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THE RELATIONSHIP BETWEEN THE PERFORMANCE OF JOHANNESBURG STOCK EXCHANGE AND ECONOMIC GROWTH IN SOUTH AFRICA

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Submitted in fulfilment of the requirements for the award of the degree of Master of Management in Finance and Investments

Wits Business School
Faculty of Commerce, Law, and Management

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DECLARATION

By

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I hereby declare that this thesis is my original work and it has not been submitted to any other college or university for the award of academic credit.

Signed **Date**

_____ _____

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ABSTRACT

This research focused on measuring the relationship between the Johannesburg stock market performance and economic growth as an option for boosting economic growth. Even though there have been a lot of studies with regards to the impact of Stock market growth to economic growth, very few of these have been directed to the Southern African nations. Second, these studies had different results, some suggesting a positive long-run relationship between the stock market and economic growth, and some established that there is no long-run relationship.

The purpose of the research is to investigate the longrun and shortrun relationship between the JSE performance and economic growth in South Africa. It also investigates the direction of the causality between JSE's overall performance and economic growth in South Africa. The research uses the ARDL bound cointegration model (Suggested by Pesaran, Shin & Smith 2001) to test the availability of a longrun relationship between the variables of stock market growth and economic growth on quarterly data from 2006 to 2018. The Granger causality test was used to test the pairwise relationships between the individual variables. The ARDL bounds testing results showed evidence of a longrun relationship between economic growth and the variables of stock market performance. The availability of a long-run relationship between the stock market and economic growth opens an avenue for policymakers that can be utilized for economic recovery.The Granger causality test showed evidence of a bidirectional causality between Economic growth and Gross Fixed Capital Formation and between Market capitalisation and JSE all share index. It also showed that Johannesburg Stock Exchange's All share index (Jalsh) granger causes Economic growth. This relationship needs to be exploited so that it can benefit the economy in the longrun. The shortrun model showed that there is a relationship between economic growth and Gross Fixed Capital Formation and Labor Force. However, the relationship with the other measures of stockmarket performance is not clear in the shortrun with regression coefficients that are not statistically significant at 5% significant level.

Fundamentally, the research revealed that the relationship between the stock market and economic growth depends on the proxies used to represent the stock market. This is important as it may be one of the reasons for mixed results in the previous literature, thus, caution is needed, and one may need to consider the proxy that best suits the stock market measure. The research adds to the already available literature and can be used as a reference point for other studies in the SADC region. The study offers a relevant solution to the allocation of financial resources with a goal to boost economic growth. It also illuminates the need for a well-developed financial system that allows for a smooth intermediation process complimenting stock market growth and thereby increasing economic growth.

***Keywords*:** Stock market. Market capitalization. Cointegration. Causality. Gross domestic product. Bounce testing. Error correction term. Turnover ratio.

CHAPTER ONE

INTRODUCTION

1.1 Background

Economic growth is essential for every economy because it is an indicator of how lucrative investments in such a country will be for local and international investors. However, for this to be achieved, there is a need for a well-developed financial system. A financial system consists of six main components, that is, money, financial instruments, financial markets, financial institutions, government regulatory agencies and central banks (Cecchetti & Schoenholtz 2015). A stock market is a place where shares of publicly owned companies are traded either over the counter or using centralized exchanges. The stock market helps companies in raising financial resources as well as expanding through the selling of stocks (Cecchetti & Schoenholtz 2015).

The Africa Development Bank in 2019 reported that South Africa entered a technical recession in the second quarter of 2018 as the GDP contracted by 0.7% after a 2.6% decline in the first quarter with negative contributions from trade, transport, agriculture, and consumption. This meant that structural weakness in the economy resulted in significant unemployment and low business confidence (ADB, 2019). This paper is motivated by the decline in GDP and thus it tries to establish the relationship between the JSE and economic growth.

It has been suggested that developing the capital market by improving all variables that assist in pulling liquidity and promoting the level of investment within the country will also lead to an increase in the growth of the economy (see for example Regan 2017; Arbak, Ayadi, Ben-Naceur & De Groen 2013). Most scholars have supported this view chiefly because the capital markets assist in the optimum allocation of financial resources to productive sectors of the economy. On the other side, some scholars are of the view that capital markets sometimes adversely affect economic growth. Among others, those who have cited adverse effects of elements of stock market growth towards economic growth are Bhidhe (1993), Danaasuren (2015) and Bencivega and Smith (1991)

Cecchetti and Schoenholtz (2015), reiterated that financial markets are essential for economic growth because they help in determining prices and allocation of resources. They further explained that they help in minimizing the cost of gathering information and making transactions. The securities traded on the stock exchange market vary from shares of stocks, bonds, and other financial instruments. A stock market plays a very pivotal role in an economy, and some of these roles and functions help in stimulating economic growth. The roles and functions of the stock market are listed below.

- It offers a continuous and regular market
- Evaluation of securities
- Promotes capital formation
- Safety and security in dealings
- Stimulates industrial investment
- Encourages public borrowings
- Facilitates speculation
- Facilitates bank lending
- Regulates company management
- Serves as an economic barometer
- Creates employment
- Acts as a clearinghouse of commercial information

It is evident that most of the functions point to a generation of capital and stimulating growth. Economic growth refers to an increase in aggregate output Feldman, Hadjimicheal, & Lanahan, 2015). They further explain that economic growth is easily quantified and measured while economic development is focused on quality improvements, risk mitigation, innovation, and entrepreneurship that place the economy on a higher growth trajectory. However, investments play a major role in increasing productivity and thereby can be linked to the GDP of a country. One cannot underestimate the role played by banks and other financial intermediaries in the distribution of funds from surplus spending units to deficit spending units, thereby promoting economic growth. Moreover, financial intermediaries work closely with investors in pooling funds and distributing them within the financial system for profit. They have direct access to the financial markets and do much of their investment activities for their clients. The JSE is one such financial market in South Africa and

works with financial institutions in the trade and dealing of shares and other financial instruments. This paper seeks to establish the relationship between JSE performance and economic growth.

1.2 Problem Statement

The South African government initiated a variety of programs and campaigns like the New Growth path, financial support, Youth build and so on, aimed at creating employment, improving the quality of life of citizens, and boosting the economy. Still, most of these programs are failing to achieve the desired results. These government initiatives might be creating some form of employment but are falling short in bringing up the desired level of investment activities within the country. It is prudent to look at the Johannesburg Stock Exchange (JSE), which is one of the largest capital markets in Africa to try and improve the South African economy. It is not quite clear as to whether improving the performance of the JSE will have a positive impact on the South African economy, but it can be considered as an alternative means of transferring funds directly to small projects.

Capital markets are the main mechanism facing today's global economy in absorption and optimum allocation of savings into investing consumptions and financing massive projects (Dashtbayaz & Ghamchi, 2013). Nazir, Nawaz, & Gilani, (2010), supported the idea of a positive relationship between stock market development and economic growth in Pakistan. According to a publication by the World Bank in 2018, the South African economy has been struggling over the years as compared to its major trading partners and has been characterized by high exchange rates volatilities, interest rate risks, surging unemployment rates, and political instability. Capital market efficiency can be used to improve productivity through perfect asset allocation and funding profitable projects that can go a long way towards economic development, thereby increasing the GDP.

Nabieu & Barnor, (2016) managed to establish that stock market growth has a positive relationship with economic growth both in the short-run and long-run. The researcher used the Granger causality test on the data obtained for the Ghanaian Stock Market. Their results revealed a bi-causality relationship between Stock market performance and economic growth. Most scholars are divided towards the idea that an increase in market capitalization can signal positive economic growth. Bhidhe (1993)

argued that stock market liquidity discourages internal monitoring by reducing the costs of the 'exit' of unhappy stockholders. He further explained that in some countries like the US, most people prefer stock market liquidity as compared to active investing. From his perspective, this has a negative impact on the economy. This proves that there are mixed results and conclusions with regards to the two variables, which makes this research much more relevant.

