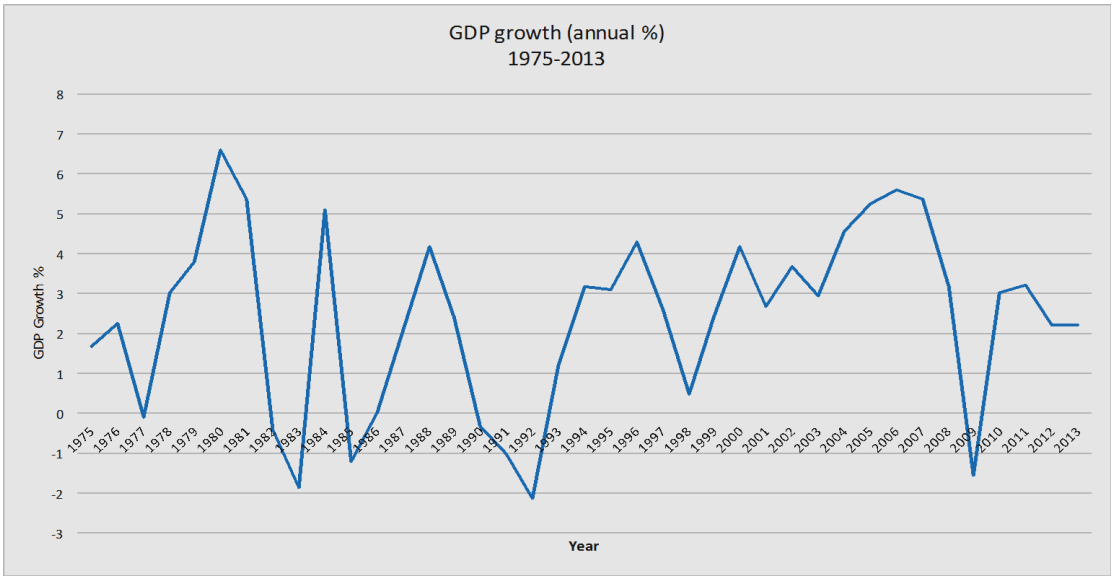
1.3 Performance and Structure of the South African Economy

1.3.1 Economic Performance

According to the Industrial Development Corporation (IDC) (2013) the South African economic landscape has undergone much change since 1994. The IDC notes that the average economic growth rate of 3.3% per annum, achieved over the period from 1994 to 2012, a huge improvement on the 1.4% average annual growth rate registered for the period from 1980 to 1993. This achievement takes on even greater significance when viewed in the context of the general expectation of doom and gloom, Rodrik(2008: pp770) articulates this expectation when he states that "given the depth of the racial and income divides that prevailed, it would not have been unreasonable to predict a cycle of redistribution and macroeconomic populism after democratization, wreaking havoc with the economy and turning the country into a sham democracy". This seemingly stellar achievement is dulled when viewed in comparison with global economic growth; the IDC points out that the pace of South Africa's economic growth since the advent of democracy falls short of the 3.6% average recorded by the world economy over the period from 1994 to 2012.

The volatility and correlation to the global economic performance of South Africa's economic growth is noted by the IDC who provide as examples the East Asian crisis of 1998, the "dot.com crisis" of 2000, the terrorist events "9/11" in the United States of 2001, corporate scandals in 2002/03[2]; and, more recently, the global financial crisis of 2008 as global events that affected the South African economy. The IDC also cites how the period in which the South African economy recorded its fastest growth[3] corresponded to a strong global bull-market and booming commodities markets as evidence of correlation.

Figure 7: South African GDP Growth 1975-2013



Source (The World Bank, 2016)

1.4 Problem Statement

According to Levine (1997) numerous studies conducted at industry-level, individual country-level, and broad cross country comparisons, tend to demonstrate a strong positive link between a functioning of the financial system and long-run economic growth. Based on the work of Levine and others, such as Bencivenga *et al.*(1996) and Demirgüç-Kunt & Levine (1996) there seems much evidence to suggest that long-run

[2] Corporate scandals included Enron, Anderson, Tyco, WorldCom, Merck, Xerox, and Vivendi among others (The Economist, 2002).
[3]The South African Economy grew fastest between the period 2004 to 2007, with real GDP growth averaging 5.2% per annum(IDC, 2013).

economic growth may be aided by the development of the financial system, including the stock exchange. The question that begs to be answered therefore is that, if economic growth can be spurred on by the development of the stock market then why is it that there is such a disparity in the growth rate experienced by South Africa and its peers in spite of it having a world leading stock market in the form of the JSE? We also need to question whether a causal relationship between stock market development and economic growth still exists in South Africa and if so why the effects are not more emphatic?

1.5 Research Objectives and Hypothesis

1.5.1 Research Objectives

The study would therefore seek to answer the question of whether there is a significant and positive correlation between the development of the JSE and economic growth in post-apartheid South Africa. The study would also examine and describe the economic growth trajectory of South Africa look prior to 1994 and post 1994.

- To assess the economic growth trajectory prior to 1994 and post 1994.
- To examine effect of the development of the JSE on economic growth in post-apartheid South Africa.

1.5.2 Research Hypothesis

Based on the above research objectives, the following hypothesis has been developed:
$\boldsymbol{H_0}$**:** The development of the JSE does not result in economic growth in post-apartheid South Africa.

1.6 Justification and Significance of the Study

The study is important, in not only getting a better understanding of the part played by capital markets, specifically the JSE, in the pre and post-apartheid economic growth, but also to serve as an example for similar developing countries on the continent who may wish to draw lessons from the South African experience. The study expects to find that there is indeed a positive correlation as well as causality between the development of the JSE and economic growth.

The study is also relevant because there is a limited amount of research that has been dedicated examining the link between stock market development and economic growth solely within the context of South Africa. Most studies such as those by Adjasi and Biekpe (2006) and Enisan and Olufisayo (2009) have largely been panel studies, which, according to Podestà (2000) panel studies can suffer from non-random errors across spatial and/or temporal units due to the heterogeneity of parameters across subsets of units. In other words, the pooling of countries may obstruct the observation of characteristics that may be peculiar to each country's stock market and economic growth.

Studies that focus on economic growth and the potential catalyse or accelerate such growth are significant given that economic growth has been long identified as the most powerful instrument for reducing poverty in developing countries with the potential to create virtuous circles of prosperity and opportunity (OECD, 2007). Sustained economic growth should result in the emergence of a strong and growing group of entrepreneurs, which could ultimately generate pressure for improved governance (OECD, 2007). Economic growth via the route of the consistent and active promotion and development of the stock markets does not seem as a favoured route in many developing countries and much evidence is required to help inform policy within African Governments and advocate for concerted efforts to develop stock markets.

The JSE has been selected for study because developing countries, especially in Sub-Saharan Africa, with the exception of South Africa, have stock markets that are still small and dominated by a few large corporations, Dangote Group which makes up about 30% of the Nigerian Stock Exchange being prime examples of such concentration (Tafirenyika, 2012). The JSE which is widely regarded as one of the leading exchanges globally presents a good example of a relatively liquid and deep stock exchange on which the relationship between economic growth and the development of the stock exchange can be studied.

The study would also add to the body of academic knowledge on the relationship and causality between stock markets and economic growth. This would hopefully help to

influence government economic policy and regulation with respect to stock exchanges in South Africa and on the African continent.

1.7 Organization of the study

This study is divided into five chapters. Chapter1 gives the background of the study. Chapter 2 reviews the literature on the impact of stock market development on economic growth. Chapter 3 discusses the research methodology of the study. Chapter 4 presents the empirical analysis and results; Chapter 5 presents conclusions and policy recommendations of the study.

Chapter 2

Literature Review

2.1 Introduction

The relationship between the development of stock markets and economic development is in itself not a new area of research. As noted by Greenwood and Smith (1997)and later by Pradhan, Dasgupta, and Bele (2013), there are four predominant schools of thought that exist when one considers the direction of finance-growth nexus; these being the supply-leading hypothesis, demand-following hypothesis, feedback hypothesis, and finally, those arguing that there is no discernible relationship between financial development and economic growth-the neutrality hypothesis. This section briefly reviews the current state of the JSE before broadly summarizing literature in the opposing schools of thought. In addition to key findings of the theoretical and empirical studies on stock market development and economic growth, arguments against efforts to leverage economic growth on stock market development will be noted before reviewing studies based specifically on South Africa and their results.

2.1.1 The Neo-classical growth theory

The neo-classical growth theory which is jointly attributed to Solow(1956) and Swan(1956)describes how a steady rate (equilibrium) of economic growth is attained through the application of the requisite quantities of labour, capital and technology. This theory succeeded capital fundamentalism which was the dominant construct for explaining economic growth in the 1950s and 1960s, capital fundamentalism suggests that rapid capital accumulation is key to increasing the rate of economic growth (King and Levine, 1994).The neo-classical growth theory, according to Solow and Swan, is based on three premises, the first being that capital accumulation and how it is applied are important determinants for economic growth. Further, it is also based on the premise that the interplay between the capital and labour determine the level of an economy's output. The third premise is that technology enhances labour productivity in such a way that it increases economic output.

The Solow-Swan model is based on a Cobb-Douglas[4] type production function in which output at time t denoted by $\boldsymbol{Y_t}$ is a function capital at time t as denoted by $\boldsymbol{K_t}$, labour at time t denoted by $\boldsymbol{L_t}$and technological advancement at time t denoted by $\boldsymbol{A_t}$. Solow drew up his model based on the assumptions of constant[5] and diminishing returns to scale[6], perfect competition and information and the absence of externalities. The Solow-Swan model is therefore thus:

$$\boldsymbol{Y_t = F(K_t, A_t L_t)} \quad \textbf{.....(1)}$$

According to the model, technological advancement results in greater productivity per unit labour which in turn increases output. Given that labour is limited by the number of workers in an economy as well as the number of jobs available, economic output based on increase in labour alone is therefore limited. The model, however, considers the economic benefits related to technological advancement as infinite thereby resulting exponentially high economic growth; thus the model considers technological advancement as exogenous with economic output growing in tandem labour whilst holding output per capital constant (in the absence of technological advancement).

Mester (2015) argued that the in some cases the neoclassical growth model was consistent with empirical evidence, she cites research that concludes that differences in measured inputs explaining less than half of the large cross-country differences in GDP per capita, consistent with the model. Mester also notes how, empirically, a strong positive correlation exists between savings rates and growth across countries; this finding is contrary to the neoclassical growth theory which suggests there would be no correlation, provided countries are in the steady state. The notion that only growth in productivity can lead to long-run economic growth that is suggested by the neoclassical growth theory is also challenged by Jones and Romer (2009) who go on and propose a set of six stylized facts which they state is an attempt to address the neoclassical growth theory's narrow focus on physical capital alone.

[4]At the 1927 meetings of the American Economic Association, Paul Douglas presented a paper entitled "A Theory of Production," which he had co-authored with Charles Cobb. The paper proposed the Cobb–Douglas function as a mathematical representation of the relationship between capital, labour, and output(Biddle, 2012).
[5] Constant returns to scale implies that increases of an equal percentage in all factors of production would lead to an increase of the same percentage in output.
[6] Constant and diminishing returns to scale in the absence of technological advancement

The analysis of the long-run economic effects of the development of the JSE cannot therefore be undertaken in the context of the neoclassical growth theory. The existence of empirical evidence that points towards the positive correlation between of savings rate and economic growth effectively renders the theory unsuitable as considers savings growth as exogenous. Ultimately the failure of the neoclassical growth theory to explain how savings and investment rates or how policies and regulations that influence savings and investment rates can affect the steady-state growth rate led to the conclusion on its unsuitability as a theoretical basis for the study.

2.1.2 The Endogenous growth theory

The endogenous growth theory (also known as the new growth theory) is essentially an extension of the neoclassical growth theory and a return of sorts to capital fundamentalism (King and Levine, 1994). The endogenous growth theory whose early proponents including Romer(1986), Lucas(1988)and Rebelo(1991) propose a model in which economic growth is affected not only by government policies which have the potential of raising a country's growth rate through the promotion of more intense competition which in turn stimulate product and process innovation but also by investment in research and development and human capital. The endogenous growth model therefore proposes that technological advancement is endogenous and vital to economic growth. The endogenous growth theory also posits that technological advancement can be explained through factors such as increased savings, investment and population growth which factors are in turn are affected by government policies which influence the rate of long-run growth by impacting accumulation of capital (physical and human capital), creation and diffusion of new knowledge through software development and other information technology provided services (Vacu, 2013).

This endogenous theory can, therefore, be used to explain the financial development and economic growth nexus given how savings and investment within this theory catalyse economic growth. According to Howitt (2010) first version of the endogenous growth model is the AK model which is expressed as follows:

$$Y_t = AK_T \quad \text{.....(2)}$$

The AK model which was earlier expressed by Frankel(1962)is also based on a Cobb-Douglas type production function in which output at time t denoted by $\boldsymbol{Y_t}$ is a function of the level of technological advancement, which is positive constant denoted by **A** and the physical and human capital at time t denoted by $\boldsymbol{K_T}$ (Howitt, 2010;Pagano, 1993)**.**Frankel(1962) suggests that aggregate output function can exhibit constant and sometimes increasing marginal product of capital due to the some of the capital accumulated capital accruing to firms being in the form of intellectual capital. Intellectual capital, according to Frankel, results in technological advancement which in turn offsets the tendency for marginal product of capital to diminish.

As shown by Howitt (2010) the AK model demonstrates how long-run economic growth rate depends on an economy's savings rate. According to the AK model, if an economy saves a fixed portion of output, **s,** and given a fixed rate of depreciation, $\boldsymbol{\delta}$, the rate of aggregate net investment is as follows:

$$\frac{dK}{dt} = sY_t - \delta K_T \quad \text{.....(3)}$$

When considered in conjunction with equation **(2)** the growth rate, **g**, is presented as follows:

$$g \equiv \frac{1}{Y}\frac{dY}{dt} = \frac{1}{K}\frac{dK}{dt} = sA - \delta \quad \text{.....(4)}$$

According to equation **(4)** an increase in the savings rate, **s**, results in a permanent increase in the growth rate, **g**. Based on the analysis of the AK model of endogenous growth a positive correlation between stock market development and economic growth should exist. The study is therefore couched in the endogenous growth theory, this is also in spite of the absence of any indication in the theory of the direction of the relationship between these two variables (Vacu, 2013).

2.2 Financial Sector Contribution to Economy

Abdalla and Dafaalla (2011) argue that the efficiency of a financial system is key to economic growth due to the existence of significant information and transaction costs, they also argue that asymmetric information creates adverse selection and moral hazard, and high transactions costs which in turn impose inefficiencies. Abdalla and Dafaallasuggest that an efficient financial system can enhance capital productivity and thereby promote economic growth by specializing in the collection of information, evaluation of projects, sharing risks, and provision of liquidity. By so doing, Abdalla and Dafaalla propose that an efficient financial system can intermediate financial savings, and improve the allocations thereof across investments.

Three channels are described by Abdalla and Dafaalla through which financial intermediation results in economic growth. The first channel draws from the findings of McKinnon (1973) and Shaw (1973) who postulate that financial liberalization in increases the levels of savings and, therefore, investment. McKinnon and Shaw assert that the financial deepening results in improved productivity of capital and rates of savings which translate to investment and growth. The Second channel described by Abdalla and Dafaalla relates to the reduction of information and transactions costs and how such reductions result in an increase of volume of funds from lenders to borrowers. In coming up with the second assertion, Abdalla and Dafaalla cite the findings of Gurley and Shaw (1955, 1960 and 1967)who emphasize the importance this financial intermediation process in directing savings to investment. In describing the third channel in which financial intermediation results in economic growth Abdalla and Dafaalla note the improvement in the allocation of resources that the financial sector facilitates throughthrough various mechanisms including " (1) fund pooling, that is, making large investment projects possible and lending cheaper; (2) risk diversification, that is, reducing productivity and default risks by holding diversified portfolios; (3) liquidity management, that is, providing liquidity to investment projects; (4) screening, that is, gathering and evaluating information on projects to channel funds to the most profitable ones; (5) monitoring, that is, disciplining borrowers' performance to make sure they fulfill their commitments" (Abdalla and Dafaalla, 2011: pp96).