Moreover, most studies have used Vector autoregressive models and the Engel Granger model in determining the short and long-run relationship between the two variables. This study will be one of the few that uses the Autoregressive distributed lag – bounds testing method. Even though there have been a lot of studies with regards to the impact of Stock market growth to economic growth, very few of these have been directed to the Southern African nations. This study focuses on the relationship between JSE performance and economic growth in South Africa.

Concisely, the above discussion has identified two main problems with the available literature, and these are the lack of clarity with regards to the long-run relationship as most researchers have come out with mixed results. The second problem besides this gap in the literature is identifying which theory applies to South Africa between the demand following hypothesis and the supply leading hypothesis. This makes the direction of the causality an important factor as it assists policymakers in allocating limited resources.

1.3 Research Questions

This study seeks to answer the following questions:

- Is there a long-run relationship between JSE performance and the economic growth in South Africa?
- Is there a short-run relationship between JSE performance and economic growth in South Africa?
- Is there bidirectional causality between the JSE's overall performance and economic growth in South Africa?

1.4 Purpose and Research Objectives

The purpose of the study was to analyze the relationship between the JSE's performance and economic growth in South Africa. The specific objectives of this study were as follows:

- To investigate the long-run effect of the JSE performance on economic growth in South Africa.
- To investigate the short-run effect of the JSE performance on economic growth in South Africa.
- To determine if there is bi-directional causality between the overall performance of the JSE stock market and South African economic growth.

1.5 Delimitation

The proposed research focused on national data. The researcher used quantitative data from the stock market and GDP figures depending on the availability of information. The research used secondary data. The accuracy of secondary data usually depends on the source and to ensure that this did not negatively affect the results, the data was acquired from internationally recognized sources of financial data like the Bloomberg data center.

Moreover, the researchers used national data which is usually country-specific. This does not affect the relevance of this research since the main objective of the study is to focus on South Africa. The results of this research can also be compared with other similar studies that have been done in other countries for a global conclusion with regards to the subject.

Most researches use different variables to explain economic growth and even stock market growth. These variables include trade openness and inflation. These variables, however, affect the whole financial system, and hence their effect will be captured in the aggregate output values. However, leaving these variables will still make the research relevant since their effects are also captured in the GDP and the market capitalization figures.

The research is going to use South African data to draw out conclusions about the subject line. However, regardless of this fact, the results are still relevant within the

region since South Africa, currently, have a better financial structure than other countries within the SADC region and that most countries within this trading block rely on South Africa as a major trading partner. Moreover, the JSE is the largest capital market within the region making our time series analysis relevant. Investigation of other African stock markets is beyond the scope of the study.

1.6 Justification of the Research

The SADC community has been in an economic crisis within the last decade. According to the publication by the African Development Bank (ADB, 2019), the SADC region has been experiencing slow economic growth due to high inflation, increasing government debt and slow economic growth in South Africa which contributes about two-thirds of the region's GDP. Growth in SA, which is mainly driven by services, manufacturing, and mining, has been slow since 2011 and has been trending downwards. In a bid to achieve an efficient allocation of resources, it may be prudent to look at the stock market to improve the growth of the economy. This research seeks to fill that gap by investigating whether increasing the performance of the financial market can be a feasible tool for boosting economic growth and thereby improving the quality of life of their residents.

Moreover, most researches within this area have been focusing on the Central African region and Northern parts of Africa, very few similar types of research have been done in South Africa. These researches have been using information that dates-back to four decades ago. As time changes and markets evolve, this study seeks to use current information that can apply to the current economic phenomena.

Policymakers in trying to revive the economy can also use this information. That is if it can be proved that the stock market can help improve the economy; policies can be made that will help in enabling its efficiency and promoting investments on the stock market that will further have a direct or indirect impact on economic growth.

This information will enable investors to determine which sectors of the economy to focus on. So, this information is vital for sound decision making by local and foreign investors. A positive economic growth might mean that chances of you losing your money after investing in South Africa are slim. Moreover, engaging in government projects will be more lucrative, with a reduced level of risk.

Moreover, it can be seen from the provided literature that the results with this subject are mixed. Some support the idea of a positive long-term relationship (Nazir et al., 2010), some say stock market liquidity might hurt the economy (Bhidhe, (1993) and others provide inconclusive results (Nyasha & Odhiambo 2014). Hence, this research will be looking at South Africa and then compare the results with the available literature.

Since these researches are on-going, it is imperative to have new information for real-time investors. This means that research conducted five years ago might not be relevant now. There is a need for constant revision, of such results using new information.

1.7 The Structure of the Study

This chapter has introduced the subject and pillars of the research study, the impact of the Johannesburg stock exchange performance on economic growth in South Africa. The research is divided into five chapters. Chapter two reviews the various literature, both theoretical and empirical literature relevant to the subject line. Chapter three looks at the various analytical tools and methods used in gathering and analyzing the research information. Chapter four deals with the presentation, analysis, and discussion of the information gathered in response to the statement of the problem. Lastly, chapter five presents a summary of the research, conclusions, and recommendations. It also provides direction for future studies within the same field.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter elaborates and discusses the various theories that are paramount to this research study. The chapter first deals with the relevant theoretical literature on the relationship between stock market performance and economic growth (see Section 2.2). These are the theories that are the basis for this study and can help us understand the dynamics of economic growth and stock market growth as they form the core foundation of this study. Despite the theoretical framework on the relationship between the stock market and economic growth, it is equally important to discuss the empirical literature from studies in other countries and how they have concluded their work and how it can assist in carrying out this research from a policy-making perspective. The study goes on to study the empirical literature in Section 2.3.

2.2 Theoretical Framework

2.2.1 Endogenous Growth Theory

This school of thought purports that economic growth is essentially a result of internal factors and not external factors. It supports the idea that investments in new knowledge, technical know-how, and human skills can contribute immensely to economic growth. Cortright (2001) reiterated that policymakers need to give clear thought to factors that can harvest the proceeds of knowledge creation (research and development, entrepreneurship, diversity, macroeconomic expectations, openness to trade) to sustain growth. These factors can be improved using the capital markets to allocate financial resources and thereby attaining economic growth efficiently. This theory is essential to the study as we are trying to establish internal relationships between variables and fine-tune these core relationships to improve efficiency, thereby productivity.

2.2.2 Efficiency Market Hypothesis

For capital markets to fully aid in boosting economic growth, they need to operate efficiently. The efficient market hypothesis supports the notion that prices of all

financial instruments, including stocks, reflects all available information (Cecchetti & Schoenholtz 2015). This results in market prices fluctuating continuously to movements in fundamental values, innovations and the availability of new information. Bodie, Kane, and Marcus (2011), explained that competition is one of the main reasons why capital markets will be efficient.

Capital market efficiency is one of the most fundamental issues of stock market operations. Fama (1991) hypothesized three stages of market efficiency. He used various tools to try and explain the notion that stock prices reflect all relevant and available information. Fischel (1978) indicated that the two major implications of efficient markets are that prices adjust rapidly in an unbiased manner to new information and that price changes behave randomly. For this research, the JSE is presumed to be an efficient capital market where there is an equal and efficient distribution of information, and all players can access it at the same time. The impact of shocks on interest rates and security trades in the stock market can be used to signal economic boom or depression. Over the years, shocks in mortgage prices (Housing) have proved to have far-reaching effects within the economy as evidenced by the global financial crisis of 2007 – 2009 in the United States of America.

2.2.3 Capital Asset Pricing Model

Sharpe (1964) explained the equilibrium relationship between the asset risk and its return in the capital market. He reiterates that because of competition in the market, an asset's return will eventually match its risk profile. Ross, Westerfield and Jordan (2010) defined it as the equation of the security market line (SML), showing the relationship between expected return and beta[1]. Since it uses the market risk premium (Rm) as the slope of the SML, this model helps in understanding the overall performance of the market. In the case of the JSE, the All-share index can be used to determine the performance or efficiency of the market. This principle is very important for economic growth as it can be linked to efficient asset allocation. This implies that under such a system, profitable investments will get much-needed funding, and risky projects will attract high returns. The theory is essential because of its implications on price adjustments on security prices and eliminates imperfect competition. This implies that for this research, the variables of JSE growth are

[1] Beta is the sensitivity of portfolio returns to movements of the market returns.

implied to have been acquired under perfect market competition and where there are no arbitrage opportunities.

2.2.4 Financial Intermediation

The theory of financial intermediation emphasizes the need to bring two parties together, which are suppliers of funds and the ones who need financial products. It is the facilitation of the movements of financial products and assets from the deficit spending units to the surplus spending units. Financial intermediaries assist in pulling funds, providing liquidity, diversifying risk, collecting and processing information services (Cecchetti & Schoenholtz 2015). However, Capital markets also perform such roles as they mobilize funds and facilitate the provision of much-needed liquidity to firms in need. These functions reduce transaction costs, increase access to capital, and improve the efficiency of the financial system, which in turn will facilitate economic growth. This theory elaborates on the interdependence of all the six elements of the financial system for effective economic growth. It links the production output (primary sectors of the economy) to the tertiary sectors and works as a bridge mechanism for the movement of capital between two parties.

2.2.5 The Demand-Following and Supply-Leading Hypotheses

The demand-following hypothesis postulates that growth in the need for financial services relies on the increase in real production and the development (commercialization and monetization) of other primary sectors of the economy. Acaravci, Ozturk and Acaravci (2009), explained that a well-developed financial sector provides critical services to reduce the cost of intermediation and thus help to increase the efficiency of the financial system. They found evidence of demand-following hypothesis in several Sub-Saharan countries when broad money to GDP ratio is used as a measure of economic development. The results are supported by other studies in Africa (Adeyeye, Fapetu, Aluko & Migiro 2015; Ciftci 2019), and it shows that for emerging countries, the demand-following hypothesis is more prominent. This might be due to the lack of well-established and efficient financial systems.

The supply-leading hypothesis assumes that financial development is the primary driver of economic growth (Adeyeye et al., 2015). He explained that bidirectional causality between financial development variables and economic growth indices

explain their inter-dependence. Since the stock market is part of the financial system, this theory looks on the Stock market as a source of economic growth.

The stage of development hypothesis states that supply-leading financial development can stimulate real investments in the early stages of economic development. Chukwu (2009) explained that as sustained growth comes underway, the supply leading impact becomes less and less, and the demand-following response takes over and becomes more dominant.

In their study, Calderon and Liu (2003), concluded that financial deepening contributes more to casual relationships in developing countries than in industrialized countries. Moreover, financial deepening fuels up economic growth through rapid capital accumulation and improved productivity.

In summary, the supply leading and the demand following the hypothesis best explain the relationship between the Johannesburg stock exchange performance and the economy. These theories explain the causal relationship between financial development and economic growth, and they consider the level of development in the country. The distinction between the causal relationship in developing countries and developed countries makes these theories more appropriate and as such the supply-leading and demand following hypothesis speak to the objectives of this study.

2.3 Empirical Literature

There have been many instances where the stock market performance has been directly linked to economic growth. This is because when the stock market is performing well, firms tend to get their desired capital level with less transactional costs and with ease. These funds are then transferred into the economy via the financial intermediaries, and it is channelled down to the public (Blanchard & Johnson 2013). The profitability of industries through increased investments will also lead to an improvement in the quality of life for ordinary citizens. As such, an increase in income for consumers will result in an increase in savings, which results in funds being taken back to the financial institutions as investment income (Blanchard & Johnson 2013). Through their participation in the stock market, financial institutions will be able to redistribute these funds and help in capital allocation that will boost economic growth.

Stock market bubbles, on the other side, do not necessarily have desirable results for economic growth. Stock market bubbles may result in excessive investment and poor allocation of resources. A shift in over-optimism to extreme pessimism causes a collapse in investments and thereby, economic growth (Cecchetti & Schoenholtz 2015). Ubesie and Ude (2019), examined the Nigerian stock market from 1990 – 2016 and their research revealed that capital market indices had a significant long-run influence on the productivity of manufacturing firms in Nigeria. They also emphasized that policymakers should aim at restoring confidence, transparency and encouraging the private sector to invest in the capital markets.

Also, Mamun, Basher, Hoque and Ali (2018), concluded that there is a long-run relationship between GDP, Stock market development, net interest spread, real effective exchange rates and financial depth in Bangladesh. They used quarterly data from the year 2000 to 2017 and pointed out that the short-run impact of stock market development sustains in the long-run growth of the Bangladesh economy. The Engle-Granger cointegration method applied by Kapingura and Makhetha-Kosi (2014), on the South African bond market data (1995 – 2012) concluded that there is a long-term relationship between the two variables. They also established that there is a need for South Africa to put in place policies that promote the development of the bond market to mobilize domestic resources and promote economic growth.

A study on the Rwandan stock market by Rurangwa and Shukla (2017), concluded that there is a positive relationship between GDP and economic growth with the factors of stock market development. They used data from 2009 to 2016 and applied the Ordinary Least Squares method in their analysis. Moreover, Regmi (2012) established that there is a significant contribution between market concentration rates of the Nepal stock market to the growth of the economy. They added that a refined policy structure must be implemented to improve and boost the role of the stock market to expedite and maintain economic growth.

After using a Vector error correction model, Pradhan, Arvin, Norman and Bahmani (2019), concluded that there is a long-run relationship between financial development, foreign direct investments, and economic growth. Similarly, they used turnover ratio, traded stocks, and market capitalization in their model and suggested that economic growth can be elevated by improving these variables with absolute certainty.

Looking at the UK economy between 1985 and 2008, Nasir, Ahmad, Ahmad and Wu (2015), reiterated the strong association between stock markets and economic growth. They used the GDP growth rate and considered economic stability in the Vector Error correction model. Acquah-Sam & Salami (2014) reiterated that developing countries should place great emphasis on financial sector development with a specific focus on capital market development to promote economic growth. They used quarterly data from Ghana (1991-2011) and concluded that there is a bi-directional causality relationship between economic growth and capital market development with the stronger being capital market development to economic growth in Ghana.

Using the ARDL Bounds testing model, Raza, Jawaid, Afshan and Karim (2015), concluded that there is a strong relationship between the variables of economic growth and stock market growth. The research also established that there existed a bi-directional causality relationship between economic growth and stock market capitalization in Pakistan from 1976 to 2011. The VEC model used by Nordin (2016) illuminated that both the stock market and the debt market have a positive and significant influence on the Malaysian economy with the stock market being the strongest. They also established a bi-directional causality between the two variables.

The dynamic panel GMM estimator used by Naik and Padhi (2015), on emerging markets from 1995 to 2012 showed that stock market development greatly contributes to economic growth, and there is a bi-directional causality. The study also reveals that other variables like trade openness, investment ratio, and exchange ratio significantly contribute to economic growth. Conversely, Sekakela (2018) concluded that financial development measured by private credit has a negative and significant impact on economic growth both in the long-run and in the short-run. They also established that financial development measured by liquid liabilities has a positive and significant impact on economic growth in the short-run. The evidence suggested that financial development measured by private credit leads to a higher output level in Botswana.