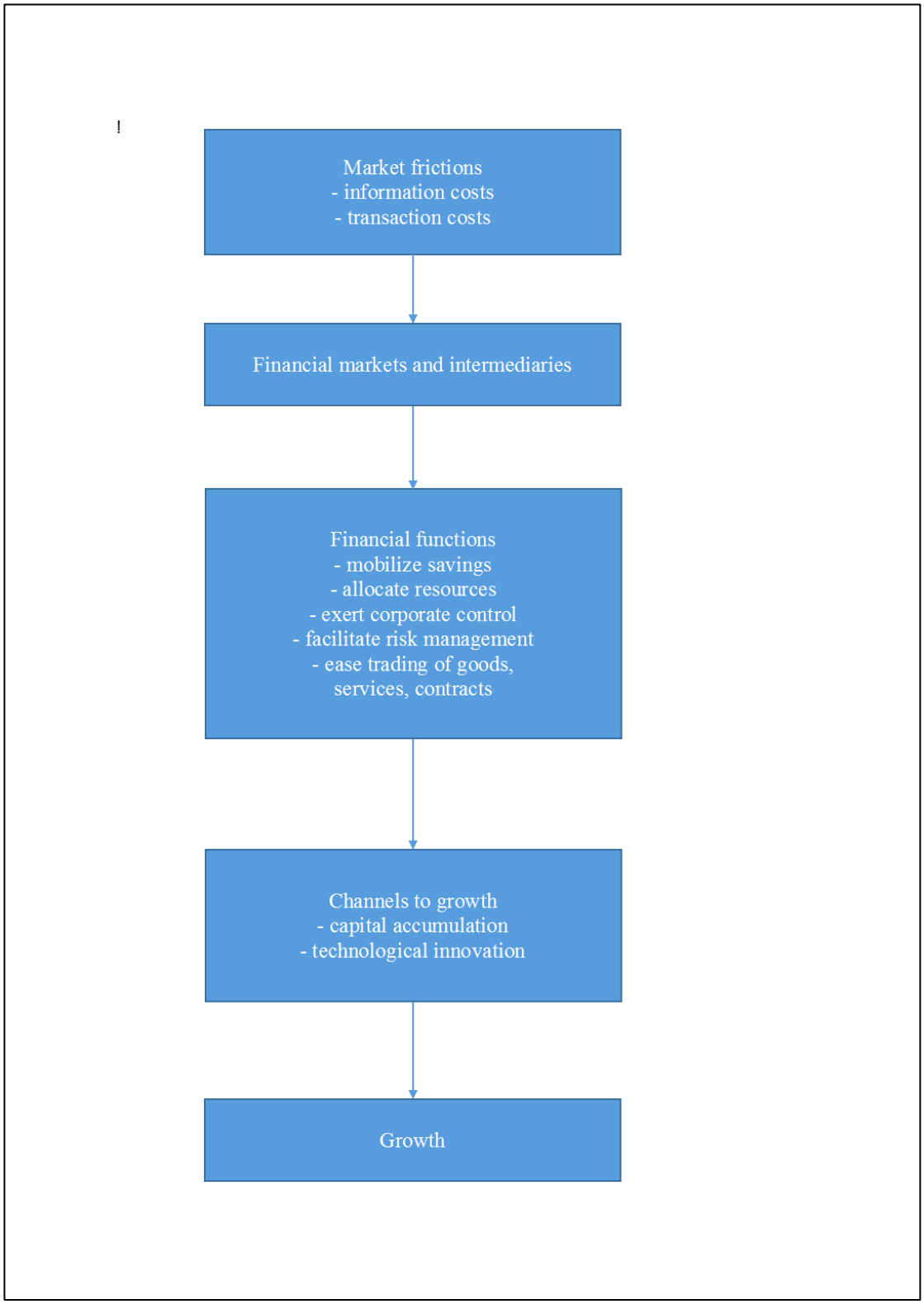
Financial development therefore seems to have long been a source and catalyst for economic growth as evidenced by the enabling role it plays in ensuring that the costs of acquiring information and the integrity and reliability of that information is such that

levels of asymetry are reduced as well as the attendant behaviours associated with adverse selection and moral hazard.

2.3 Analytical Framework of the Finance-Growth Nexus-Functional Approach

Levine(1997)explains how market frictions including information and transaction costs serve to motivate the emergence of financial markets and intermediaries. These resultant financial markets and intermediaries, according to Levine, provide five key functions namely, the facilitation of risk management, allocation of resources, monitoring of management and exertion of corporate control, the mobilization of savings, and facilitate the exchange of goods and services. Levine asserts that each of these five functions affect growth through two channels, being, capital accumulation and technological innovation.

Figure 8: Theoretical Approach to Finance and Growth



Source (Levine, 1997)

Figure 9 above illustrates the functions borne out of market frictions as well as the channels through which stock market development results in economic growth. According to Levine, countries with more developed financial systems, that is, with larger banks and more active stock markets, may expect to grow at faster rates than peers with less developed financial systems even after controlling for other factors that belie economic growth. Levine points to the large volume of research that supports his assertion as evidence of how financial development is an important catalyst for economic growth.

Mobilize savings: Economic growth is promoted by efficient stock markets which serve as an intermediary between investors and firms in the mobilization of savings (Levine, 2005). Levine argues that this delegation of economizes on aggregate monitoring costs and eliminates the free-rider problem since the intermediary does the monitoring for all the investors he furthermore suggests that as relationship between financial intermediaries and firms matures over time, information acquisition costs can be expected to reduce further.

Allocation of resources: Greenwood, Sanchez and Wang (2010) note the key role played by intermediaries in the process of directing funds to the highest valued users, they contend that if the costs of information production drop, then it follows that financial intermediation should become more efficient thereby resulting in an improvement in economic performance. Improvements in the efficiency of financial intermediation, due to improved information production, are likely to reduce the spread between the internal rate of return on investment in firms and the rate of return on savings received by savers. Greenwood *et al.* also point out the fact that the spread between these returns reflects the costs of intermediation. Therefore, it follows that equity markets, as intermediaries can play a role an expansionary role in the economy by identifying high return investments and allocating resources to them.

Exert Corporate Control: Greenwood *et al*. (2010) illustrate how financial intermediation can reduce market frictions and stimulate growth through the exertion of corporate control. They also stress the connection between the state of technological development in the financial sector, suggesting that if technological improvement in

the financial sector occurs at a faster pace than in the rest of the economy, then financial intermediation becomes more efficient leading to more diligent monitoring and a reduction in the rents earned by firms. Levine (2005) also concurs with this view and reiterates that how degree to which the providers of capital to a firm can effectively monitor and influence how firms use that capital has consequences on both savings and allocation decisions. Levine also proposes that shareholders may exert effective corporate governance directly by voting on crucial issues, such as mergers, liquidations, and changes in business strategies, and indirectly by electing boards of directors to represent their interests. According to Levine, low information costs enable shareholders to make informed decisions and vote accordingly. Thus, in the absence of large market frictions and distorted incentives, boards of directors will represent the interest of shareholders, oversee managers , and improve the allocation of resources(Levine, 2005).

Facilitate Risk Management: Levine (2005) describes how intermediaries may arise to ease the trading, hedging, and pooling of risk with implications for resource allocation and growth. He also describes on to categorize the risk management measures associated with intermediaries such as the stock markets as cross-sectional risk diversification, intertemporal risk sharing, and liquidity risk reduction. With respect to cross-sectional risk diversification, Levine points out how savers are generally risk averse in spite of high-return projects tending to be riskier than low-return projects. He outlines how financial markets facilitate the diversification of risk thereby enabling people to invest in a portfolio of higher risk and higher expected return projects. In addition, Acemoglu and Zilibotti (1997) contend that in the absence of financial arrangements that allow agents to hold diversified portfolios, agents will avoid the high-return, risky projects as they require agents to invest heavily in risky endeavours. They illustrate how financial systems such as a well-functioning stock market allows agents to hold a diversified portfolio of risky projects and how such facilitation fosters a reallocation of savings toward high-return ventures with positive effects on growth.

With respect to risks that cannot be diversified at a particular point in time, such as macro-economic shocks, Levine (2005)suggests that these risks can be diversified across generations. Levine describes how long-lived intermediaries, including stock markets, can facilitate intergenerational risk sharing by investing with a long-run

perspective and offering returns that are relatively low in boom times and relatively high in depressed times. Levine also states that risk sharing is possible with markets; other intermediaries may be more effective in intertemporal risk sharing by lowering contracting costs.

Levine (2005) notes liquidity risk as the third risk associated with information and transaction costs. He describes liquidity risk as reflecting the cost and speed with which agents can liquidate financial instruments. Levine states that informational asymmetries and transaction costs serve to inhibit liquidity thereby intensifying liquidity risk; he also states that such frictions are conducive for the emergence of financial markets and institutions that augment liquidity. The liquidity and economic development nexus arises due to the supposition that some high-return projects require a long-run commitment of capital, but savers do not like to relinquish control of their savings for long-periods; therefore, a financial system that augments liquidity of long-term investments is necessary.

Ease Trading of Goods and Services: Levine (2005) cites Smith (1776) in his assertion that lower transaction costs can promote specialization, technological innovation and growth. He points out how links between facilitating transactions, specialization, innovation, and economic growth make up the core elements Smith's Wealth of Nations and how Smith argued that specialization is the primary factor underlying productivity improvements. Greenwood and Smith(1997)find that increased specialization requires more transactions and posit that because each transaction is costly, financial arrangements that serve to lower transaction costs will facilitate greater specialization. Greenwood and Smith also assert that markets that facilitate exchange encourage productivity gains. They also suggest the possibility of feedback from these productivity gains to financial market development and conclude that in the event of the existence of fixed costs associated with establishing markets, and then higher income per capita lessens the fixed cost burden per capita income. Thus, Greenwood and Smith also conclude that economic development can also enhance the development of financial markets.

2.4 Finance-Growth Nexus

The finance-growth nexus is often described in terms of causal direction, which in turn gives rise to four schools of thought which will be examined in succeeding sections. Two fundamental hypotheses were stipulated by Patrick (1966), namely the demand-following and supply-leading hypotheses. Agbetsiafa(2016) cites Patrick when he describes the demand-following hypothesis as a postulation that a causal relationship from real to financial growth exists. According to this theory, as the real sector develops, increased demand for financial services induces growth in the latter(Agbetsiafa, 2016). Conversely, the supply leading hypothesis posits a causal relationship from financial to real growth; cultivation and development of financial institutions and markets increases supply of financial services thereby promoting growth in the real sector(Agbetsiafa, 2016).

Patrick(1966) also proposes a stage of development hypothesis whereby the supply-leading financial development can induce real capital formation in the early stages of economic development. Patrick reasons that financial innovation and development of new financial services creates new opportunities for investors and savers and, by induction, sustainable economic growth(Calderón and Liu, 2003). Patrick also argues that as financial and economic development proceed, the supply-leading characteristics of financial development diminish gradually and are eventually dominated by demand-following financial development(Calderón and Liu, 2003).

Choong *et al.* (2005) describe the feedback hypothesis as an approach that suggests a two-way causal relationship between financial development and economic growth. According to Choong *et al.* this hypothesis asserts that a country with a well-developed financial system could promote high economic expansion through technological changes, product and services innovation which in turn, will create high demand on the financial arrangements and services. They describe as positively interdependent the relationship between financial development and economic growth.

2.5 Supply-leading hypothesis

The supply leading hypothesis seems, based on empirical evidence, by far the most dominant and prevalent school of thought(Pradhan, Arvin, Hall, and Bahmani, 2014), Laeven *et al.*(2015)describe this school of thought as one which believes that financial development precedes and ultimately results in economic growth. Laeven *et al.* also describe the synergies that exist between finance and the advances in technology which ultimately resulted in the expansion of economies and give examples of how in the 19th and 20th centuries financial entrepreneurs developed specialized investment banks and accounting systems which facilitated the screening and monitoring of remotely located investments and projects. Such innovation meant that industrialization and economic growth would no longer only be limited to the locality of project investors but could occur further afield Demirgüç-Kunt and Levine (1996, p229) aptly describe the supply-leading hypothesis when they state that "most of the innovations that characterized the early phases of the industrial revolution had been invented much earlier. Rather, more liquid financial markets made it possible to develop projects that required large capital injections for long periods before the projects ultimately yielded profits. Without liquid capital markets, savers would have been less willing to invest in the large, long-term projects that characterized the industrial revolution. Bencivenga *et al.*(1996) also emphasized their belief in the supply leading hypothesis by stating that the industrial revolution had to wait for the financial revolution to occur first.

Proponents of the supply-leading hypothesis propose that well developed stock markets have the potential to encourage specialization as well as the acquisition and dissemination of company related information which in turn improves the allocative efficiency of capital, thereby enabling the companies with the potential for high risk-adjusted returns to attract financing(Diamond, 1984).The improvement in the ease at which companies can mobilize savings, is also found, by Greenwood and Smith (1997), to be a catalyst for investment and economic development.This argument is also buttressed by Levine and Zervos (1996) who, through cross-country regressions, found that stock market size, liquidity, and integration with world capital markets may affect economic growth. Levine and Zervos observed that more liquid and integrated markets exerted a greater positive effect on economic growth.

On the matter of corporate control, Diamond and Verrecchia (1982) find that developed stock exchanges tend to enhance corporate control of firms by counteracting the

principal-agent problem. Diamond and Verrecchia suggest that the threat of corporate takeover facilitates the aligning of the interests of a firm's management and ownership, the actions of management would then be more focused towards value creation.The ease at which corporate takeovers can be effected in stock markets is argued by Scharfstein (1988) and Arestis et al (2001) to be a positive effect of stock markets; they posited that the principle-agent problem was effectively mitigated by the threat of a takeover. Scharfstein and Arestis et al suggest that the threat of a takeover and subsequent dismissal of poorly performing management teams served to motivate management to act in the best interest of shareholders and thus would ultimately lead to enhanced profits and an increase the share price.

In more recent time and closer to home,in the African context, Adjasi and Biekpe (2006) demonstrate the causal relationship between stock market development and economic growth. Adjasi and Biekpe also suggest that in order for African economies to derive the benefit from stock market development, African stock markets need to be more integrated into the global economic system. Adjasi and Biekpe, however, qualify their findings by stating that stock markets played a significant role in economic development only when the respective stock markets are relatively liquid and have large enough volumes of trade, Adjasi and Biekpe maintain that highly developed markets in which more shares are traded frequently and at a relatively lower cost would boost confidence and productivity. In addition, Adjasi and Biekpe also find that in order for stock markets to make an effective contribution to economic growth, they would need to be domiciled in a country that is classified as upper middle income. Enisan and Olufisayo, (2009) also find evidence of finance-led growth in the cases of Egypt and South Africa; they conclude that stock markets could assist in the promotion of economic growth in Africa provided African countries take up the initiative to further develop stock markets through appropriate legislation and macroeconomic policies.

The findings of Tachiwou (2010) provide empirical evidence of the important role that stock market development plays on economic growth for West African Monetary union Countries over the period 1995-2006. This is despite the relative youthfulness of West African bourses. In finding a positive relationship between stock market development and economic growth, Tachiwou also finds that foreign direct investment and the

availability of skilled manpower are also key determinants of growth within the West African Monetary Union.

Abdalla and Dafaalla (2011) studied the causal relationship between stock market development and economic growth for the Sudanese economy using time series data for the period 1995-2009. Using the Granger-causality approach Abdalla and Dafaalla find that empirical results of the study show that the causal relationship between stock market development and economic growth is sensitive to the proxy used for describing the stock market development. They find that when the stock market capitalization is used as a proxy, the results indicate a bidirectional causal relationship whereas when the stock market liquidity is used, the results show unidirectional causal relationship from economic growth to stock market development. They conclude, in the case of Sudan, stock market development leads to economic growth.

Other scholars who also subscribe to the supply-following hypothesis also include, among others, Kolapo and Adaramola (2012), Estrada, Donghyun, and Ramayandi (2010) and Colombage (2009)[7].

2.6 Demand-following hypothesis

The demand-following hypothesis is a construct that maintains that economic growth precedes financial development, it suggests that where there is economic growth demand for financial services will result in financial development (Odhiambo, 2007). An early proponent of the demand-following hypothesis was Robinson (1952: p 86) who states that "where enterprise leads finance follows." Ndlovu (2013), also an adherent, asserts that financial system development is an outcome of the need for more sophisticated capital markets that are pressured by economic growth. Ndlovu suggests that trade liberalization, investment promotion and removal of trade barriers are more effective measures in spurring economic growth than developing the financial system. The demand following hypothesis for stock markets is also supported by Kar *et al.* (2011)Panopoulou (2009), Liu and Sinclair (2008) and Ang and McKibbin(2007). Patrick(1966) suggests how the demand-following approach implies that finance is

[7]Colombage (2009) finds that the results from four of the five developed countries examined support the supply-leading hypothesis that the development of financial markets stimulates economic growth. Colombage confirms the demand-following hypothesis for Canada only in the short run.

essentially passive and permissive in the growth process citing the late eighteenth and early nineteenth century England as a historical example. Patrick also seems to provide some qualification on the demand-following hypothesis when he states that increased supply of financial services in response to demand may not be a given nor, flexible, or inexpensive especially in underdeveloped countries. Patrick cites as examples, restrictive banking legislation in early nineteenth century France, religious barriers against loans and interest charges. Based on academic literature it seems as though the demand-following hypothesis is not as widely accepted or prevalent as the supply-leading hypothesis.

2.7 Feedback hypothesis

According to Pradhan *et al*. (2014) the feedback hypothesis explains a phenomenon whereby countries exhibit a simultaneous bi-directional causation between stock market development and economic growth. Cheng (2012)demonstrates that there is simultaneous feedback between equity markets and economic growth in Taiwan between 1973 and 2007. Cheng notes that the negative impact of volatility on economic growth prior to financial openness reversed soon after financial openness. Cheng proposed that within the context a more matured stock market, volatility tends to enhance Taiwan's economic growth following financial openness. Cheng also notes that the beneficial influence of liquidity economic growth before financial openness also reversed afterward; thereby suggesting that openness has the unintended effect of excess liquidity thus hampering economic growth. Hou and Cheng (2010) similarly conclude a bi-directional causal relation between financial development and economic growth in Taiwan, suggesting the existence of feedback hypothesis phenomena in Taiwan. In a study on Pakistan, Rashid (2008) finds that there exists a long-run bi-directional causation between the stock market and macroeconomic variables[8].