After exploring the relationship between financial sector development and economic growth for some countries in the Mediterranean region from 1985 to 2009, Arbak et al., (2013) concluded that loans to the private sector and bank deposits are negatively associated with growth whilst stock market size and liquidity are important for growth. He reiterated that investment, whether domestic or FDI, contributes

significantly to economic growth. A study in the Islamic countries by Grassa and Gazdar (2014), found no significant relationship between conventional Islamic financial development and growth between 1996 and 2011. They further suggested the need to improve financial reforms for Islamic states to stimulate economic growth. This study used the Ordinary least squares model and a panel data framework.

In another research, Taiwo, Adedayo and Evawere (2016), indicated that market capitalization rate, the total value of listed securities, labor-force participation rate, accumulated savings, and capital formation are significant macroeconomic deterministic factors of economic growth in Nigeria. Moreover, McGowan (2008) also concluded that there is a positive relationship, and statistically significant regression coefficients between GNI per capita and total stock market capitalization (as a fraction of GNI) for each year from 1994 to 2003, for between 78 to 102 countries.

Another study by Greenwood and Smith (1997), concluded that market formation is endogenous and that it will typically require that market development follow some period of real development. Secondly, market development enhances growth after it occurs. Competition among potential providers of financial services will result in markets performing in a way that is perceived to be efficient by market participants. This is in line with the supply leading hypothesis.

On the other hand, Deb, Mishra and Banerjee (2019), established a robust relationship between the measures of economic growth and stock market growth during an economic boom and a very weak relationship during the economic depression in research. They used Panel data analysis and established that the casual relationship for developed economies is strong from the financial sector to the real sector whilst for developing countries; it flows from the real sector to the financial sector. A literature survey by Nyasha and Odhiambo (2014), concluded that the relationship between financial development and economic growth is not clear. They furthered their study to included bank-based financial development and still got the same results.

As explained by Aboagye and Idun (2014), all six elements of the financial system need to be efficiently functioning for the stock markets to have a bigger impact on economic growth. The research singled out bank competition and innovations to have a positive impact on economic growth in the short-run whilst innovations have a

negative impact in the long-run. A cointegration analysis by Laopodis and Papastamou (2016), showed inconclusive results between stock market growth and growth in the real economy for 14 emerging markets between 1995 and 2014. However, adding more variables resulted in a much more strong and positive relationship with the real economy. This is related to the production of goods or real capital accumulation. In short, the Stock market, as part of an effective and efficient financial system, can greatly influence future economic growth. However, due to the poor infrastructural development (regulatory and systems) in emerging markets, it can hurt the economic competitiveness on the international level and stall domestic economic growth trajectory.

Sehrawat and Giri (2015), established evidence of a long-run relationship between both bank-based and market-based indicators of financial development with the growth of the Indian economy using an ARDL model. The researcher concluded that the bank-centric Indian economic structure has the potential for growth if there is efficiency within the financial system. The research covered a period from 1982 to 2012.

2.4 Conclusion

It can be seen from the above arguments that the relationship between the stock market and economic growth remains a mystery for most financial economists. No matter how much researches have been done the issue of data and time span remains a problem. The available literature seems to suggest the evidence of a long-run relationship between stock market growth and economic growth. Most of the studies were done in the north and central African countries. Even though there are studies that were done in Europe and Asia, these researches seem to focus more on financial development rather than economic growth.

All researches studies were focusing on time series data analysis, and market capitalization is the commonly used measure of economic growth and the all-share index. Various measures of economic growth are used, including GDP per capita, GNI per capita and real GDP. Most utilized research methods include the ordinary least squares, Vector error correction method, generalized ARDL method, Granger causality, and the GMM dynamic panel data analysis method. Very few of the researches focused on the bounds testing only.

From the literature above, it can be observed that the results are mixed between no relationship and evidence of a long-run relationship. Some suggested that the results are inconclusive. Since these studies do not point to South Africa, it is imperative that the study of the South African situation be carried out. The research will also assist the whole SADC region since very few studies have been done with this region. Moreover, it is necessary to determine the direction of causality as developing countries have been experiencing different results as compared to developed ones.

The following chapter explains how the research was carried out and the development of the empirical model from the theoretical model. It also shows the necessary steps that were taken to get reliable results.

CHAPTER THREE

RESEARCH STRATEGY, DESIGN, AND METHOD

3.1 Introduction

This chapter presents the data used in this study, the econometric model and the adopted estimation technique. This research uses the Autoregressive bounds test method in establishing the relationship between economic growth and stock market growth in South Africa. The econometric data analysis model is only valid when analyzing I (0) and I (1) integrated data variables. That is data that is only stationary at the level or first difference and, the research uses the Augmented Dickey-Fuller method to test for unit root.

3.2 Research Strategy

This research follows a quantitative data analysis approach. It uses secondary data from reputable sources and applies an econometric data analysis model in deriving statistical inferences. This was motivated by the availability and the type of data that needs to be evaluated for the purpose of the research for example GDP per capita and stock market data, which is very difficult to acquire using primary data gathering tools like personal interviews. Moreover, the length of the period under review is also another major cause of the choice of this strategy.

Abina and Lamea (2019), implemented this research strategy in their analysis of the capital market and performance of the Nigerian economy. They looked at annual data from 1985 to 2017 and used the Johansen cointegration, Error correction, and Granger causality methods to analyze their data. Their main objectives were to establish if there is a long-run relationship between capital markets and the performance of the Nigerian economy and to determine the direction of the causality relationship. The major benefit of using this method is the ease it offers in accessing data, fewer transaction costs and the reliability of the data sources. This study seeks to tap into the benefits of the quantitative research strategy.

3.3 Research Design

The study applies a time-series research design. Many researchers who tried to establish the relationship between stock market growth and economic growth have commonly used the research design. Li and Men (2006), used it in establishing the relationship between stock index and the national economy in China. The main objectives were to analyze the relationship between the two variables and to determine the direction of the causality between the two. This research design is easy to interpret and allows for a clear understanding of movements in one variable to changes in the other variable, which is the main reason the researcher chose this method. It also works well with the analytical model for this study, which is the ARDL method.

3.4 Data

This research uses quarterly data from June 2006 to December 2018. The data is for South Africa and follows a time-series research design. To determine the responsiveness of the dependent variables to movements in the independent variables, the following variables are being used in this research.

a) Gross Domestic Product Per Capita (GDPK)
b) Stock market capitalization (MKT)
c) Share turnover ratio (TOR)
d) Real gross fixed capital formation (GFCF)
e) Labour force (LBF)
f) JSE All-share index (JALSH)

Stock market capitalization (market value) can be defined as the share price multiplied by the number of shares outstanding (including their several classes) for listed domestic companies. The JSE's market capitalization includes the market capitalization of all companies that are on the capital market. It can be used as a measure of the growth of the market. The increase in the value of the shares or market might be linked to the profitability of the companies or investors over the period under consideration. This was motivated by the research done by Sehrawat and Giri (2015) on a similar subject. The stock market turnover ratio is a measure of market

liquidity. This is the ratio of the value of shares traded to market capitalization. It is a measure of liquidity and the higher the coefficient, the more liquid the market is.

Gross fixed capital formation measures the level of capital inputs in the republic. It is a measure of investments in the country. This is a proxy for capital on the theoretical model and connects the theoretical model to the empirical model. The study used change in GDP per capita as the proxy for economic growth as motivated by other researchers on a similar subject (see Deb et al. 2019; Abina and Lamea 2019; Bassey, Esang, & Ewah, 2009; Li and Men 2006) which all used GDP per capita as a proxy for economic growth. This is also relevant as it satisfies the random walk characteristics for bounds testing at level values (I (0)). Since GDP per capita is used in calculating the growth in the economy, the growth in GDP per capita will be used as a proxy for economic growth. The differenced logged data of GDP per capita will be used in the model as a proxy for economic growth.

The JSE all-share index is used to show the performance of companies on the stock market. The growth in this index can be used as a proxy for the growth of the stock market.

The South African Labour force, as provided by the statistical authorities of South Africa, will be used as a proxy for labor on the theoretical model. This assists in the transformation of the Cobb-Douglas theoretical model to our empirical ARDL model, which incorporates the variables of economic growth and stock market growth. The data was acquired from authentic sources of economic data. The variables were carefully selected, based on similar researches that were done in other countries across the globe.

Below is the list of the sources of data:

- The global economy database
- Unctadstat
- Bloomberg analytics

Detailed information about the data and sources is shown in Table A1 in Appendix A.

3.5 Trends of the Variables

Figure 3.1 shows the trends in variables. The selected data trends resemble different characteristics based on economic conditions. The South African GDP per capita has been on an upward trend since 2009 and maintained a steady growth pattern. There was a slight decline in growth in 2008 and 2009. This must have been a result of the global financial crisis, which affected the country and its trading partners, including the United States of America. This might also have been the result of structural difficulties in the economy, which includes a sharp increase in inflation during the same period. It is worth noting that the steady growth rate has been slowing down during the period from 2017 to date. The same period exhibits a drop in the Gross fixed capital formation, which can explain the decrease in the level of investments in the country.

The market capitalization of the Johannesburg stock exchange experienced a period of slow growth since the year 2009, but the situation was better in 2015 though there was a slight decline in the year 2017. The peak in the year 2015 explains the increase in participation by investors in the market. There was an increase in Gross Fixed Capital Formation and an increase in the turnover ratio as well during the same period.

However, as market capitalization increased over the years, Figure 3.1 shows that the turnover ratio was very volatile with peaks and troughs in subsequent periods. The turnover ratio is linked to the market capitalization since it is the value of traded shares divided by the average market capitalization for the period. This ratio shows how quick it can be to convert or sell shares on the stock market. It is a measure of liquidity, and Figure 3.1 shows that the year 2016 and 2017 were more liquid as compared to the year 2018. This calls for the need to evaluate such performance and establish ways to apply it towards economic growth.

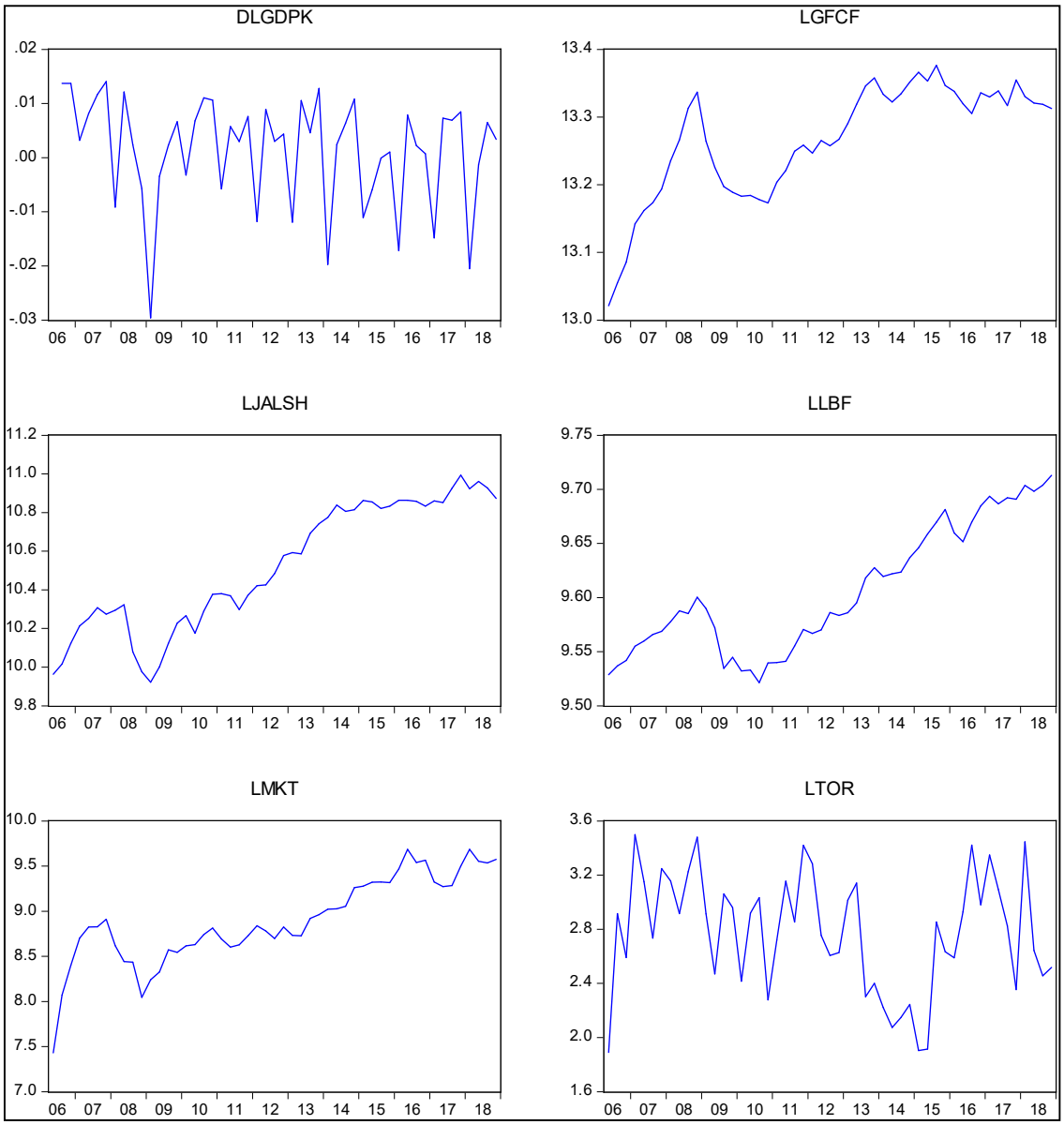


Figure 3. 1: Trends of the variables

Source: Author's computations

Having described the data, the next section discusses the econometric models of the study.

3.6 Econometric Model

The researcher used an econometric model to analyze the time-series data gathered about this study. The ARDL model was used to estimate the augmented Cobb-Douglas theoretical model. Charles Cobb and Paul Douglas developed this model in the period between 1927 and 1947. Their model has been widely used to show relationships between two or more variables.

The Cobb-Douglas production function provides the opportunity to establish the participation of certain factors of production (Labour and capital) in creating the total output (income) in the economy (Josheski, 2011).

The Cobb- Douglas production function (Theoretical model) is as follows:

$$P(L,K) = bL^{\alpha}K^{\beta} \quad (1)$$

where:

L – Labor input (person-hours worked in a year)

K – Capital input

α – Output elasticity for labor

β - Output elasticity for capital

b – Total factor productivity

The above equation can be expressed in log form as follows:

$$\ln P = b + \alpha lnL + \beta lnK \quad (2)$$

where:

ln – is the natural logarithm

The modified or augmented Cobb-Douglas production function, which is considered as the Theoretical Model of this study is expressed as follows:

Economic growth = f (Capital, Labour, Stock market performance) (3)

where the stock market performance was represented by the Turnover ratio, Market capitalization, and the JSE all-share index and this is used to determine the performance of the Johannesburg Stock Exchange.

Adding stock market performance to the model allowed the researcher to understand the underlying relationship between economic growth and the stock market performance.

$$Economic\ growth = \varphi_0 + \pi K_t + \sigma L_t + \sum_{i=1}^{3} \tau_i\, SMP_{it} + \omega_t \quad (4)$$

where:

φ – constant

t – time period

$\sum$ - summation

SMP – Stock market performance measures

$\pi; \tau;\ \sigma$ – Output elasticities (Coefficients)

ω - regression error term

An Autoregressive Distributed Lag Model (ARDL) was used to establish the relationship between the variables. The bounds test (Pesaran et al., 2001) was done to explain the long-run and short-run relationship between the variables. Pesaran (1997) concluded that the ARDL approach could yield consistent long-run coefficients estimates that are asymptotically normal irrespective of whether the underlying regressors are I (0) or I (1)[2].