In an examination of the causal relationship between stock markets and economic growth based on the time series data compiled from 20 countries for the period 1981 through 1994 Tuncer (n.d.)identifies a two way relationship[9] Tuncer made use of the

[8]Rashid (2008) did not find a bi-directional causation with consumer prices.
[9] Tuncer also found that individual country analyses were inconclusive.

Sims' causality test firstly on panel data covering all countries over the entire analysis period were used to detect the direction of causation and then for each country individually.

In a study to examine the causal linkage between stock market development and economic growth in Zimbabwe from 1990-2010, Ishioro(2013), using annual time series data and the Toda and Yamamoto non-causality test finds a two-way statistically significant relationship exists between stock market development and economic growth in Zimbabwe. The major focus of Oshiro's study was to examine the nature of the relationship that exists between stock market development and economic growth using the proxies of real market capitalization and value traded and stock market volatility for stock market development; GDP growth rate is used as an indicator for economic growth.

Applying multivariate vector autoregressive (VAR) and vector error correction model (VECM) Ndako (2010) identifies a unidirectional causality from economic growth to financial development using bank credit to private sector for Nigeria. While using liquid liabilities, Ndako's results suggest bidirectional causality between financial development and economic growth.

2.8 Mixed findings

Others such as Enisan and Olufisayo (2009), find evidence of supply-leading, feedback and neutrality in their studies. They find that stock market development is cointegrated with economic growth in Egypt and South Africa and that stock market development has a significant positive long-run impact on economic growth in the case of these two countries. However, Enisan and Olufisayo also present evidence of a bidirectional relationship between stock market development and economic growth for Cote D'Ivoire, Kenya, Morocco and Zimbabwe. In the case of Nigeria, Enisan and Olufisayo argue that the evidence of causality is weak.

Academic literature also points to the overstatement of the contribution of stock markets to economic growth. Arestis *et al.* (2001) undertook a study which controlled for the effects of the banking system as well as for stock market price volatility and

found that although both the banking system and the stock market were positive promoters of economic growth, the former was a more significant contributor. Aretis *et al.* also suggested that cross-country regressions tended to overstate or exaggerate the contribution of stock markets to economic growth.

2.9 Pitfalls associated with stock market development

Over time there have been some scholars have about aspects of the proposition that promotes the developing equity markets with the hope of stimulating economic growth. Notably, Keynes (1936), suggests that volatility, which to a certain extent is useful as a mechanism for reflecting new information in efficient markets (Shiller, 1980), may in fact undermine a stock exchange's ability to efficiently allocate capital for investment. This view is supported by Federer (1993) who argued that in situations of excess volatility, interest rates were likely to move up in response to increased uncertainty. The resultant interest rate hike, according to Federer, would result in repressed levels and productivity of investment and, therefore, lower economic growth.

Stiglitz (1985)also suggests that information asymmetry between shareholders and outsiders effectively reduces the effectiveness of the threat of a corporate takeover as a mechanism of exerting corporate control. Stiglitz is of the opinion that outsiders would be reluctant to effect takeovers owing to the fact that they have less information than current shareholders and that the cost associated with the acquisition of reliable information would result in any successful takeover being overpriced.

Demirguc-Kunt and Levine (1996) also warn on the harmful effects of stock market development on economic growth, they stress that the increased liquidity provided by stock market development can constrain capital accumulation and hence economic growth by reducing savings rates through income and substitution effects. Demirguc-Kunt and Levine also suggest that the reduction of uncertainty of investment returns relative to savings would lead not only to lower precautionary savings and uncertain effects on the economy but also adverse effects on corporate governance through investor myopia. Investor myopia or short-termism being brought about by the ease at which disgruntled investors can exit stock rather than exert corporate control by overseeing management performance.

Opinions are, as seen above, opposed with regards the effectiveness of stock markets in spurring economic growth, the direction of causality and even the desirability of stock market development. Findings are not only country dependent but also depend on a number of various factors including methodology and levels of financial openness and integration amongst other factors.

2.10 South Africa focused studies

Nyasha and Odhiambo (2015) investigated the dynamic causal relationship between bank based and stock market based economic development with economic growth over the period 1980 to2012. Using multivariate Granger-causality and autoregressive distributed lag (ARDL) bounds testing approach Nyasha and Odhiambo demonstrate a supply led relationship between bank based financial development and stock market development and economic growth. Odhiambo (n.d.) also finds, using a 1971 to 2007 data set, that the causal direction between economic growth and stock market development is sensitive to the proxy used for the measurement of economic development. Odhiambo finds that economic growth tends to Granger-cause stock market development in cases whereby market capitalization is the proxy for stock market development. When stock market traded value and stock market turnover are used as proxies Odhiambo finds that market development Granger-causes economic growth. This study illustrates the conundrum faced by researchers when deciding on appropriate indicators for stock market development. Ndako (2010) examines financial development, economic growth and market volatility in Nigeria and South Africa. For South Africa, he evaluates the causal relationship between stock market development and economic growth using both bank and stock market variables: bank credit to private sector, market capitalization, turnover ratio, and value shares traded. Ndako's study applies multivariate vector autoregressive (VAR) and vector error correction model (VECM). The results for Nigeria suggest the existence of unidirectional causality from economic growth to financial development using bank credit to private sector. While using liquid liabilities, it indicates bidirectional causality between financial development and economic growth. In the case of South Africa, the findings suggest the existence of bidirectional causality between financial development and economic growth using the banking system. However, when the stock market variables are used,

the results indicate unidirectional causality from economic growth to stock market system.

Literature that examines South Africa in isolation and not as a member of a panel is very sparse. With the exception of works by Nyasha and Odhiambo (2015), Odhiambo (n.d.) and Vacu (2013)studies exclusively within the context of South Africa experience in the post-apartheid era is scarce. It is, therefore, desirable to add to this body of knowledge.

2.11 Conclusion

Based on the literature, it seems that the debate over the relationship between finance and economic growth is far from settled, it is made more complex by the dynamic nature and sensitivity of the results to econometric methodology and choice of measurement variables. As Marwa and Zhanje(2015)note how the discourse on the finance–growth nexus remains a contentious topic requiring more theoretical and empirical work. It is evident, however, that despite the lack unanimity among scholars on the causal link between finance and growth, there is a general consensus that development in finance results in economic growth.

The study of the relationship between the development of the JSE and South Africa's economic development is expected to throw out some interesting insights owing to the fact that the economy operated under isolation up until 1994. The advent of democracy resulted in an unbalanced economic growth path that was heavily skewed towards the services industry at the expense of industry. This lopsided economic growth coupled with a general slowdown in growth rate will be interesting to analyse, especially in light of the ever-burgeoning growth trajectory that the JSE is undergoing.

Chapter 3

Research Methodology and Data

3.1 Introduction

This chapter describes the empirical model to be utilized and the econometric techniques to be employed in estimating the model. It also gives an account to the data period and data sources.

3.2 Data Period and Data Sources

Annual time series data, which covers the period from 1975 to 2013, is used in order to cover the period 19 years before democracy and 19 years after democracy, 1975 was used as start date as reliable data on JSE market capitalisation is only available from that date. The data will be obtained from different sources, including South African Reserve Bank annual reports, quarterly bulletins, International Financial Statistics (IFS) from the International Monetary Fund and World Bank Statistical Yearbook. In addition data on real GDP growth rate for South Africa will be obtained from Statistics South Africa whilst the JSE's stock market capitalization and total value of stocks traded will be obtained from the JSE website, turnover ratio of stocks traded will be calculated.

3.3 Definition of Variables

Economic Growth: South Africa's economic growth variable is measured by real per capita GDP, which is computed as follows:

Real GDP per capita ($^{y}/_{N}$) whereby) whereby Real GDP is denoted by **y** and Total Population is denoted by **N**.

Stock Market Development: As noted in previous sections, stock market development is represented by stock market capitalisation ratio, stock market value traded ratio, and stock market turnover ratio. Stock market capitalization ratio is calculated as the total market value of listed companies divided by GDP. Stock market value traded ratio is calculated as the total value of shares traded on the stock exchange divided by the GDP

and the stock market turnover ratio calculated as the ratio of the total value traded divided by the stock market capitalisation.

3.4 Measurement of Stock Market Development

Bayraktar (2014) identifies the commonly used indicators as being related to size, activity and efficiency, these measures being the ratio of stock market capitalization in percent of GDP, ratio of stock market total value traded in percent of GDP, and stock market turnover ratio, respectively. Bayraktar further asserts market capitalization in percent of GDP as the most commonly used indicator. Alternative measures have been suggested such as those by Levine and Zervos (1996) whose proposed measure combines idiosyncratic characteristics of the stock markets, such as size, liquidity, and risk diversification in constructing an index. Levine and Zervos suggest that larger values of the index indicate a higher development level of stock markets. Levine and Zervos' measure has been discounted by Bayraktar for an absence of consideration of any country specific characteristics. Measures of stock market development abound but as Demirgüç-Kunt and Levine (1996) state, economists still lack a common concept or measure of stock market development. This study measures stock market development using the proxies of stock market capitalization, stock market value traded and stock market turnover owing mainly to the accessibility of data on the indicators and the statistically significant positive correlation between market size and value traded/GDP (Demirgüç-Kunt and Levine, 1996).

3.5 Specification of the Model

In examining the relationship between stock market indicators and economic growth, the study employs three proxies of stock markets in Stock Market Capitalization (STKCAP), Stock Market Traded Value (STKT) and Stock Market Turnover (STKOV). The relationships are presented mathematically in equations 5 to 7 below;

$$\ln(GDP)_t = \alpha + \beta \ln(STKCAP)_t + d01 + \mu_t \quad \text{.....(5)}$$

$$\ln(GDP)_t = \alpha + \beta \ln(STKT)_t + d01 + \mu_t \quad \text{.....(6)}$$

$$\ln(GDP)_t = \alpha + \beta \ln(STKTVOL)_t + d01 + \mu_t \quad \text{.....(7)}$$

where $STKCAP$, $STKT$ and $STKTOV$ are as defined as before; GDP is the gross domestic product; Δ is the change and ln represents the natural logarithm. $d01$ is a dummy variable defined as 0 if periods before 1994 and 1 for periods after 1994.

3.6 Stationarity Tests

Hyndman and Athanasopoulos(2013) define a stationary time series is one whose statistical properties such as mean, variance and autocorrelation are all constant over time, they note the predictive simplicity of time series that are "stationarized" and how a majority of statistical forecasting methods are based on the assumption that the time series can be rendered approximately stationary through the use of mathematical transformations. Likewise, variables stock market capitalisation (STKCAP/GDP), stock market traded value (STKT/GDP), stock market turnover (STKTOV/GDP) and economic growth ($^{y}/_{N}$) must be tested for stationarity prior to running the causality test. Data of order zero I(0)[10] is tested for stationarity and if found to be non-stationary, the data needs to be differenced then tested again, this iterative process is performed until stationarity is attained. For robustness sake the approach adopted by Vacu (2013) of employing informal and formal techniques of checking the time series for stationary of all the variables is utilized. The informal test is conducted through the observation of graphs and correlograms for auto-correlation as done by Vacu, whereas the formal test utilises the current study uses some of the most recent unit root tests, namely the Phillips-Perron proposed Phillips and Perron (1988) and the Dickey-Fuller generalised least square (DF-GLS) de-trending test proposed by Elliot et, al. (1992); this approach for the formal tests was adopted by Odhiambo (n.d.). The null hypothesis to be tested is that the time series data is non-stationary against the alternative hypothesis that it is stationary.

3.6.1 Informal Stationarity Test

The informal stationarity test is essentially a visual test that examines stationarity by way of graphical analysis, plotting the series over time. Stationarity is then determined by looking out for evidence that indicate trend in mean, variance, autocorrelation and seasonality. Evidence of such or patterns are indications that the time series data is non-

[10] Order zero is also referred to as level

stationary and requires transformation into a stationary one. Sustained upward or downward sloping patterns (linear or non-linear) are indications of a non-constant mean and thus, non-stationarity (Metes, 2005).Non-stationarity is also evident in cases where the vertical fluctuation of the series appears to differ greatly from one portion of the series to the other, such phenomena indicates that the variance is not constant(Metes, 2005). Variations in the autocorrelation characterized by positive autocorrelations and by negative autocorrelations are also indications of non-stationarity(Metes, 2005).

3.6.2 Formal Stationarity Test-DF-GLS Unit-root Test

The DF-GLS test proposed by Elliot et, al. (1992) is essentially an augmented Dickey–Fuller test except that the time series is transformed via a generalized least squares (GLS) regression before performing the test(Stata.com, n.d.). Elliott et, al. also claimed that the DF-GLS test has significantly greater power than the previous versions of the augmented Dickey–Fuller test(Stata.com, n.d.).

Cooray and Wickremasinghe(2005) also assert the belief that the DF-GLS is a more powerful test than the Dickey-Fuller test, they note how in the Augmented Dickey-Fuller (ADF) test regression, either a constant or a constant and a linear time trend is included to take account of the deterministic components of data. Cooray and Wickremasinghe also note how Elliot *et al*. (1992)propose a modification to the ADF regression in which data are detrended prior to conducting unit root tests. Cooray and Wickremasinghe(year) explain how the de-trending is done by taking the explanatory variables out of the data as suggested by Elliot *et al.*(1992). According to Cooray and Wickremasinghe (2005) an equation of the form illustrated in equation (17) is then estimated to test for a unit root in the variable:

$$\Delta y_t^d = \alpha y_{t-1}^d + \beta_t \, \Delta y_{t-1}^d + \ldots.. + \beta_p \, \Delta y_{t-p}^d + \gamma_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.(8)$$

Where Δ is the difference operator, y_t^d denotes the generalized least squares de-trended value of variable, α; $\beta_t$and $\beta_p$being coefficients to be estimated and $\gamma_t$denoting the independently and identically distributed error term. A test for a unit root of the variable y involves examination the following null and alternative hypotheses:

$$H_0: \alpha = 0$$

$$H_1: \alpha \neq 0$$

H_1 implies that the time series data is non-stationary and that the time series is not integrated of order I(0) thus requiring the data to undergo further differencing until stationary is reached.

3.6.3 Formal Stationarity Test –Phillips-Perron (PP) Unit-root Test

Phillips and Perron(1988) developed the Phillips-Perron (PP) unit-root test, which as Vacu(2013)notes, is essentially the ADF test but more comprehensive as it allows for auto correlated residuals through nonparametical statistical methods. Three scenarios are described by Asteriou and Hall (2011) whereon a decision on stationarity can be made or inferred. The first case being when all variables included in the time series data are stationary at level I (0), in such a scenario Asteriou and Hall report that it can be concluded that the variables are cointegrated. The second scenario described is one whereby the variables are integrated of different orders in this scenario tit can be concluded that there is no cointegration. The last scenario describes a situation whereby the variables are integrated of the same order thus allowing a cointegration test to be performed.

3.6.4 Autoregressive Distributed Lag (ARDL) - Bounds testing

The study makes use of the Autoregressive Distributed Lag (ARDL) - Bounds testing approach originally developed by Pesaran and Shin (1999) and as used by Odhiambo (n.d.)to examine the long-run cointegration relationship between each of three proxies of stock market development and economic growth; namely stock market capitalization, stock market turnover, stock market traded value and per capita GDP respectively. The advantages of using the ARDL cointegration approach over other cointegration approaches does not impose a restrictive assumption that all the variables under study be integrated of the same order meaning that the ARDL approach can be applied in spite of underlying regressors being integrated of order one, order zero or fractionally (Odhiambo, 2009). Odhiambo also notes the relative insensitivity of the ARDL approach to the size of the sample and the generally unbiased nature of estimates of the long-run model and valid t-statistics, even in the face of endogenous regressors,

as benefits of the approach. Based on the selected lags, the ARDL specification of the three proxies of stock market development is presented in equations 9 to 14.

Model 1- Stock Market Capitalization and Economic Growth

$\Delta \ln y_t = a_0 + \sum_{i=1}^{n} a_{1i} \Delta \ln y_{t-i} + \sum_{i=0}^{n} a_{2i} \Delta \ln STKCAP_{t-i} + a_3 \ln y_{t-1} + a_4 \ln STKCAP_{t-1} + \mu_t$ .....(9)

$\Delta \ln STKCAP_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i} \Delta \ln STKCAP_{t-i} + \sum_{i=0}^{n} \beta_{2i} \Delta \ln y_{t-i} + \beta_3 \ln y_{t-1} + \beta_4 \ln STKCAP_{t-1} + \mu_t$ …….(10)

$\ln y_t$ denotes the natural logarithm of per capita real GDP, *lnSTKCAP* denotes the natural logarithm of stock market capitalization, μ_t denotes the white noise error term and Δ denotes the first difference operator.

Model 2-Stock Market Traded Value and Economic Growth

$\Delta \ln y_t = \phi_0 + \sum_{i=1}^{n} \phi_{1i} \Delta \ln y_{t-i} + \sum_{i=0}^{n} \phi_{2i} \Delta \ln STKT_{t-i} + \phi_3 \ln y_{t-1} + \phi_4 \ln STKT_{t-1} + \mu_t$ .....(11)

$\Delta \ln STKT_t = \delta_0 + \sum_{i=1}^{n} \delta_{1i} \Delta \ln STKT_{t-i} + \sum_{i=0}^{n} \delta_{2i} \Delta \ln y_{t-i} + \delta_3 \ln y_{t-1} + \delta_4 \ln STKT_{t-1} + \mu_t$ …….(12)

$\ln y_t$ denotes the natural logarithm of per capita real GDP, *lnSTKT* denotes the natural logarithm of stock market traded, μ_t denotes the white noise error term and Δ denotes the first difference operator.

Model 3-Stock Market Turnover and Economic Growth

$\Delta \ln y_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta \ln y_{t-i} + \sum_{i=0}^{n} \alpha_{2i} \Delta \ln STKTOV_{t-i} + \alpha_3 \ln y_{t-1} + \alpha_4 \ln STKTOV_{t-1} + \mu_t$ .....(13)

$\Delta \ln STKTOV_t = \lambda_0 + \sum_{i=1}^{n} \lambda_{1i} \Delta \ln STKTOV_{t-i} + \sum_{i=0}^{n} \lambda_{2i} \Delta \ln y_{t-i} + \lambda_3 \ln y_{t-1} + \lambda_4 \ln STKTOV_{t-1} + \mu_t$ …(14)

lny_t denotes the natural logarithm of per capita real GDP, *lnSTKTOV* denotes the natural logarithm of stock market turnover, μ_t denotes the white noise error term and Δ denotes the first difference operator.

According to Pesaran et, al.(2001),the ARDL bounds testing procedure is based on the joint F-statistic or Wald statistic in a generalized Dicky–Fuller type regression to test the significance of lagged levels of the variables under consideration in a conditional unrestricted equilibrium correction model (ECM).Odhiambo (n.d.) notes a non-standard asymptotic distribution of the F-statistics under the null hypothesis of no cointegration between examined variables. Thus, it follows that his assertion that, the null hypothesis of no cointegration among the variables in equations5, 6, 7, 8, 9 and 10 is (H_0: a_3 = a_4 = 0) as opposed to the alternative hypothesis (H_1: $a_3 \neq = a_4 \neq$ 0). Similarly, in equation (6), where the stock market capitalization is the dependent variable, the null hypothesis of no cointegration is (H_0: β_3 = β_4 = 0) versus the alternative hypothesis (H_1: $\beta_3 \neq \beta_4 \neq$ 0). In equation (7), the null hypothesis of no cointegration is (H_0: ϕ_3 = ϕ_4= 0) against the alternative hypothesis (H_1: $\phi_3 \neq \phi_4 \neq$0). In equation (8), where the stock market traded is the dependent variable, the null hypothesis of no cointegration is (H_0: δ_3 = δ_4 = 0) against the alternative hypothesis (H1: $\delta_3 \neq \delta_4 \neq$ 0). In equation (9), the null hypothesis of no cointegration is (H_0: α_3 = α_4 = 0) against the alternative hypothesis (H_1: $\alpha_3 \neq \alpha_4 \neq$ 0). Finally, in equation (10), where the stock market turnover is the dependent variable, the null hypothesis of no cointegration is (H_0: λ_3 = λ_4 = 0) against the alternative hypothesis (H_1: $\lambda_3 \neq \lambda_4 \neq$ 0).

Pesaran et, al.(2001) report two sets of asymptotic critical values are provided for the two opposite cases which assume that all the regressors are either integrated purely of order one, I(1) and purely of order zero I(0). Pesaran et, al assert that because these two sets of critical values provide critical value bounds for all classifications of the regressors into purely I(1), purely I(0) or mutually cointegrated, bounds testing procedure is feasible. They propose that if the computed test statistic exceeds the upper critical bounds value, then the alternate hypothesis, H_1, is rejected, however, should the test statistic fallwithin the upper and lower critical bounds then the test becomes inconclusive and knowledge of the order of the integration of the underlying variables is required prior to conclusive inferences being drawn. In the event the test statistic falls

below the lower critical bounds value, then the null hypothesis, H_0, suggesting no cointegration cannot be rejected.

Before the bounds test, the order of lags on the first differenced variables in equations (5) – (10) is obtained from the unrestricted equations by using the Akaike Information Criterion[11] (AIC) and Schwartz Bayesian Criterion[12]. As the second step, Odhiambo suggests the application of a bounds F-test to equations (5) – (10) in order to establish a long-run relationship between the variables under study.

3.7 Short-run and Long-run Dynamics

The Error Correction Model (ECM) version of the ARDL is used to examine the short-run dynamic relationship of the three models. The ECM is applied through the Ordinary Least Squares (OLS) method. The lagged values of the first differenced independent variables in each respective model are the explanatory variables of the GDP, with the error correction variable at a first difference. The models estimated for the short-run dynamics are shown on equations 15- 17 as follows:

$$\Delta lnGDP_t = \beta_0 + \sum_{i=1}^{p} \beta_i \Delta lnSTKCAP_{t-i} + d01 + ECT_{t-1} \quad \ldots\ldots (15)$$

$$\Delta lnGDP_t = \gamma_0 + \sum_{j=1}^{q} \gamma_j \Delta lnSTKT_{t-j} + d01 + ECT_{t-1} \quad \ldots\ldots (16)$$

$$\Delta lnGDP_t = \delta_0 + \sum_{k=1}^{r} \delta_k \Delta lnSTKTOV_{t-k} + d01 + ECT_{t-1} \quad \ldots\ldots (17)$$

The same equation is estimated through the vector error correction model from the VAR estimation technique. The long-run dynamic relationship is estimated through the OLS equations given by equations 18– 20:

[11]The AIC provides a versatile procedure for statistical model identification which is free from the ambiguities inherent in the application of conventional hypothesis testing procedure (Akaike, 1974).

[12] The problem of selecting one of a number of models of different dimensions is treated by finding its Bayes solution, and evaluating the leading terms of its asymptotic expansion. These terms are a valid large-sample criterion beyond the Bayesian context, since they do not depend on the a priori distribution (Schwarz, 1978).

$$\ln(GDP)_t = \alpha + \beta \ln(STKCAP)_t + d01 + \mu_t \quad \text{(18)}$$

$$\ln(GDP)_t = \alpha + \beta \ln(STKT)_t + d01_t + \mu_t \quad \text{(19)}$$

$$\ln(GDP)_t = \alpha + \beta \ln(STKTOV)_t + d01 + \mu_t \quad \text{(20)}$$

The diagnostic tests used for the estimated equations 15 – 17 include tests for serial autocorrelation, heteroskedasticity, and any model misspecifications. The stability of the models is checked through the CUSUM and CUSUM-Q, and the graphical representations of the recursive coefficients are used to check the stability of the coefficients.

3.8 Granger-Causality Test

Having performed cointegration tests, Odhiambo(n.d.) suggests that the next step is to test for the causality between the variables.Granger-Causality tests, in this case, are employed to test the causal relationships between stock market development and economic growth variables. Causality is commonly been interpreted within the context of Granger-Causality (Granger, 1969), which states that if a variable X Granger-causes Y, the historical values of both X and Y can represent better predictors of the values of Y, as opposed to Y on its own. Odhiambo(2009) notes that the Granger-Causality test method is preferred over other alternative techniques due to its favourable response to both large and small samples; consequently, this study employs Granger-Causality tests to determine causal relationships.

3.9 A priori expectations

Based on the literature, stock market development, as represented by the proxies for size and liquidity, is expected to positively affect economic growth in South Africa post-apartheid.

3.10 Constraints and Limitations

The study is constrained by the fact that it is not a cross-country analysis and as Levine and Zervos (1996b) noted, it may suffer more scepticism than cross-country comparison studies. The study has persisted as a time series, single country study, however, primarily due to the fact that "Cross-country growth regressions suffer from measurement, statistical, and conceptual problems. In terms of measurement problems, country officials some- times define, collect, and measure variables inconsistently across countries"(R Levine and Zervos, 1996).The use of GDP as a measure of economic growth is a limitation as it introduces the potential of double counting, typically when the costs associated with intermediate goods and services used for producing a final product are included in the GDP count(OECD and WTO, 2012). Ortner and Geiger (2006) proposes the use of an alternative measure, gross value added (GVA) which they define as gross output less the value of intermediate goods and services. The GVA fails, however, to adequately reflect the full picture of trade in an economy (OECD and WTO, 2012), thus the use of GDP as a measure is maintained and the limitation is not addressed in this study.

Chapter 4
Discussion of Findings

4.1.1 Introduction

This chapter covers the discussion of the empirical results. It first presents the descriptive statistics of the dataset and provides the details and characteristics of the series. In addition, the cointegration analysis together with the results of the long-run, short run and causality analysis are also discussed.

4.2 Descriptive Statistics

Table 1 provides descriptive statistics of annual time series data for all domestically listed stocks. These statistics include the following distributional parameters: size, mean, variance, skewness, kurtosis, followed by a Shapiro-Wilk test to determine the normality of the time series distributions.

4.1.2 Data Analysis

In table 1, above, descriptive statistics for the various time series variables being investigated under this study and for the years 1975-2013 are displayed. It can be observed that the market capitalization of listed domestic companies had a higher average value (US$318 billion) when compared to GDP (current US$) and GDP (constant 2010 US$) with average values are US$127 billion and US$225 billion respectively. The Stocks traded, total value was on average much less (US$73.1 billion) when compared to the economic growth, GDP (current US$), which averaged US$127 billion over the same period.

Table 1: Descriptive Statistics

Variable	Mean	Std. Dev.	Median	Skewness	Kurtosis
Market capitalization of listed domestic companies (current us$)(Millions)	318,000	307,000	185,000	1	2.47
Stocks traded, total value (current US$)(Millions)	73,100	94,300	15,900	1.05	2.42
Stocks traded, total value (% of GDP)	28.35	27.62	10.3	0.62	1.86
Stocks traded, turnover ratio of domestic shares (%)	15.14	11.91	9.3	0.46	1.73
GDP (current US$)	127,000	116,000	134,000	1.01	2.98
GDP growth (annual %)	3.14	2.53	2.6	-0.12	2.67
GDP per capita (current US$)	3,064	2,081	3398	0.63	2.59
GDP at market prices (constant 2010 US$)	225,000	94,000	233000	0.47	2.35

Source: Research Data

The skewness and kurtosis coefficients of the three proxies of stock market development suggest that stock market returns are platykurtic[13] relative to the normal distribution, this observation is contrary to the findings of Caporale, *et al.* (2002)who find that stock market returns to be generally leptokurtic relative to the normal distribution (Morales, 2007). This observation should not, however, be cause for concern as we are told by Doane and Seward, (2011)how data sets containing extreme values will tend not only be skewed, but also generally will be leptokurtic. The JSE data set is not given to extreme variations thus the finding of a platykurtic distribution in our dataset would be consistent with expectation.

The descriptive statistics also show how the time series distributions are mostly positively skewed with the exception of GDP annual growth percent variable which is slightly negatively skewed. Skewness plays an important part in finance as shown by Conrad *et al*.(2013) who find that individual securities' risk-neutral volatility, skewness, and kurtosis are strongly related to future returns. The negative skewness in the GDP annual growth variable is therefore indicative of risk of negative returns on economic growth. In addition, all kurtosis values are smaller than 3, ranging from 1.73

[13]According to Kim (2013) excess kurtosis is measured by subtracting 3 from the kurtosis, Kim asserts that for a perfectly normal distribution excess kurtosis should be zero. He describes distributions with positive excess kurtosis as being leptokurtic implying that they have a high peak, and distributions with negative excess kurtosis as being platykurtic meaning that they have a flat-topped curve.

to 2.98, and given that normal distribution series will have a kurtosis of 3.0, it follows that all the time series data is not normally distributed except for GDP (current US$) which has a kurtosis of 2.98 and is therefore approximates a normal distribution.

4.1.3 Test for normality

The Shapiro-Wilk W-test test for normality is used in this instance to formally determine if the time-series distributions are normal. The test which was published in 1965 by Samuel Sanford Shapiro and Martin Wilk has been described by Royston (1992) as a "well-established and powerful test of departure from normality". Table 2 provides the summary results of the normality test using the Shapiro-Wilk test.

Table 2: Shapiro-Wilk W-Test for Normality

Variable	Obs	W	V	z	Prob>z
Market capitalization	41	0.80364	7.911	4.359	0.00001
Stock traded(current US$)	41	0.73736	10.581	4.972	0.0002
Stocks traded(% of GDP)	41	0.83032	6.836	4.051	0.00003
Stocks traded, turnover ratio	41	0.83668	6.58	3.971	0.00004
GDP (current US$)	56	0.86277	7.06	4.196	0.00001

The p-values are very small (less than 0.01) which means the null hypothesis of normality can be rejected at the 1% level of significance for all series. This implies that the time series of the variables are not normally distributed. The Shapiro-Wilk test statistics are also found to have high values and be significant at a 1% level and provides clear evidence to reject the null hypothesis of normality for the unconditional distribution of all the economic growth and stock market data series.

4.1.4 Trend Analysis

The following time series analysis displays figures of the economic indicators over time.

Figure 9: GDP vs. Stock Market Capitalization

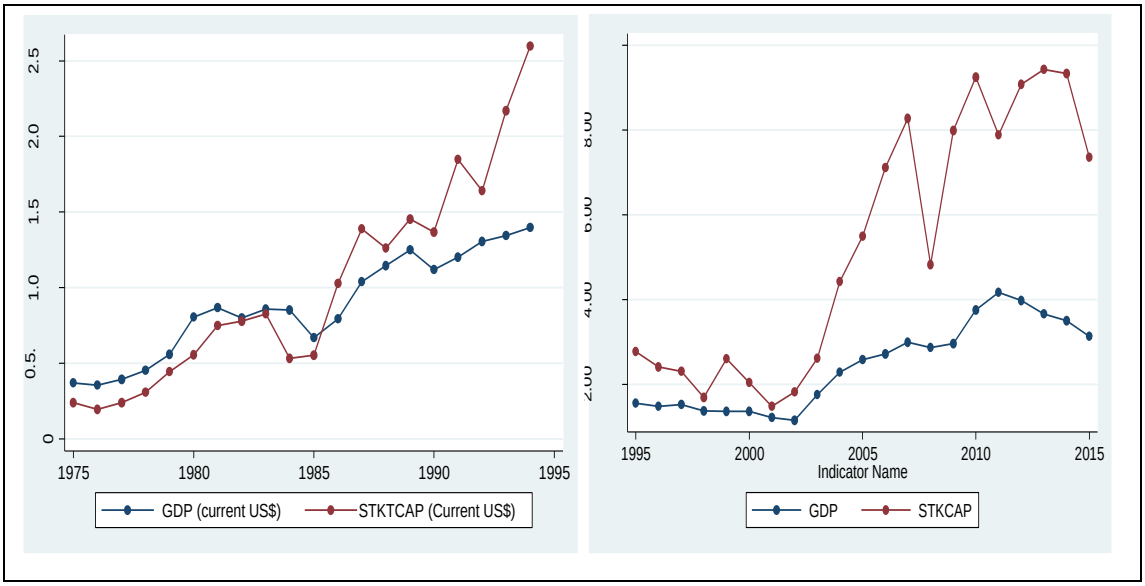


Figure 10 illustrate how the variables stock market capitalization (STKCAP) and Economic Growth (GDP) trended relative to each other prior to democracy and post-democracy. Between 1975 and 1984 these variables tended to steadily increase in tandem, with volatile annual negative returns for both around 1984/85.The negative returns observed around 1984 and 1985 corresponded to a period in South Africa which Levy (1999)notes as being characterized by net foreign capital outflows averaging 2.3 percent of GDP, increased civil and political unrest and increased pressure on foreign companies doing business in South Africa to disinvest. These series of events, according to Levy, culminated in the declaration of a state of emergency in July of 1985 and the "Rubicon[14]" speech in August of the same year by President P.W. Botha. The resultant crisis saw the South African Rand plummet and the temporary closure of the JSE and foreign-exchange markets as well as a suspension of interest payments on government debt(Levy, 1999).Around about the same time indications are that the domestic stock market capitalization (STKCAP)surpassed economic growth with widening gaps till 1994. This phenomenon could be as a result of a combination of