The Generalised ARDL Model *(p, q, w, x, y, z)* is as follows:

$$DLGDPK_t = \alpha_0 + \sum_{i=1}^{P} \beta_i DLGDPK_{t-i} + \sum_{i=0}^{q} \beta_i\, LGFCF_{t-i} + \sum_{i=0}^{w} \beta_i\, LLBF_{t-i} + \sum_{i=0}^{x} \beta_i\, LTOR_{t-i} + \sum_{i=0}^{y} \beta_i\, LMKT_{t-i} + \sum_{i=0}^{z} \beta_i\, LJALSH_{t-i} + \varepsilon_t \quad (5)$$

Where:

α- constant

$DLGDPK$- differenced logged data on GDP per capita

$LGFCF$- logged data on Gross Fixed Capital Formation

$LLBF$- logged data on Labor force

$LTOR$- logged data on Turnover ratio

$LMKT$- logged data on Market capitalisation

[2] Stationary at first difference

$LJALSH$- logged data on the JSE all share index

β- output elasticities

t- time period

i- natural numbers

$p; q; w; x; y; z$ – upper parameters

3.7 Estimation Technique

3.7.1 Unit Root Test

The bounds test methods require that the time series data be integrated in order zero or order one. To certify this condition, a unit root test for stationarity was done using the Augmented Dickey-Fuller test. The method tested the null hypothesis

H_0 – the data has a unit root

Against the alternative

H_1- the data has no unit root.

Rejecting the null hypothesis (H_0) will imply that the data is stationary. The main objective of this test in this research is to ascertain the order of integration and to avoid spurious regression results if the variables are stationary at order above one.

3.7.2 Autoregressive Distributed Lag Model (ARDL)

The Autoregressive Distributed Lag-Bounds test, as suggested by Pesaran et al., (2001) was used. This method is only accurate when implemented on variables that are integrated level zero I (0) or integrated level one I (1). Ada (2016) explained the advantage that this method uses a single reduced form equation to test for co-integration whilst the other methods (Johansen, 1988; Johansen and Juselius, 1990) employed more than one equation. This simplified the model as compared to the alternative models. Ada (2016) also stated that the method can work on variables with different optimal lags and still provide a reliable answer, which is not viable on standard cointegration tests. The ARDL approach is suitable for economic models that combine levels and growth variables, Sekakela (2018). He also stated that long-run

parameters and valid t-values could be estimated regardless that independent values are endogenous.

The research used the ARDL Bounds test to make statistical inferences for both the long-run and the short-run. This model involves the inclusion of the short-run model and the error correction model (ECM) in the generalized ARDL model.

Wong (2018) listed the five basic steps for the bound test as follows:

a) Identification of tentative model
b) Estimate the equation (6) by (Ordinary Least Squares) OLS technique.
c) Diagnostic checking (if the model is found inadequate, go back to step 1)
d) Using the Wald test (F test) to test for the long-run relationship.
e) To compare the F statistic with the critical values

It can be derived from equation (5) follows:

$$\Delta DLGDPK_t = \alpha_{01} + \beta_{1i} DLGDPK_{t-i} + \beta_{2i} LGFCF_{t-i} + \beta_{3i} LLBF_{t-i} + \beta_{4i} LTOR_{t-i} + \beta_{5i} LMKT_{t-i} + \beta_{6i} LJALSH_{t-i} + \sum_{i=1}^{P} \theta_{1i} \Delta DLGDPK_{t-i} + \sum_{i=1}^{q} \theta_{2i} \Delta LGFCF_{t-i} + \sum_{i=1}^{w} \theta_{3i} \Delta LLBF_{t-i} + \sum_{i=1}^{x} \theta_{4i} \Delta LTOR_{t-i} + \sum_{i=1}^{y} \theta_{5i} \Delta LMKT_{t-i} + \sum_{i=1}^{z} \theta_{6i} \Delta LJALSH_{t-i} + \varepsilon_{1t} \quad (6)$$

Where

$\theta;\ \beta$ – output parameters

Δ - change

There is a need to test for cointegration in equation (6) to determine the interrelationships between the variables. The results of the bounds test determined whether to specify a VECM, ARDL or ECM model; where there is no long-run relationship, the following short-run model applies:

ARDL (p, q, w, x, y, z)

$$\Delta DLGDPK_t = \alpha_{01} + \sum_{i=1}^{p} \theta_{1i} \Delta DLGDPK_{t-i} + \sum_{i=1}^{q} \theta_{2i} \Delta LGFCF_{t-i} + \sum_{i=1}^{w} \theta_{3i} \Delta LLBF_{t-i} + \sum_{i=1}^{x} \theta_{4i} \Delta LTOR_{t-i} + \sum_{i=1}^{y} \theta_{5i} \Delta LMKT_{t-i} + \sum_{i=1}^{z} \theta_{4i} \Delta LJALSH_{t-i} + \varepsilon_{1t} \quad (7)$$

If there is a long-run relationship, the ECM model was used to specify both the long-run and the short-run relationship. The following model was be estimated:

$$\Delta DLGDPK_t = \alpha_{01} + \sum_{i=1}^{P} \theta_{1i} \Delta DLGDPK_{t-i} + \sum_{i=1}^{q} \theta_{2i} \Delta\, LGFCF_{t-i} + \sum_{i=1}^{w} \theta_{3i} \Delta\, LLBF_{t-i} + \sum_{i=1}^{x} \theta_{4i} \Delta\, LTOR_{t-i} + \sum_{i=1}^{y} \theta_{5i}\, \Delta LMKT_{t-i} + \sum_{i=1}^{z} \theta_{6i}\, \Delta LJALSH_{t-i} + \curlywedge\, ECT_{t-1} + \varepsilon_t \quad (8)$$

where ECT represents the Error correction term, which is specified as follows:

$$ECT_{t-1} = DLGDPK_t - (\alpha_{01} + \beta_{1i} DLGDPK_{t-i} \beta_{2i} LGFCF_{t-i} + \beta_{3i} LLBF_{t-i} + \beta_{4i} LTOR_{t-i} + \beta_{5i} LMTK_{t-i} + \beta_{6i} LJALSH_{t-i}) \quad (9)$$

3.7.2. Optimum Lag Selection

The ARDL model requires that optimum lags[3] be selected in building a robust model, and this will be achieved using various information criterion. The most used are the Akaike Information Criterion, Schwarz Information Criterion, Hannan-Quinn information criterion, Final prediction error, and the Sequential modified LR test statistic. The decision will be to select the lag order that has been specified by most of these information criteria.

3.7.2.2 Model selection

Using the various information criteria, we can select the appropriate model for the empirical model, and this is done by running regressions for the model using different lag specifications and selects the one that gives the least estimates on most of the Information criterion used. Usually, the Akaike Information criterion and the Schwarz information criteria are considered the most.

3.7.2.3 Bounds testing

Using the ARDL bounds testing approach by Pesaran et al. (2001), we can test the hypothesis of no long-run relationship against the alternative that there is a long-run relationship. The researcher uses the F-statistic of the bounds test results to determine if there is a long-run relationship or not. The decision criteria follow that:

[3] The lagged value of a variable (which may be *yt* , *xt*, or *ut*) is simply the value that the variable took during a previous period.

- If the F-statistic is above the Upper bound, from Pesaran tables, then there is Cointegration.
- If the F-statistic is below the Lower bound from Pesaran tables, then there is no Cointegration.
- If the F-statistic is in-between the lower and the upper bounds, then the results are inconclusive.