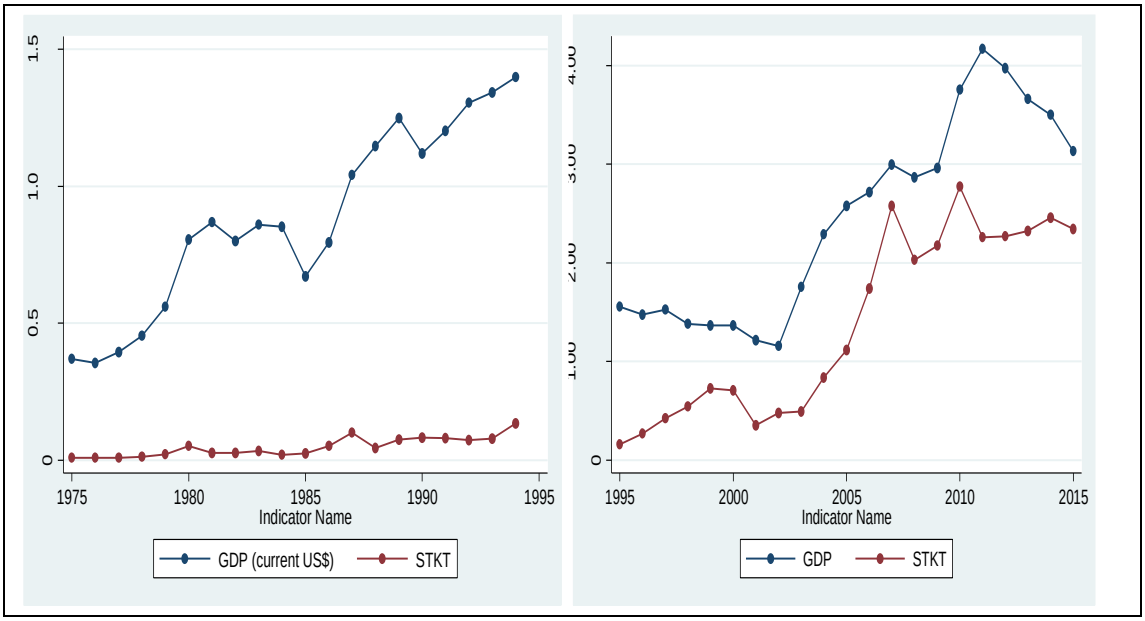
[14] The Rubicon speech delivered president P.W. Botha on the evening of 15 August 1985 was widely expected to introduce reforms to the policy of apartheid, including the release of Nelson Mandela from prison(Levy, 1999)

factors including the minimal economic effects of trade sanctions which were circumvented by the government which to export through countries that were not participating in the embargoes, albeit at unfavourable terms of trade (Levy, 1999). Other explanatory factors are offered by Alli *et al.* (n.d.) who suggest that the increased pace of reforms during the 1984-94 increased integration with the rest of the world led to more listings and better performance by the JSE. Alli *et al*. cite the admission of the JSE into the membership of the African Stock Exchanges association in 1993, the removal of the citizen requirements for stockbrokers in South Africa in 1995, and the establishment of the South African Institute of Stock Brokers as some of the reasons behind the JSE's enhanced integration in the global economy.

The period subsequent to 1994 saw a slowdown in both variables, until 2003, followed by a sharp increase of both indicators, with the gap between STKCAP and GDP widening up until 2015. Notably, there were negative returns around 1998 for STKCAP which coincided with a less pronounced downturn in GDP. The sharp decline in STKCAP can be attributable to the global financial crisis of 1998. Stals(1999) states that the global financial crisis, which had its roots in East Asia, had spill-over effects on the South African economy which manifested in the form of large outflows of portfolio capital as a result of fund managers losing confidence in emerging economies. Furthermore, the raft of financial liberalization measures that South Africa undertook in order attract foreign direct investment provided an easy source of liquidity for the fund managers who needed to transfer funds back to their countries of origin(Stals, 1999).The period between 2002 and 2008 saw the STKCAP expand quite rapidly, outpacing GDP before another structural break occurred in 2008, the global financial crisis of 2008. Dullien *et al.* (2010) provide insight on the impact that the 2008 global financial crisis had on emerging market economies and bourses when they state: "However, in spite of their residual nature, the potentially destabilizing effects of capital flows on the emerging-market economies' foreign exchange and financial markets are considerable, given that, in relation to the size of these markets, the volume allocated by global investors is not marginal. Because these markets are not very liquid and deep, sales by these investors can result in currency depreciations and significant reductions in the prices of assets, with potentially harmful effects on other segments of the financial market, as well as on the macroeconomic dynamics and on the level of activity"(Dullien *et al.*, 2010: pp 59). Further structural breaks in STKCAP occurred in

2011 and was accompanied by steadily declining GDP figures attributes to currency weakness as the JSE was in record levels when measured in rand terms.

Figure 10: GDP vs. Stock Market Value Traded



The gap between economic growth (GDP) and market stock market value traded (STKT) was very wide pre 1994 and narrowed post 1994.Notably, STKT performed far below GDP pre-1994 due mainly to factors discussed earlier in this chapter, including lack of global integration, liberalization and financial and civil unrest. Post 1994 saw both variables steadily increasing up 2005 with negative returns around 2007/8 owing to the effects of the global financial crisis. There was a sharp decrease for both indicators after 2012, with GDP facing the steeper decline compared to STKT. These results generally indicate a positive unconfirmed association between STKT and GDP as the graph depicts a similar incremental trend between the two.

Figure 11: GDP vs. Stock Market Turnover

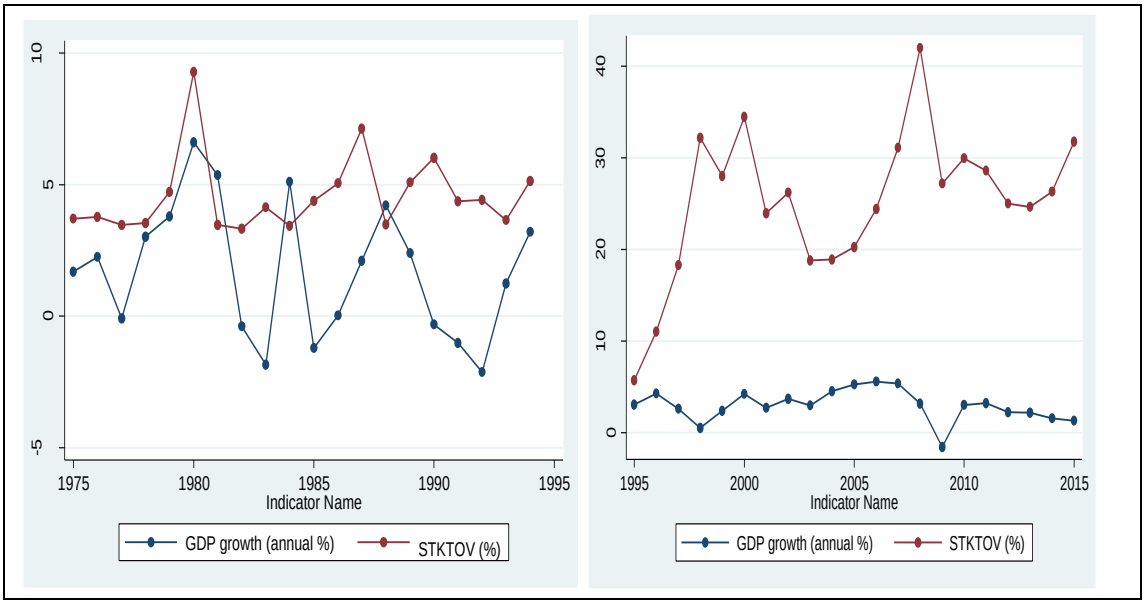


Figure 12depicts series data for GDP growth (annual percent) and stock market turnover STKTOV (percent) for the two periods. The seasonal patterns for the variables indicate negative returns around 1982-1999 followed by steady increase for STKTOV up to 1988. GDP growth rate was very volatile up to 1994, with lowest deeps in 1983, 1985, and 1992. STKTOV percent increased drastically following independence up to 2000, declining steadily preceding 2005 and increasing up to 2006/7 (highest positive) and later dropping in 2008/9. There seems to have been negative correlations between percentage rate (not actual monetary value) of GDP and STKTOV

In summary, the results above indicate that the pattern of the seasonal variations among the variables portray positive correlations, as economic growth increases so does STKT, STKTCAP, and STKTOV

4.1.5 Portmanteau test for white noise

In order to test the hypothesis of independence between variables (autocorrelation), a test of the white noise process given by the Ljung-Box-Pierce portmanteau test statistics used.

Table 3: Portmanteau test for white noise

Variable	Portmanteau (Q) statistic	Prob > chi2(18)
Market capitalization of listed domestic companies (current US$)	146.17	0.002
Stocks traded, total value (current US$)	165.31	0.0018
Stocks traded, total value (% of GDP)	169.21	0
GDP current ($US)	187.07	0.004

White noise refers to the fact that a variable does not have autocorrelation or serial correlation[15].The portmanteau test provides a reasonable way of proceeding as a general check of a model's match to a dataset where there are many different ways in which the model may depart from the underlying data generating process(Statacorp, 2009). The results as per Table 3 provide evidence against the white noise null hypothesis. The Q (18) test statistic reject the null hypothesis of uncorrelated economic growth and market stock returns, suggesting a slowly decaying autoregressive effect which implies non-stationarity. Thus, the null hypothesis of strict white noise is rejected; hence further tests are done to check for stationarity of the data.

4.1.6 Formal Stationarity Tests

Based on the findings of Shahbaz, *et al.*(2014) the use of unit root tests such as the Augmented Dickey Fuller (ADF) and the Philips Peron unit root test is not best suited for this analysis due to the unavailability of information about potential structural break points in the data which in turn may lead to biased or spurious results. The study then resolved to employ the Zivot-Andrews[16] unit root test which takes into account structural breaks that may exist in the time series, which is relevant for this dataset. The results of these unit root tests are shown in Table 4, below. The results from the Zivot-Andrews unit root test (Table 4), which take into account the existence of a structural breaks, show that all the time series data are integrated of order I(1) except for the series STKOV, which is stationary. Therefore, the upper bound critical values will be used for the f-test for cointegration in the variables.

[15] According to Box and Pierce (1970) many statistical models, particularly autoregressive-moving average time series models, are attempts at transforming the data to white noise, which they defined as being an uncorrelated sequence of errors.
[16]Zivot & Andrews, 1992

Table 4: Zivot-Andrews Structural Break Unit Root Test Results

Variable	Level		1st Difference	
	T-statistic	Time break	T-statistic	Time break
lnGDP	-3.9916(1)	1998	-6.4605(4)**	2003
lnSTKCAP	-3.3553(0)	1996	-7.2338(0)**	2003
lnSTKT	-3.8344(0)	2006	-5.3164(4)**	2001
lnSTKTOV	-5.3590(0)**	1996		

** *Significant at 5% level of significance (i.e. stationary)*

Having ascertained that some of the variables are I(1), the ARDL estimation can go forward as it allows for variables to be either I(1) or I(0) for the regression.

4.1.7 Bounds Cointegration Test Results

The results for the cointegration test using Wald's test are shown in Table 5. In testing for the cointegration, the study first identifies the appropriate lags. The selection of the lag order for the three models has been made using the information criterion approach including the Likelihood-Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC) and Hannan–Quinn Information Criterion (HQIC). As illustrated in Appendices 1, 2 and 3, the LR, FPE, AIC, SIC and HQIC all specify two lags for models 1 and model 3 and specifies one lag for model 2.

Table 5: Cointegration Test Results

	Critical values:	1%		5%		10%	
		I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
Model 1	14.29641**	7.625	8.825	5.260	6.160	4.235	5.000
Model 2	8.973823**	7.625	8.825	5.260	6.160	4.235	5.000
Model 3	5.603716**	7.625	8.825	5.260	6.160	4.235	5.000

***Significant at a 5% level of significance*

According to Ziramba (2008)if the test statistic is greater than the lower bound, but less than the upper bound critical values then no inference can be made on whether cointegration exists or not amongst the variables. If the test statistic is less than the lower bound critical value, the null hypothesis cannot be rejected, when all the variables are stationary. If the test statistic is greater than the upper bound critical value then the null hypothesis is rejected, for variables that are integrated of order 1.

The hypothesis test conducted from the results given in Table 5, above, is that of the long-run relationship between the variables. The null hypothesis being that of no cointegration or no long-run relationship amongst the tested variables; the alternative hypothesis being that of a long-run relationship between the variables, that is, cointegration. According to the results in Table 5, we can conclude that for all three models, there is evidence of cointegration at a 5% level of significance. Therefore, all the models show that there is a long-run relationship between economic growth (GDP) and each of the independent variables in their respective models. The estimated models from which the bounds test results are generated are shown in appendices 4 – 6 which illustrate how the models specified are jointly significant in explaining the variation in economic growth.

The long-run relationship can be intuitively explained through Table 6, below, where it can be observed that there is a strong positive correlation between economic growth (GDP), market capitalization, and stock market traded value and stock market turnover for South Africa. This implies that an increase in market capitalization, stock market

traded value and stock market turnover, individually, result in an increase in economic growth.

Table 6: Correlation Coefficient Matrix

	LNGDP	lnSTKCAP	lnSTKTOV	lnSTKT
lnGDP	1.000000			
lnSTKCAP	0.960042	1.000000		
lnSTKTOV	0.689490	0.776615	1.000000	0.930305
lnSTKT	0.888633	0.953555	0.930305	1.000000

4.1.8 Short-run Cointegration

To test the short-run and long-run relationship among the variables the VECM and the OLS models are estimated, the short-term ECM estimations are given Models 1, 2 and 3 in Table 7. The results show the coefficients of STKCAP and STKT being statistically significant at the 5% level as opposed to STKTOV which is not statistically significant. This positive coefficient observed for STKCAP and STKT indicates that the developments in the stock markets enhance economic growth. The error correction terms are also significant for STKCAP and STKT and not significant for STKTOV. From Table 7, it is observed that for Models 1 and 2, the ECM is statistically significant at 1%. The coefficient of the error correction term for Models 1 and 2are negative[17]and statistically significant with value of -0.32135 and -0.19734 respectively. This shows that32% and 20% of the preceding year's disequilibrium is corrected implying that the speed of adjustment is relatively high.

[17] Negative coefficients imply stability of the system and convergence towards equilibrium path in case of any disturbance in the system.

Table 7: ECM Estimation Results: Dependent Variable: Δ(LNGDP), Method: Least Squares

Model 1		**Model 2**		**Model 3**	
Variable	**Coefficient**	**Variable**	Coefficient	**Variable**	**Coefficient**
C	-2.214558** (-2.64826)	**C**	0.205031 (0.417524)	**C**	0.957557* (1.822871)
ΔLNSTKCAP	0.292851*** (4.739886)	**ΔLNSTKT**	0.162901*** (3.025415)	**ΔLNSTKOV**	0.011787 (0.149194)
D01	-0.134795** (-2.1810	**D01**	-0.174612* (-1.98121)	**D01**	-0.007463 (-0.07856)
ECT_{t-1}	-0.32135*** (-0.28436)	**ECT_{t-1}**	-0.19734** (-0.27091)	**ECT_{t-1}**	-0.08788 (-1.12981)
F-statistic	9.59335	**F-statistic**	4.055519	**F-statistic**	0.899625
Prob > F	0.000024	**Prob > F**	0.008345	**Prob > F**	0.474693
Adj. R-squared	0.468472	**Adj. R-squared**	0.23861	**Adj. R-squared**	-0.010402
DW stat	1.367592	**DW stat**	1.401683	**DW stat**	1.327695

*Notes: Model 1 = Market capitalization Model 2= Stocks traded, Model 3=Stocks traded turnover. T-statistics in parentheses. ***, ** and * denotes significance at 1%, 5% and 10%*

4.1.9 Long-run Cointegration

The long-run relationship estimations are given in Table 8. The long-term relationship among the variables is estimated through the OLS and the coefficients obtained from the model are all significant at the 1% significance level, except for STKTOV (model 3). Also, the coefficients of the independent variables are positive indicating a positive relationship. The models makes use of dummy variables which Joyeux(2007) explains as necessary for regressions with a structural break. According to Joyeux, structural breaks elevate the risk of incorrectly accepting the null hypothesis of a unit root in the presence of a trend in the regression, the inclusion of a dummy variable therefore addresses this risk.

The dummy variable D01 indicates the structural break in the regression for the three models. The structural break year used in this study is 1994, the year of South Africa's first democratic elections. The dummy variable indicates the post-apartheid era in South Africa with a "1" and a "0" for the apartheid era in South Africa. The dummy variable examines the effect of the development of the JSE on economic growth in post-apartheid South Africa. The long-run model dynamics indicate that the dummy variable is statistically significant at a 5% level of significance for Models 1 and 2, but is not statistically significant for Model 3. The negative sign associated with the coefficients

of the dummy variable in both the short- and long-run dynamics is reflective of the political and economic instability that characterized South Africa during the period of regime change and based on the negative values of the dummy variables, South Africa's economic growth direction should have been negative (i.e. decreased) but the fact that it increased suggests that there were other variables that were driving the economic growth other than the regime change event. Overall, the coefficients of the stock market indicators are positive suggesting that even though the medium term the structural break didn't show evidence of improved economic growth, the positive trend in economic growth can also be explained by the increased capital inflows into South Africa post-apartheid after the sanctions on South Africa were lifted (Moolman, 2004).