3.7.2.4 Serial correlation test

One of the assumptions of the Classical Linear regression is that the covariance of the error terms should be equal to zero. This implies that there is no autocorrelation, and the test is essential in attaining unbiased estimates and avoids spurious regression. A graphical test, the Durbin-Watson test, and the Breusch-Godfrey test amongst other methods are normally used to test serial correlation. These methods test the Null hypothesis that there is no serial correlation among the disturbance terms against the alternative that it is auto-correlation. Rejecting the null hypothesis will imply that serial correlation is present in the model. The disadvantage of the Durbin-Watson test is that it is only valid under a full set of the Classical Linear model assumptions. The research uses the Breusch-Godfrey test for autocorrelation. This is because it is more general, easy to interpret, and that it tests for autocorrelation to the r^{th} order of the disturbance term. The Breusch – Godfrey test can examine for autocorrelation for the residuals and several of the lagged values of the error term, unlike the Durbin-Watson test that only tests if consecutive errors are related to one another (Brooks 2014). The null hypothesis of no serial correlation will be rejected if the p-values of the Chi-squared test are below 0.05.

3.7.2.5 Model stability tests

The CUSUM of squares test was be used for model stability testing. Besides being easier to formulate and interpret (Talas 2013) concluded that the CUSUM[4] test enables more robust estimation than the COSUM test and therefore gives more information about the model. However, if the line graph representing the model falls within the boundary lines, then we can be satisfied that the model is stable.

[4] CUSUM stands for cumulative sum of recursive residuals

3.7.2.6 Estimating the long-run model

The last step that follows is to carry out diagnostic tests will be to estimate the long-run model. This was done by specifying Equation **8** using the research variables and the calculated speed of adjustment coefficients. The long-run model entails the specification of the error correction term.

3.6.3 Granger Causality

The Granger causality test was used to determine the direction of causality between two variables that are cointegrated. A variable X is said to Granger cause Y if future values of Y can be used to estimate with greater accuracy using its past values including the past values of X (Ghauri et al., 2017). However, a bi-directional causality occurs when past values of Y can also be used in estimating future values of X. To perform a Granger causality test, the researcher had to test for stationarity as explained in section 3.7.1 and then apply the Granger causality test on stationary (First differenced) time series variables. One of the limitations of the Granger causality tests is that it may produce inaccurate results if the true relationship between X and Y involves a third variable that is not included in the regression. The researcher will use the Pairwise Granger causality test to derive inferences between two variables.

3.8 Conclusion

This chapter has explained the development of the model that is being used in this research for data analysis. The chapter explained on the Cobb-Douglas theoretical model and how it was modified to develop the empirical model of the study, which includes the elements of stock market growth. It also explained how the analytical model being used would be interpreted in making statistical inferences. The researcher followed the outlined steps to develop the model and to carry out all diagnostic tests. The ARDL model was specified, and the results are presented and interpreted in the next chapter.

CHAPTER FOUR

RESULTS PRESENTATION AND DISCUSSION

4.1 Introduction

This chapter focuses on the presentation of model steps, results, and interpretation. It follows the steps necessary to carry out the bounds test for co-integration, model tests, and implications of the results.

4.2 Results Presentation

4.2.1 Descriptive Statistics

Table 4.1 Descriptive Statistics

	GDPK	GFCF	JALSH	LBF	MKT	TOR
Mean	5433.10	579178.9	38973.37	14883.41	8139.01	17.59
Median	5452.24	591533.0	35757.98	14584.50	6802.69	17.35
Maximum	5618.71	644549.0	59504.67	16528.70	16101.03	33.10
Minimum	5102.55	451850.0	20363.91	13647.78	1686.27	6.62
Std. Dev.	109.47	46936.24	12226.70	883.53	3671.56	7.26
Skewness	-0.92	-0.78	0.08	0.40	0.60	0.46
Kurtosis	3.59	2.86	1.47	1.79	2.32	2.34
Jarque-Bera	7.95	5.18	4.99	4.48	4.07	2.70
Probability	0.02	0.07	0.08	0.12	0.13	0.26
Observations	51	51	51	51	51	51

The above table 4.1 shows the descriptive statistics from the raw data. As can be seen from the table, the standard deviation which how variations in how the data is distributed are quite high and above 20 000 for GFCF and 109 for GDP per Capita (GDPK). The kurtosis for all other variables except for GDPK is below 3, which shows the absence of fat tails in the distributions. The presence of fat tails can be observed on GDPK with a kurtosis above 3. The probability value of the Jarque-Bera is also above 0.05 for some of the variables (GFCF, JALSH, MKT, TOR, LBF), which shows that most of the variables are normally distributed.

The median for GDPK is R 5452.24, and the minimum number is R5102.55, which shows its deviation from the mean. The range of values for GFCF is quite high (R644 549 – R451 850). These values prompted the need to log the data so as to reduce the spread of large numbers whilst maintaining the characteristics of the data. The table below shows descriptive statistics from the logged data.

Table 4.2 Descriptive statistics for logged variables

	DLGDPK	LGFCF	LJALSH	LLBF	LMKT	LTOR
Mean	0.0014	13.2709	10.5305	9.6078	8.9295	2.7969
Median	0.0032	13.2978	10.5311	9.5888	8.8257	2.8536
Maximum	0.0140	13.3763	10.9938	9.7129	9.6866	3.4994
Minimum	-0.0296	13.0548	9.9215	9.5213	8.0443	1.9040
Std. Dev.	0.0100	0.0774	0.3218	0.0583	0.4311	0.4206
Skewness	-1.0952	-0.7862	-0.1926	0.3290	0.0618	-0.2387
Kurtosis	3.6917	2.8607	1.6389	1.7453	2.1501	2.2588
Jarque-Bera	10.9920	5.1910	4.1687	4.1821	1.5366	1.6192
Probability	0.0041	0.0746	0.1244	0.1236	0.4638	0.4450
Observations	50	50	50	50	50	50

The Table 4.2 above shows the descriptive statistics from the logged data. It can be observed that the data have been modified in a much better way with a smaller range and standard deviations below 1. The mean and median values are also significantly small. The standard deviation is significantly smaller, showing less volatility and that the data units are quite close together making it easier to analyze and make statistical inferences.

However, the Jarque-Bera is still showing that DLGDPK is not normally distributed at the 5% significance level and LGFCF, LJALSH, LLBF, LMKT, and LTOR are normally distributed with p-values of the Jarque-Bera above 0.05. It also shows that the data is negatively skewed for most variables except for the Labour force and market capitalisation, which is positively skewed. The degree of skewness is small as compared to the raw data in Table 4.1. Moreover, it is evident that LGFCF, LJALSH, LLBF, and LTOR have no fat tails since their kurtosis coefficients are below 3.