Table 8: Stock Market and Economic Growth - 1975-2013

Dependent Variable: LNGDP					
Model 1		**Model 2**		**Model 3**	
Variable	Coefficient	**Variable**	**Coefficient**	**Variable**	**Coefficient**
C	-2.301379*** (-3.45344)	**C**	0.270417 (0.550242)	**C**	0.930046* (1.814682)
LNSTKCAP	0.28654*** (5.770765)	**LNSTKT**	0.112507*** (3.231776)	**LNSTKOV**	0.031661 (0.0608719)
D01	-0.140426** (-2.69131)	**D01**	-0.191709** (-2.18832)	**D01**	-0.007322 (-0.07804)
AR(1)	0.382618*** (3.828242)	**AR(1)**	0.656342*** (7.078796)	**AR(1)**	0.881512*** (13.16086)
F-statistic	242.6917	**F-statistic**	158.6883	**F-statistic**	121.6658
Prob >F	0	**Prob >F**	0	**Prob >F**	0
Adj. R-squared	0.948958	**Adj. R-squared**	0.923838	**Adj. R-squared**	0.902743
DW stat	1.315616	**DW stat**	1.214737	**DW stat**	1.320071

*Notes: Model 1 = Market capitalization Model 2= Stocks traded, Model 3=Stocks traded turnover. T-statistics in parentheses. ***, ** and * denotes significance at 1%, 5% and 10%*

Stock Market and Economic Growth: Post-Apartheid Analysis

The results of the pre and post-apartheid analysis on the effect of stock market development and economic growth are presented in Table 9. From Table 9, the coefficients of all the proxies of the stock market development are significant are found to be positive and significant during apartheid period from 1975 to 1993, whereas the proxy for stock market development is only significant in Model in post-apartheid period from 1994 to 2015. In addition, higher coefficients are also observed for the stock market indicators in the Apartheid model compared with post-Apartheid model. This suggests that effect of stock market development on economic growth more

pronounced during Apartheid South Africa. The autoregressive components are significant at a 5%, 1% and 1% level of significance for domestic stock market capitalization (STKCAP), market stock market value traded (STKT) and stock market turnover (STKOV) respectively in apartheid Model (1975-1993) while a significance of 5%, 1% and 1% is observed for domestic stock market capitalization (STKCAP), stock market value traded (STKT) and stock market turnover (STKOV) respectively in the post-apartheid Model (1994-2013). The autoregressive components are important in the study given that, statistically speaking, autoregressive processes and models all inherently presume that past values have some effect on future values(Hamilton, 2010). Significant autoregressive components may, therefore, indicate that their past values are significant in explaining the variation in GDP. This may indicate that apartheid South Africa may still have a strong bearing on the current South African economy.

The results in Table 9also indicate that all three models under both regimes (Apartheid and post-apartheid) are jointly significant in explaining the variation in economic growth in South Africa during and after the apartheid regime. Furthermore, for the apartheid era, the Durbin Watson Statistic indicates that there was no serial correlation. In the post-apartheid period, Model 1 exhibits no serial correlation while Models 2 and 3 indicate positive autocorrelation, which is addressed by the autoregressive component.

From the results, one may conclude that only stock market capitalization has translated into economic growth in post-apartheid South Africa. This phenomenon can be explained by the relative differences in the length of time during which the South African economy has been subject to the effect of apartheid and democracy-apartheid having lasted a total of 46 years versus the 21 years of democracy. Consequently, the effects of stock market development under apartheid would necessarily be more pronounced than those under the new democratic dispensation.

Over the period, a 1% increase in domestic stock market capitalization resulted in 0.37% growth in the long-run. Also notable is the fact that variables are jointly significant in explaining the variation in GDP in post-apartheid South Africa, but as highlighted above, only domestic stock market capitalization is individually statistically significant.

Table 9 also illustrates how the autoregressive components have all been positively and statistically significantly affected by post-apartheid South Africa. This means that there is a one-year lag in the effect of the post-apartheid regime of South Africa on the indicators of stock market developments.

Table 9:Stock Market and Economic Growth: Apartheid and Post-Apartheid Analysis

	1975 – 1993 (Apartheid)				1994 – 2013 (Post-apartheid)		
	Model 1	**Model 2**	**Model 3**		**Model 1**	**Model 2**	**Model 3**
Variable	Coefficient	Coefficient	Coefficient		Coefficient	Coefficient	Coefficient
C	-1.19717	0.065156	0.931925		-4.233712	0.048811	0.332043
LNSTMKT	0.246578**	0.179223***	0.257928**		0.370937***	0.066965	-0.028159
D01	-0.105906	-0.096796	-0.013764		-0.049667	-0.090927	0.082643
AR (1)	0.369623**	0.495539***	0.838424***		0.334507**	0.808294***	0.964770***
F-statistic	45.73065	55.48646	34.35701		108.2137	39.55273	36.10414
Prob >F	0.0000	0.00000	0.000001		0.0000	0.0000	0.0000
Adj. R-squared	0.881728	0.900804	0.847549		0.941459	0.852571	0.840399
DW stat	1.452064	1.633297	1.857379		1.954108	1.222232	1.261632

*Notes: Model 1 = Market capitalization Model 2= Stocks traded, Model 3=Stocks traded turnover ***, ** and * denotes significance at 1%, 5% and 10%. Source: Authors estimation from research data.*

4.1.10 Granger Causality

According to Bayar et al, (2014), a causality analysis is used to determine causation between two variables and to determine the direction of the relationship in the event that there is a relationship. This study examines the causal relationship among the variables by way of a granger causality test. A granger causality test is performed by testing whether the coefficients of the lag lengths of the independent variables preceding the error term in the three models specified are collectively equal to zero(Bayar *et al.*, 2014). Should the coefficients differ significantly from zero at a particular significance level, X is said to cause Y(Bayar *et al.*, 2014). The results of the causality analyses are presented in Table 9 and Table 10. From Table 9, which is an analysis of the entire period of the study, the output suggests that the null hypothesis of a non-causal relationship between stock market and economic growth is only rejected in Model 1 at 1%. Furthermore, the causal relationship is observed to flow from stock market capitalization to economic growth. Thus the results of the pairwise granger

causality tests seem to indicate that over the period between 1975 1nd 2015 only stock market capitalization has a causal effect on economic growth.

Further analysis of the apartheid era period in isolation, also presented Section B in Table 10, it appears that a causal relationship exists between stock market and economic growth for models 1 and 2 at the 1% and 10% level of significance respectively. The output of Table 10 also indicates the direction of causality as having been from stock market capitalization to economic growth and from stock market turnover to economic growth for models 1 and 2 respectively. Section C of Table 10 indicates no causal relationship between any of the proxies of stock market development and economic growth. These results can possibly be explained by the transition of the South African economy from the apartheid to the post-Apartheid. Apartheid lasted for 46 years and as such had more time than current post-Apartheid South Africa (21 years) to develop the independent variables included in this study towards growing the GDP of the economy.

Table 10: Granger Causality Results

Models	Null Hypothesis	F-Statistic	Prob.	Decision on
A. Granger Causality 1975-2013				
1	lnSTKCAP does not Granger Cause lnGDP	7.68744***	0.002	Reject
	lnGDP does not Granger Cause lnSTKCAP	0.00263	0.997	Do not reject
2	lnSTKT does not Granger Cause lnGDP	3.23503*	0.052	Do not reject
	lnGDP does not Granger Cause lnSTKT	0.28898	0.751	Do not reject
3	lnSTKTOV does not Granger Cause lnGDP	0.97483	0.388	Do not reject
	lnGDP does not Granger Cause lnSTKTOV	0.92805	0.405	Do not reject
B. Apartheid causality (1975 - 1993)				
1	lnSTKCAP does not Granger Cause lnGDP	6.94860***	0.0099	Reject
	lnGDP does not Granger Cause lnSTKCAP	0.70229	0.5147	Do not reject
2	lnSTKT does not Granger Cause lnGDP	4.13886*	0.043	Reject
	lnGDP does not Granger Cause lnSTKT	0.66848	0.5306	Do not reject
3	lnSTKTOV does not Granger Cause lnGDP	0.46995	0.6361	Do not reject
	lnGDP does not Granger Cause lnSTKTOV	0.13338	0.8764	Do not reject
C. Post-apartheid causality (1994 - 2013)				
1	lnSTKCAP does not Granger Cause lnGDP	1.69451	0.217	Do not reject
	lnGDP does not Granger Cause lnSTKCAP	0.92539	0.4179	Do not reject
2	lnSTKT does not Granger Cause lnGDP	1.20151	0.3281	Do not reject
	lnGDP does not Granger Cause lnSTKT	2.39734	0.1249	Do not reject
3	lnSTKTOV does not Granger Cause lnGDP	0.81993	0.4593	Do not reject
	lnGDP does not Granger Cause lnSTKTOV	0.59657	0.5633	Do not reject

*Notes: ***and * denotes significance at 1%and 10%*

4.1.11 Diagnostic Tests

To determine the robustness of the specified models, diagnostic tests for serial autocorrelation, heteroscedasticity and normality of the residuals are undertaken. The diagnostic tests used for the OLS estimations of the three models include: serial autocorrelation (Breusch-Godfrey test[18]), heteroskedasticity (White test[19]) and the Ramsey RESET test[20] for model misspecification. The null hypotheses for the diagnostic tests are given below:

1. Breusch-Godfrey Serial Correlation LM Test – H_0: No serial autocorrelation.
2. White Test (Heteroskedasticity) – H_0: No heteroskedasticity.
3. Ramsey RESET test (Model Misspecification) – H_0: No model misspecification.

The results of the diagnostic tests are given on tables 11-14. The summary of results of the diagnostic tests is shown on Table 13, below. These results confirm that the models do not violate the assumptions for OLS estimation to be sufficient and consistent and where there has been a violation, in the case of the presence of serial correlation, it has been corrected by the inclusion of an autoregressive process so as to eliminate the effect of the serial correlation.

Table 11: Summary of results of diagnostic tests

	Diagnostic Test		
	Serial Autocorrelation	**Heteroskedasticity**	**Model Misspecification**
Model 1	Reject H_0	Fail to Reject H_0	Fail to Reject H_0
Model 2	Reject H_0	Fail to Reject H_0	Fail to Reject H_0
Model 3	Fail to Reject H_0	Fail to Reject H_0	Fail to Reject H_0

Table 12: Diagnostic tests based on OLS (long-run) estimation – Model 1

Serial Autocorrelation test: Breusch-Godfrey Serial Correlation LM Test			
F-statistic	3.541039	Probability	0.0401
Obs*R-squared	6.895541	Probability	0.0318
Heteroskedasticity Test: White test			
F-statistic	0.414424	Probability	0.9034

[18]Zeileis & Hothorn (2002)
[19]White (1980)
[20]Ramsey & Schmidt (1976)

Obs*R-squared	3.864609	Probability	0.8691
Model Misspecification: Ramsey RESET test			
F-statistic	0.894777	Probability	0.3507
Likelihood ratio	1.009749	Probability	0.3150

Table 13: Diagnostic tests based on OLS (long-run) estimation – Model 2

Serial Autocorrelation test: Breusch-Godfrey Serial Correlation LM Test			
F-statistic	4.523733	Probability	0.0181
Obs*R-squared	8.406967	Probability	0.0149
Heteroskedasticity Test: White test			
F-statistic	2.547700	Probability	0.0293
Obs*R-squared	15.86685	Probability	0.0443
Model Misspecification: Ramsey RESET test			
F-statistic	0.003860	Probability	0.9508
Likelihood ratio	0.004411	Probability	0.9470

Table 14:Diagnostic tests based on OLS (long-run) estimation – Model 3

Serial Autocorrelation test: Breusch-Godfrey Serial Correlation LM Test			
F-statistic	3.043126	Probability	0.0608
Obs*R-squared	6.073157	Probability	0.0480
Heteroskedasticity Test: White test			
F-statistic	1.801214	Probability	0.1148
Obs*R-squared	12.69307	Probability	0.1229
Model Misspecification: Ramsey RESET test			
F-statistic	0.036974	Probability	0.8486
Log likelihood ratio	0.042233	Probability	0.8372

4.1.12 Stability Tests

The Stability tests for the OLS estimations include: CUSUM AND CUSUMSQ for long-run OLS. Graphical representations of CUSUM and CUSUM square are shown in Appendix 8 for the three long-run OLS models. According to Bahmani-Oskooee and Ratha (2004) the null hypothesis (that the regression equation is correctly specified)

cannot be rejected if the plot of these statistics remains within the critical bounds of the 5% significance level. As it is clear from Fig. 17– 19 the plots of both the CUSUM and CUSUM square are within the boundaries and hence these statistics confirm the stability of the long-run coefficients of regressors in the estimations. This means that the coefficients are stable and consistent and the estimated coefficients provide unbiased information about the relationships between the independent variables and the dependent variable.

4.1.13 Conclusion

The purpose of the study is to answer the question of whether there is a significant and positive correlation between the development of the JSE and economic growth in post-apartheid South Africa. This study also seeks to examine and describe the economic growth trajectory of South Africa prior to 1994 and post 1994. This was executed using the following null hypothesis:

H_0: The development of the JSE does not result in economic growth in post-apartheid South Africa.

To accomplish the goal of this study, the autoregressive distributed lag (ARDL) methodology is employed and it considers the existence of a structural break in the series due to this analysis considering the pre and post-apartheid eras in South Africa. The existence of a long-run relationship between the variables is tested after using lag length selection criteria from an estimated VAR to select the optimal lags for the vector error correction model of the ARDL. The results obtained from this analysis confirm that there is a long-run positive relationship between economic growth, stock market capitalization and stock market traded value. The existence of a positive long-run relationship between economic growth and two of the three proxies for stock market development can be used to make a general inference of a positive long-run relationship between the development of the JSE and South Africa's growth rate post-apartheid. The empirical analysis further confirms that the growth elasticity between stock market capitalization, stock market traded value and economic growth is less than 1 indicating a possible channelling of funds raised on the JSE to offshore investments or to non-productive sectors of the economy. It is also evident from regression analyses run on

the post democracy era that post-apartheid South Africa has only had a positive statistically significant effect on the domestic stock market capitalization at the exclusion of stock market value traded (STKT) and stock market turnover (STKOV).

Further, from the pairwise Granger causality tests conducted, it is evident that market capitalization unidirectionally causes economic growth in South Africa implying that the development of the JSE does result in economic growth in post-apartheid South Africa. The results obtained are in line with the supply-leading hypothesis as described by Laeven *et al.* (2015).The study also established how economic growth in pre-democracy South Africa was stunted due primarily to the effect of economic and political isolation. Low levels of economic growth were also accompanied by low levels of stock market development which were a result of a combination of factors including lack of integration with global markets as well as an environment that was not liberalized. Post-democracy the study shows how economic reforms and closer integration with the global economy have resulted in an acceleration of economic growth and stock market development. The economic growth trajectory of South Africa post-apartheid has also been, as a result of greater integration, subject to the effects of global financial crises and has to a greater extent mirrored the fluctuations experienced by the global economy.

Chapter 5
Conclusions, Policy Recommendations and Areas for Further Study

5.1.1 Introduction

The purpose of this chapter is to summarize all the chapters including limitations of the study, policy recommendations as well as recommend areas for further study. The main objective of the study was to answer the question of whether there is a significant and positive correlation between the development of the JSE and economic growth in post-apartheid South Africa. The study also sought to examine and describe the economic growth trajectory of South Africa look prior to 1994 and post 1994.

The study explored Solow (1956) and Swan's (1956) neoclassical growth theory as well as the endogenous growth theory as espoused by Romer (1986), Lucas (1988) and Rebelo (1991) as a way of providing context and a theoretical framework from which the long-run impact of the stock market development on economic growth could be explained. After reviewing the theoretical framework an analysis of the performance and structure of the South African economy is performed with the study noting how the average pace of economic growth since the advent of democracy has lagged the global economy's average growth rate by approximately 0.3%. Upon reviewing the structure of the South African economy, the study noted how South Africa's export profile is skewed in favour of commodities how manufactured exports also contain a high share of primary commodities as inputs. South Africa's export profile, is therefore said to export primarily natural resources and capital-intensive goods as opposed labour-intensive, job-creating products(Bhorat *et al*., 2013). Comparisons were also made of the value added by various sectors of the South African economy in the pre-democracy and post-democracy era and it was noted that the service sectors contribution to the economy expanded in the post-democracy era, mainly at the expense of the industrial sector in what Fedderke (2014) refers to as an unbalanced growth structure. South Africa's growth structure was also seen to be out of step with emerging market peers such as Brazil, Chile, India, the Philippines, Mexico, Singapore and Turkey

The functions and services of the JSE were also examined including the various trading platforms for the trade in a multitude of securities including equities, derivatives,

currencies and commodities among others. In such examination the regulatory framework in which the JSE operates was also assessed. The study then proceeded to examine the underpinnings of the finance growth nexus, whereby it was explained by Levine (1997) how market frictions such as information and transaction costs necessitate the emergence of financial markets and intermediaries which in turn provide five key functions namely, the facilitation of risk management, allocation of resources, monitoring of management and exertion of corporate control, the mobilization of savings, and facilitate the exchange of goods and services.

In explaining the causal relationship between the development of the JSE and economic growth, the supply leading, demand following and feedback hypothesis were reviewed. The majority of studies reviewed report a causal link between stock market development and economic growth in the long-run. However, the study also noted some studies that pointed towards a demand led and feedback relationship between stock market development and economic growth. Others, still, argued that the significance of the stock market development as a factor for economic development was exaggerated.

Following on theoretical and empirical literature, the study specified an empirical model in an attempt to explain the effect of stock market development and economic growth. Within the model, economic growth is expressed as a function of stock market development as represented by the proxies, stock market capitalization, stock market value traded and stock market turnover, as the independent variables. The study made use of the ARDL Bounds testing approach originally developed by Pesaran and Shin (1999) and as used by Odhiambo (n.d.) to examine the long-run cointegration relationship between each of three proxies of stock market development and economic growth. The first step was to identify the existence of long-run relationships using the ARDL approach. Having identified a long-run relationship, the study examined the short-run and long-run Granger-causality between the three proxies of stock market development and economic growth.

The results obtained from the study confirm that there is a significant long-run relationship between economic growth and two of the three proxies for stock

market development specified[21]. The study also suggests that the long-run relationship between economic growth and the development of the JSE could be affected by the channelling of resources raised on the JSE to foreign investments or to non-productive sectors of the economy, this suggestion is made on the basis of low growth elasticity ratios obtained from long-run cointegration estimates. The study also suggests that post democracy era (post-apartheid South Africa) has only had a positive statistically significant effect on the domestic stock market capitalization at the exclusion of stock market value traded (STKT) and stock market turnover (STKOV).

Through the pairwise Granger causality tests conducted, results demonstrated how the JSE's market capitalization influences economic growth in South Africa. The two other proxies for stock market development namely; stock market value traded and stock market turnover did not exhibit any causal relationship with economic growth. Based on the evidence of strong positive correlation between South Africa's economic growth and all proxies for the development of the JSE as well as the unidirectional causal relationship between the JSE's market capitalization, it is reasonable to conclude that the development of the JSE does result in economic growth in South Africa. Whilst analysing the two periods in South Africa's history in isolation it is apparent that in the post-apartheid era there is no statistically significant evidence of causality between the proxies of stock market development and economic growth. This finding could be explained by the fact that apartheid in South Africa lasted for 46 years and as such had more time than current post-apartheid South Africa (21 years) to develop the independent variables included in this study towards growing the GDP of the economy.

5.1.2 Policy implications and recommendations

The results presented in this study confirm the existence of a causal relationship between the development and South Africa's economic growth since the advent of democracy. These findings are in accordance with the a-priori expectations

[21] Stock market capitalization and stock market traded were proxies found to have significant positive relationships with economic growth.

presented on chapter three. Given the results above, the study makes the following policy recommendations:

- The South African Government and the JSE should consider developing policies that would enhance awareness of the JSE as an investment vehicle to potential investors. Such policies may also include measures to ensure that investor confidence in the market is not eroded.
- The South African Revenue Services (SARS) should consider providing tax incentives for companies that intend to list for the first time on the JSE. Tax incentives would make listing on the JSE less cost intensive; currently the costs incurred to list including legal, consulting and underwriting fees are not tax deductible and may be prohibitive.
- SARS should consider providing a tax deduction on interest charged on loans taken out by individuals to fund acquisition of shares on the JSE. Such incentive would increase the investor base by enabling low income population groups to participate in the JSE.
- The JSE should consider researching and providing more company specific information on emerging trends related to environmental, social and governance (ESG) matters given the increasing importance of such matters among fund managers and investors. Such information would potentially increase compliance to ESG principles amongst listed companies and result in a further development in the JSE.

5.1.3 Areas for further study

Further studies into the relationship between the development of the JSE and economic growth of the South African economy would use a methodology that includes all the individual models' independent variables into one model that examines the interaction of all the variables together with the dependent variable, economic growth. The joint significance of that regression would be key in analysing if the variables are jointly significant in explaining economic growth from the perspective of the development of the JSE.

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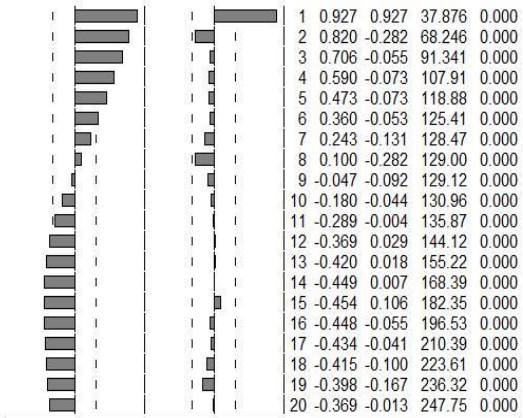
Appendix 1: Informal Stationarity Tests

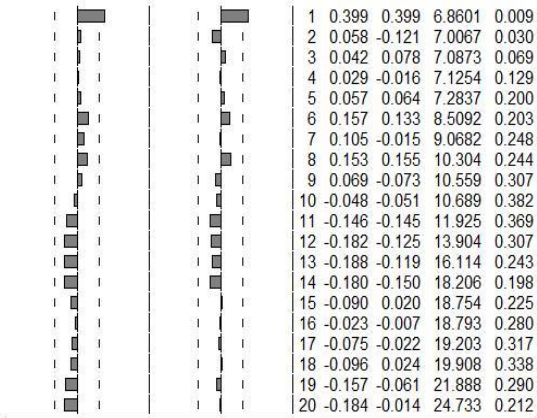
Informal Stationarity Test (GDP)

Date: 09/23/16 Time: 19:56
Sample: 1975 2015
Included observations: 41



	AC	PAC	Q-Stat	Prob
1	0.927	0.927	37.876	0.000
2	0.820	-0.282	68.246	0.000
3	0.706	-0.055	91.341	0.000
4	0.590	-0.073	107.91	0.000
5	0.473	-0.073	118.88	0.000
6	0.360	-0.053	125.41	0.000
7	0.243	-0.131	128.47	0.000
8	0.100	-0.282	129.00	0.000
9	-0.047	-0.092	129.12	0.000
10	-0.180	-0.044	130.96	0.000
11	-0.289	-0.004	135.87	0.000
12	-0.369	0.029	144.12	0.000
13	-0.420	0.018	155.22	0.000
14	-0.449	0.007	168.39	0.000
15	-0.454	0.106	182.35	0.000
16	-0.448	-0.055	196.53	0.000
17	-0.434	-0.041	210.39	0.000
18	-0.415	-0.100	223.61	0.000
19	-0.398	-0.167	236.32	0.000
20	-0.369	-0.013	247.75	0.000

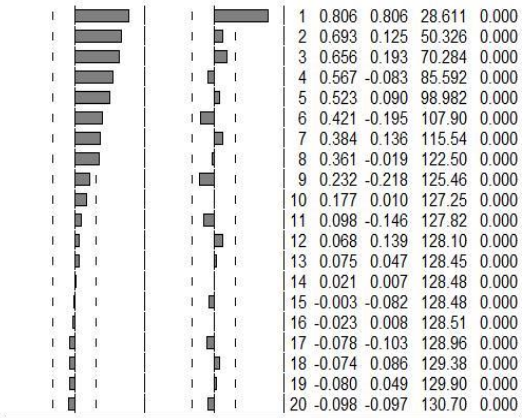
Date: 09/23/16 Time: 19:57
Sample: 1975 2015
Included observations: 40



	AC	PAC	Q-Stat	Prob
1	0.399	0.399	6.8601	0.009
2	0.058	-0.121	7.0067	0.030
3	0.042	0.078	7.0873	0.069
4	0.029	-0.016	7.1254	0.129
5	0.057	0.064	7.2837	0.200
6	0.157	0.133	8.5092	0.203
7	0.105	-0.015	9.0682	0.248
8	0.153	0.155	10.304	0.244
9	0.069	-0.073	10.559	0.307
10	-0.048	-0.051	10.689	0.382
11	-0.146	-0.145	11.925	0.369
12	-0.182	-0.125	13.904	0.307
13	-0.188	-0.119	16.114	0.243
14	-0.180	-0.150	18.206	0.198
15	-0.090	0.020	18.754	0.225
16	-0.023	-0.007	18.793	0.280
17	-0.075	-0.022	19.203	0.317
18	-0.096	0.024	19.908	0.338
19	-0.157	-0.061	21.888	0.290
20	-0.184	-0.014	24.733	0.212

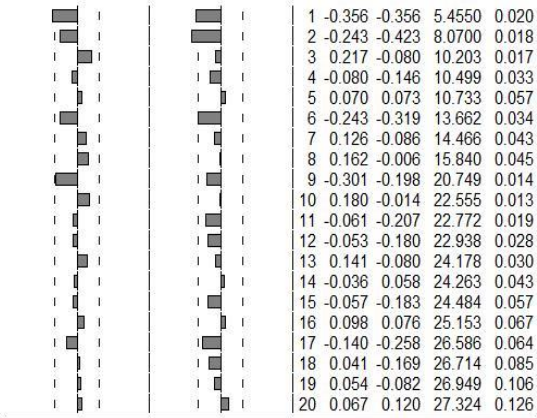
Informal Stationarity Test (Stock Market Capitalization)

Date: 09/23/16 Time: 20:02
Sample: 1975 2015
Included observations: 41



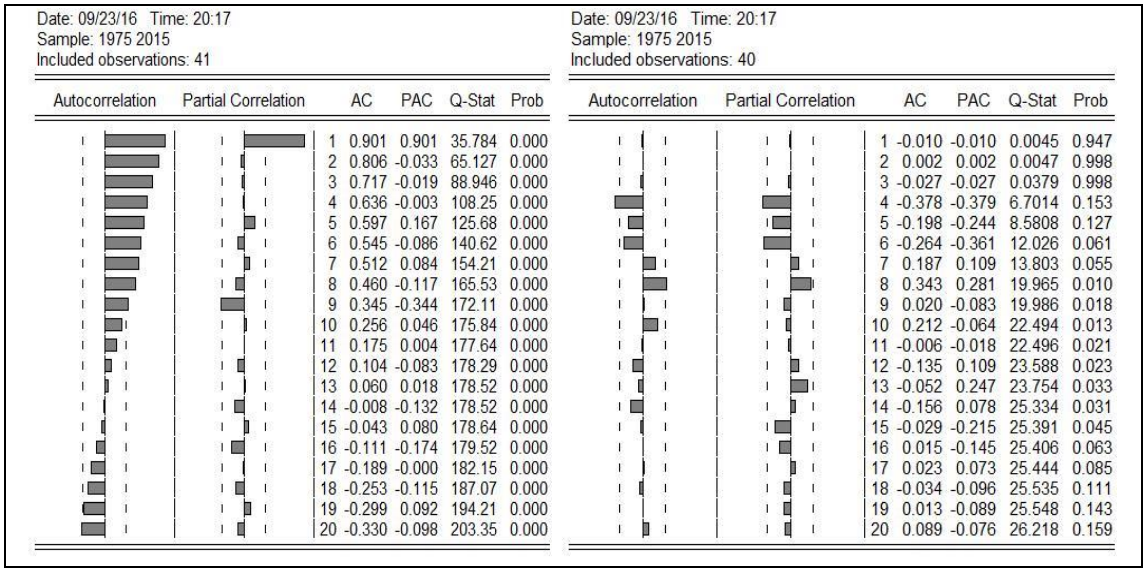
	AC	PAC	Q-Stat	Prob
1	0.806	0.806	28.611	0.000
2	0.693	0.125	50.326	0.000
3	0.656	0.193	70.284	0.000
4	0.567	-0.083	85.592	0.000
5	0.523	0.090	98.982	0.000
6	0.421	-0.195	107.90	0.000
7	0.384	0.136	115.54	0.000
8	0.361	-0.019	122.50	0.000
9	0.232	-0.218	125.46	0.000
10	0.177	0.010	127.25	0.000
11	0.098	-0.146	127.82	0.000
12	0.068	0.139	128.10	0.000
13	0.075	0.047	128.45	0.000
14	0.021	0.007	128.48	0.000
15	-0.003	-0.082	128.48	0.000
16	-0.023	0.008	128.51	0.000
17	-0.078	-0.103	128.96	0.000
18	-0.074	0.086	129.38	0.000
19	-0.080	0.049	129.90	0.000
20	-0.098	-0.097	130.70	0.000

Date: 09/23/16 Time: 20:03
Sample: 1975 2015
Included observations: 40



	AC	PAC	Q-Stat	Prob
1	-0.356	-0.356	5.4550	0.020
2	-0.243	-0.423	8.0700	0.018
3	0.217	-0.080	10.203	0.017
4	-0.080	-0.146	10.499	0.033
5	0.070	0.073	10.733	0.057
6	-0.243	-0.319	13.662	0.034
7	0.126	-0.086	14.466	0.043
8	0.162	-0.006	15.840	0.045
9	-0.301	-0.198	20.749	0.014
10	0.180	-0.014	22.555	0.013
11	-0.061	-0.207	22.772	0.019
12	-0.053	-0.180	22.938	0.028
13	0.141	-0.080	24.178	0.030
14	-0.036	0.058	24.263	0.043
15	-0.057	-0.183	24.484	0.057
16	0.098	0.076	25.153	0.067
17	-0.140	-0.258	26.586	0.064
18	0.041	-0.169	26.714	0.085
19	0.054	-0.082	26.949	0.106
20	0.067	0.120	27.324	0.126

Informal Stationarity Test (Stock Market Value Traded)



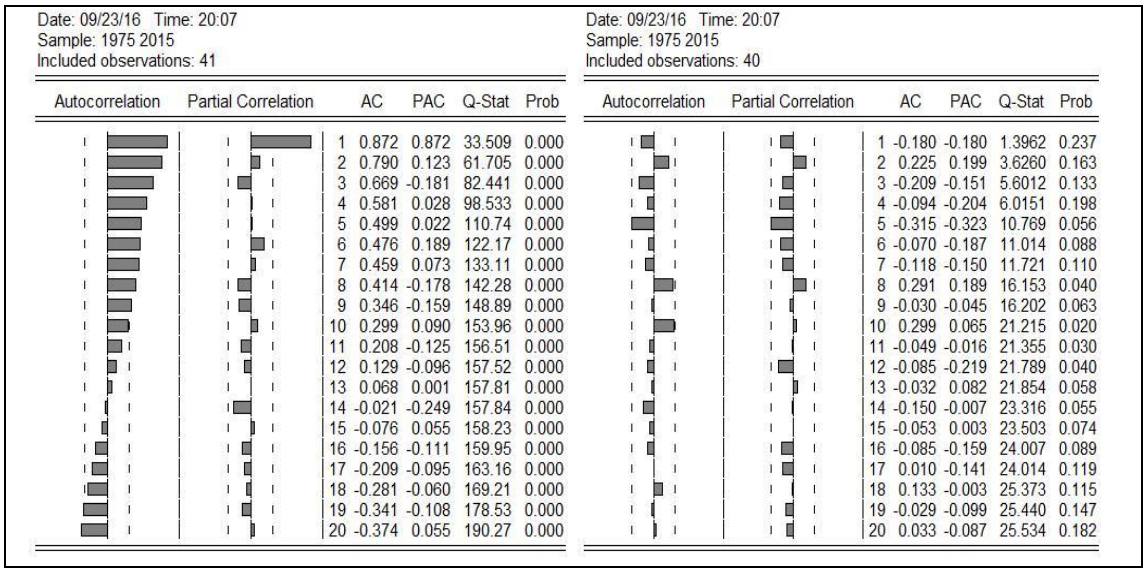
Date: 09/23/16 Time: 20:17
Sample: 1975 2015
Included observations: 41

		AC	PAC	Q-Stat	Prob
1		0.901	0.901	35.784	0.000
2		0.806	-0.033	65.127	0.000
3		0.717	-0.019	88.946	0.000
4		0.636	-0.003	108.25	0.000
5		0.597	0.167	125.68	0.000
6		0.545	-0.086	140.62	0.000
7		0.512	0.084	154.21	0.000
8		0.460	-0.117	165.53	0.000
9		0.345	-0.344	172.11	0.000
10		0.256	0.046	175.84	0.000
11		0.175	0.004	177.64	0.000
12		0.104	-0.083	178.29	0.000
13		0.060	0.018	178.52	0.000
14		-0.008	-0.132	178.52	0.000
15		-0.043	0.080	178.64	0.000
16		-0.111	-0.174	179.52	0.000
17		-0.189	-0.000	182.15	0.000
18		-0.253	-0.115	187.07	0.000
19		-0.299	0.092	194.21	0.000
20		-0.330	-0.098	203.35	0.000

Date: 09/23/16 Time: 20:17
Sample: 1975 2015
Included observations: 40

		AC	PAC	Q-Stat	Prob
1		-0.010	-0.010	0.0045	0.947
2		0.002	0.002	0.0047	0.998
3		-0.027	-0.027	0.0379	0.998
4		-0.378	-0.379	6.7014	0.153
5		-0.198	-0.244	8.5808	0.127
6		-0.264	-0.361	12.026	0.061
7		0.187	0.109	13.803	0.055
8		0.343	0.281	19.965	0.010
9		0.020	-0.083	19.986	0.018
10		0.212	-0.064	22.494	0.013
11		-0.006	-0.018	22.496	0.021
12		-0.135	0.109	23.588	0.023
13		-0.052	0.247	23.754	0.033
14		-0.156	0.078	25.334	0.031
15		-0.029	-0.215	25.391	0.045
16		0.015	-0.145	25.406	0.063
17		0.023	0.073	25.444	0.085
18		-0.034	-0.096	25.535	0.111
19		0.013	-0.089	25.548	0.143
20		0.089	-0.076	26.218	0.159

Informal Stationarity Test (Stock Market Turnover)



Date: 09/23/16 Time: 20:07
Sample: 1975 2015
Included observations: 41

		AC	PAC	Q-Stat	Prob
1		0.872	0.872	33.509	0.000
2		0.790	0.123	61.705	0.000
3		0.669	-0.181	82.441	0.000
4		0.581	0.028	98.533	0.000
5		0.499	0.022	110.74	0.000
6		0.476	0.189	122.17	0.000
7		0.459	0.073	133.11	0.000
8		0.414	-0.178	142.28	0.000
9		0.346	-0.159	148.89	0.000
10		0.299	0.090	153.96	0.000
11		0.208	-0.125	156.51	0.000
12		0.129	-0.096	157.52	0.000
13		0.068	0.001	157.81	0.000
14		-0.021	-0.249	157.84	0.000
15		-0.076	0.055	158.23	0.000
16		-0.156	-0.111	159.95	0.000
17		-0.209	-0.095	163.16	0.000
18		-0.281	-0.060	169.21	0.000
19		-0.341	-0.108	178.53	0.000
20		-0.374	0.055	190.27	0.000

Date: 09/23/16 Time: 20:07
Sample: 1975 2015
Included observations: 40

		AC	PAC	Q-Stat	Prob
1		-0.180	-0.180	1.3962	0.237
2		0.225	0.199	3.6260	0.163
3		-0.209	-0.151	5.6012	0.133
4		-0.094	-0.204	6.0151	0.198
5		-0.315	-0.323	10.769	0.056
6		-0.070	-0.187	11.014	0.088
7		-0.118	-0.150	11.721	0.110
8		0.291	0.189	16.153	0.040
9		-0.030	-0.045	16.202	0.063
10		0.299	0.065	21.215	0.020
11		-0.049	-0.016	21.355	0.030
12		-0.085	-0.219	21.789	0.040
13		-0.032	0.082	21.854	0.058
14		-0.150	-0.007	23.316	0.055
15		-0.053	0.003	23.503	0.074
16		-0.085	-0.159	24.007	0.089
17		0.010	-0.141	24.014	0.119
18		0.133	-0.003	25.373	0.115
19		-0.029	-0.099	25.440	0.147
20		0.033	-0.087	25.534	0.182

From the correlograms shown on the left, at level, the data is not stationary. The autocorrelation (AC) values that appear close to 1 suggest strongly, the presence of unit roots for each of the time series distributions tested. On the Correlograms on the right, which are produced after differencing once, indicate that the AC values tend to be closer to 0, suggesting that the data may be stationary. At this point a formal process of Unit root testing needs to be undertaken

Appendix 2: VAR Lag Selection Criteria-Model 1

Model 1

VAR Lag Order Selection Criteria
Endogenous variables: lnGDP lnSTKCAP
Exogenous variables: C
Date: 11/14/16 Time: 18:23
Sample: 1975 2015
Included observations: 38

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-28,40061	NA	0,01698	1,600032	1,686221	1,630697
1	31,254	109,8901	0,000908	-1,329158	-1,070592	-1,237162
2	42,85574	20.15038*	0.000610*	-1.729249*	-1.298306*	-1.575923*
3	46,34943	5,700241	0,00063	-1,702602	-1,099281	-1,487945

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Appendix 3: VAR Lag Selection Criteria-Model 2

Model 2

VAR Lag Order Selection Criteria
Endogenous variables: lnGDP lnSTKT
Exogenous variables: C
Date: 11/14/16 Time: 18:24
Sample: 1975 2015
Included observations: 38

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-56,8627	NA	0,075949	3,098038	3,184227	3,128703
1	12,42734	127.6396*	0.002446*	-0.338281*	-0.079715*	-0.246285*
2	16,34304	6,800947	0,002463	-0,333844	0,097099	-0,180518
3	18,99953	4,334273	0,002657	-0,263133	0,340188	-0,048476

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Appendix 4: VAR Lag Selection Criteria-Model 3

Model 3

VAR Lag Order Selection Criteria

Endogenous variables: lnGDP lnSTKTOV

Exogenous variables: C

Date: 11/14/16 Time: 18:25

Sample: 1975 2015

Included observations: 38

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-67,64923	NA	0,133991	3,665749	3,751938	3,696414
1	9,757893	142,5921	0,002815	-0,197784	0.060782*	-0,105788
2	16,65323	11.97610*	0.002423*	-0.350170*	0,080774	-0.196843*
3	19,27749	4,281691	0,002619	-0,277763	0,325559	-0,063105

* indicates lag order selected by the criterion

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

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Appendix 5: Autoregressive Distributed Lag (ARDL)-Model 1

Dependent Variable: D(LNGDP)				
Included observations: 38 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGDP(-1))	0.184385	0.17681	1.042845	0.3051
D(LNGDP(-2))	0.035928	0.165425	0.217188	0.8295
D(LNMARCAP(-1))	0.199378	0.091514	2.178659	0.0371
D01	-0.068561	0.11486	-0.59691	0.5549
LNGDP(-1)	-0.410564	0.18487	-2.22082	0.0338
LNMARCAP(-1)	0.131047	0.072633	1.804253	0.0809
C	-0.033191	0.564333	-0.05882	0.9535
R-squared	0.461923	Mean dependent var	0.034628	
Adjusted R-squared	0.357779	S.D. dependent var	0.139101	
S.E. of regression	0.111474	Akaike info criterion	-1.38523	
Sum squared resid	0.385218	Schwarz criterion	-1.08357	
Log likelihood	33.31942	Hannan-Quinn criter.	-1.2779	
F-statistic	4.43543	Durbin-Watson stat	1.90693	
Prob(F-statistic)	0.002386			

Appendix 6: Autoregressive Distributed Lag (ARDL)-Model 2

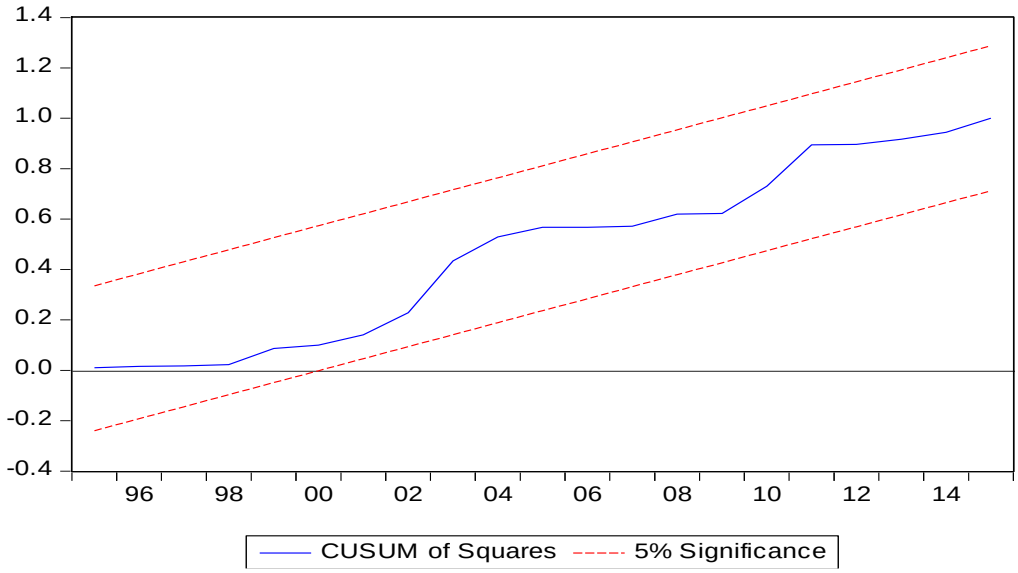
Dependent Variable: D(LNGDP)				
Included observations: 38 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGDP(-1))	0.316271	0.171873	1.840141	0.0753
D(LNGDP(-2))	-0.049054	0.174264	-0.281495	0.7802
D(LNSTOCKSTOTAL(-1))	0.070729	0.057896	1.221657	0.231
LNSTOCKSTOTAL(-1)	0.037353	0.025324	1.475027	0.1503
LNGDP(-1)	-0.244473	0.11317	-2.16023	0.0386
D01	0.031163	0.127604	0.244221	0.8087
C	1.131014	0.473275	2.389763	0.0231
R-squared	0.336352	Mean dependent var	0.034628	
Adjusted R-squared	0.207904	S.D. dependent var	0.139101	
S.E. of regression	0.1238	Akaike info criterion	-1.175482	
Sum squared resid	0.475117	Schwarz criterion	-0.873822	
Log likelihood	29.33416	Hannan-Quinn criter.	-1.068154	
F-statistic	2.618584	Durbin-Watson stat	1.826629	
Prob(F-statistic)	0.035941			

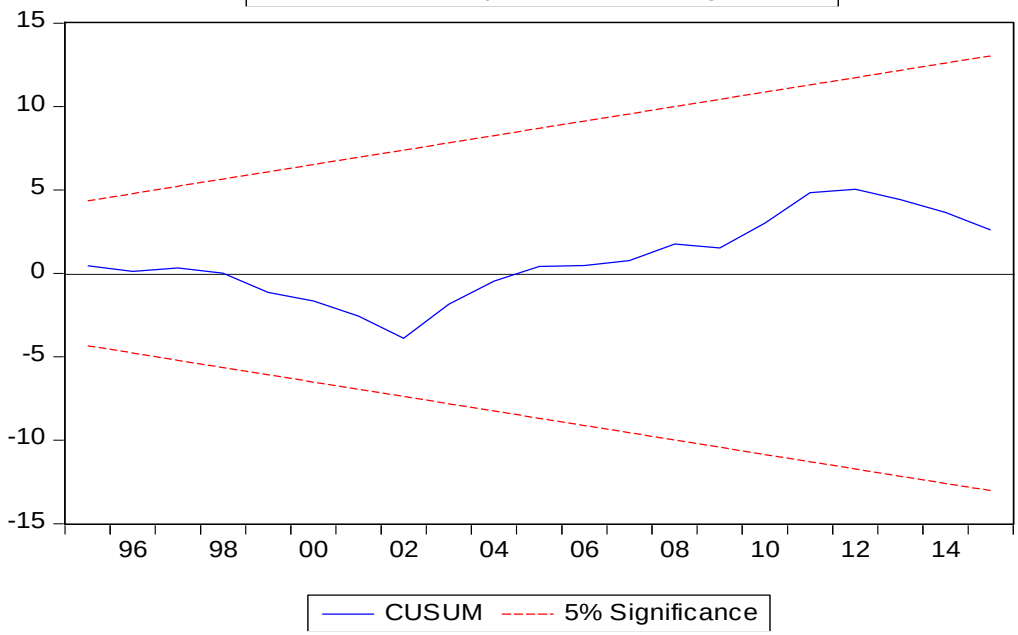
Appendix 7: Autoregressive Distributed Lag (ARDL)-Model 3

Dependent Variable: D(LNGDP)				
Included observations: 39 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGDP(-1))	0.362922	0.15423	2.353123	0.0247
D(LNSTOCKSRATIO(-1))	-0.020383	0.063272	-0.322146	0.7494
LNGDP(-1)	-0.173476	0.066644	-2.603044	0.0137
LNSTOCKSRATIO(-1)	0.045964	0.032763	1.402928	0.17
D01	0.036864	0.133953	0.275205	0.7849
C	1.335165	0.494909	2.697797	0.0109
R-squared	0.25358	Mean dependent var	0.035891	
Adjusted R-squared	0.140486	S.D. dependent var	0.137485	
S.E. of regression	0.127462	Akaike info criterion	-1.141353	
Sum squared resid	0.53614	Schwarz criterion	-0.88542	
Log likelihood	28.25638	Hannan-Quinn criter.	-1.049527	
F-statistic	2.242206	Durbin-Watson stat	1.936851	
Prob(F-statistic)	0.073221			

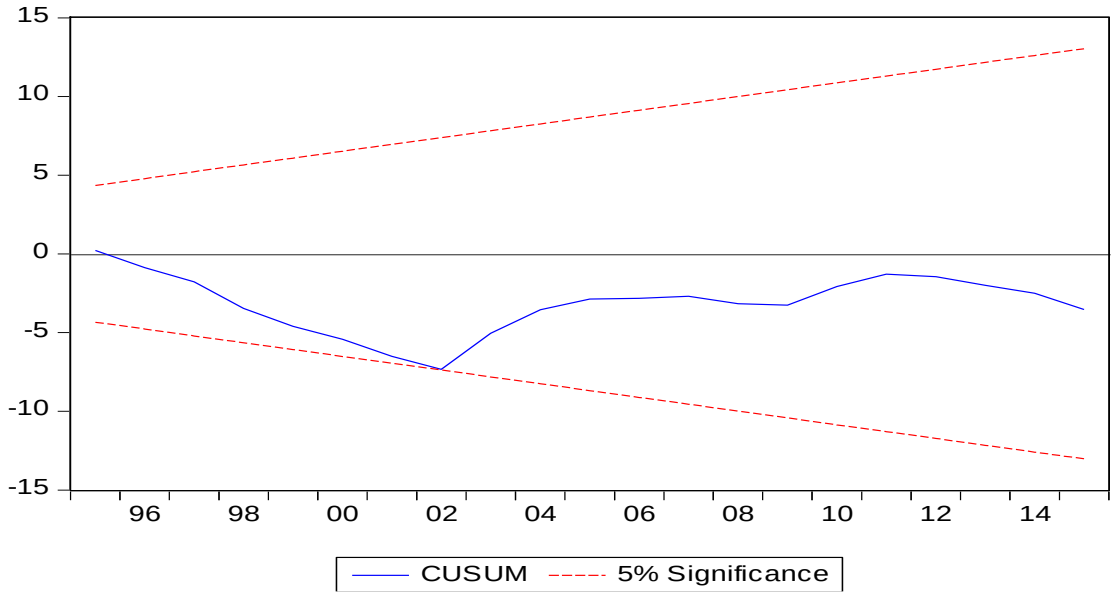
Appendix 8: Stability Tests

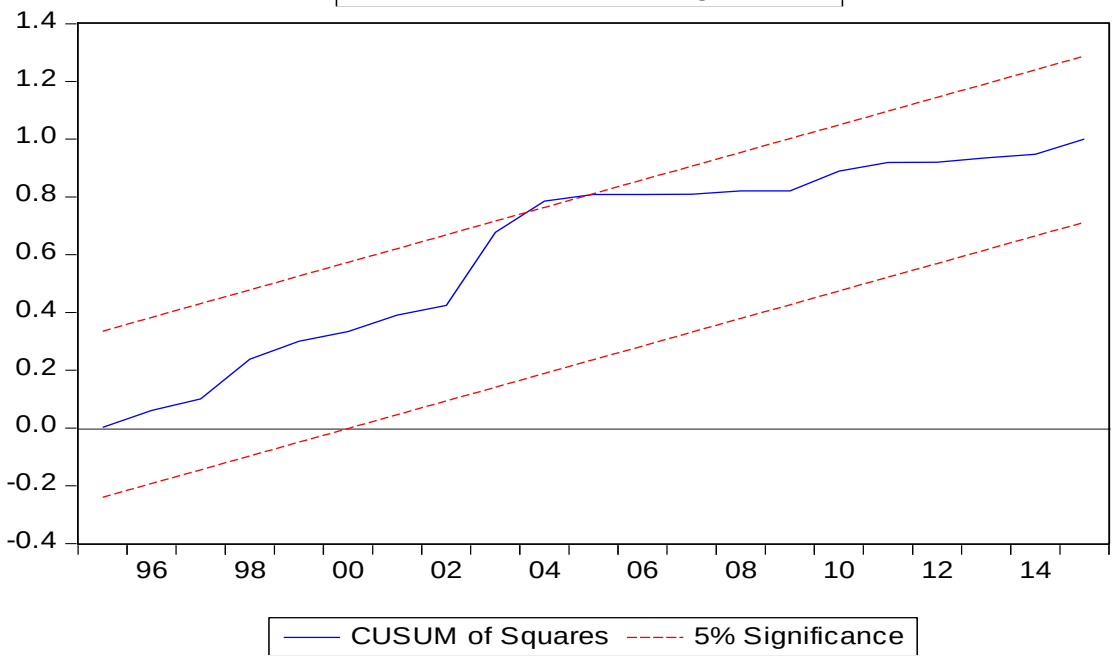
Stability Tests (Model 1)





Stability Tests (Model 2)





Stability Tests (Model 3)