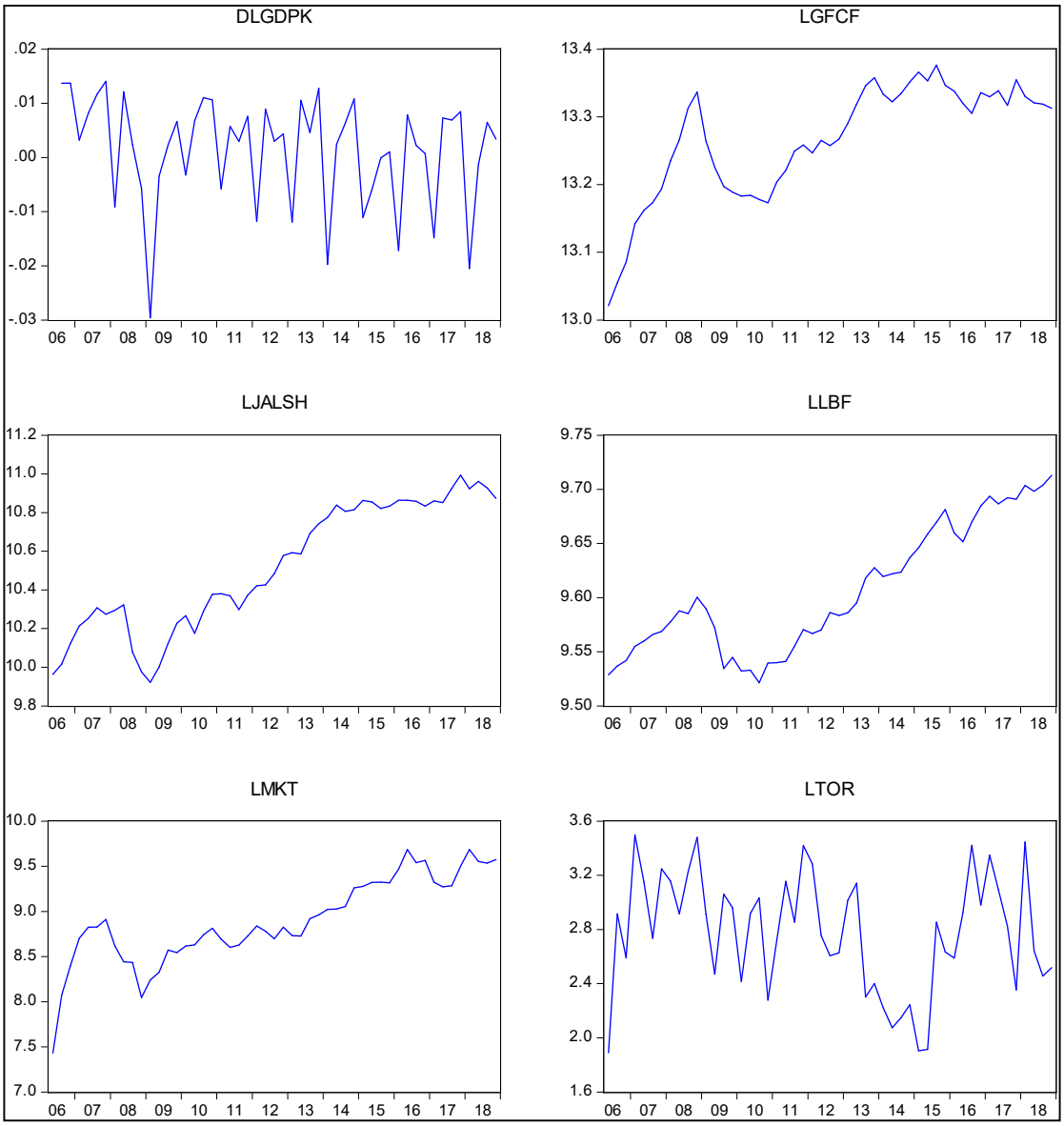


Figure 4.1: Trends of the variables in logs

Source: Author's computations

The above trends show the logged data. The data variables are as explained before in section 3.4. It can be observed from Figure 4.1 that the data is not stationary with LMKT and LLBF showing an upward trend. The turnover ratio, which measures liquidity, and DLGDPK, which measures economic growth, is quite stationary, and all other variables are taking an upward trend. This is a bad signal since the Turnover ratio is a ratio of market capitalization and the stock market turnover. It might be that there was a reduction in turnover over the period under review even though the value of other factors were going up through inflation, ceteris paribus. It may also be that the market capitalization has been going up at the same rate as the turnover of which

results in a canceling effect and that cannot be considered as growth. In a nutshell, the graphs show the random walk characteristics that are necessary for testing cointegration.

4.2.2 ARDL Procedure and Results

This Section shows and discusses the various steps taken to run the Auto-regressive distributed lag model of this study. Having specified the models in the previous chapter and discussed the descriptive statistics in the previous Section, performing unit root tests is an important step of the ARDL estimation. This is carried out to ensure that none of the variables is stationary above the first difference, as explained in Section 3.6.1. It is required that the variables either be I (0) or I(1).

4.2.2.1 Unit root test

Table 4.3 Unit root test (Level data)

Variable	ADF Test	Critical values			P-Values
		1%	5%	10%	
DLGDPK	-3,5405	-3,5847	-2,9281	-2,6022	0,0142
LGFCF	-3,3248	-3,5683	-2,9212	-2,5986	0,0189
LJALSH	-1,3366	-3,5683	-2,9212	-2,5986	0,6054
LLBF	-0,0990	-3,5683	-2,9212	-2,5986	0,9437
LMKT	-3,0561	-3,5683	-2,9212	-2,5986	0,0366
LTOR	-4,8358	-3,5683	-2,9212	-2,5986	0,0002

Table 4.4 Unit root test (Differenced data)

Variable	ADF Test	Critical values			P-Values
		1%	5%	10%	
DLGDPK	-13,2758	-3,5812	-2,9266	-2,6014	0,0000
LGFCF	-4,8962	-3,5713	-2,9225	-2,5992	0,0002
LJALSH	-4,6709	-3,5744	-2,9238	-2,5999	0,0004
LLBF	-6,1873	-3,5713	-2,9225	-2,5992	0,0000
LMKT	-6,4256	-3,5713	-2,9225	-2,5992	0,0000
LTOR	-8,2996	-3,5744	-2,9238	-2,5999	0,0000

To ascertain that the variables are either I (0)[5] or I (1) level integrated, the Augmented Dicky fuller test for unit root was used, and the results are tabulated above. It tests the

[5] A difference stationary series is said to be integrated and is denoted as I(d) where d is the order of integration, (Nabieu & Barnor, 2016)

null hypothesis that there is a unit root against the alternative that there is no unit root. From the results above, it can be established that all variables are I (1) stationary variables. Differenced Log GDP per capita (DLGDPK), Log of Gross Fixed capital formation (LGFCF), the log of market capitalization (LMKT), the log of JSE all-share index (LJALSH). Log of Turnover ratio (LTOR) and log of Labour force (LLBF) are all stationary after first differencing.

The bounds test requires that the variables be stationary at level, or first differencing, and this test has proved that my variables satisfy that requirement. Rejecting the null hypothesis will imply that the series is stationary, whereas if we fail to reject the null hypothesis, it will imply that the series is non-stationary. In this case, the data is stationary after first differencing. The rule of thumb is that absolute t-critical value should be greater than the test critical of the relevant significance level.

4.2.2.2 Optimum lag selection

One of the problems of Auto-regressive models is determining the appropriate lag length, Brooks (2014). The optimum lags (p, q, w, x, y, z)[6] are selected using various selection information criteria. Information criteria do not require normality assumptions concerning the distributions of the errors as the case with the likelihood ratio, Brooks (2014). There are different selection criteria to use, for example, the Akaike Information Criterion (AIC) and the Schwarz Bayesian Criterion (SBC), which can be used to determine the optimum lags. The researcher will select the appropriate lag length using the above-mentioned information criteria.

The table below shows that the optimum number of lags for this model is four. This is the number of lags that have been selected by various Information criteria.

Table: 4. 5: Optimum lags selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	335.4189	NA	2.43e-14	-14.3226	-14.0840	-14.2332
1	529.8886	329.7529	2.51e-17	-21.2126	-19.5430*	-20.5871
2	559.2472	42.1233	3.62e-17	-20.9238	-17.8230	-19.7622
3	609.1028	58.5261	2.47e-17	-21.5262	-16.9945	-19.8286
4	676.3336	61.3847*	1.02e-17*	-22.8841*	-16.92111	-20.6503*

Notes: * indicates lag order selected by the criterion

[6] Optimum lags (p, q, w, x, y, z) have been explained in equation 1

After using six Information criteria, the result shows an optimum lag order of 4. The various methods used are sequentially modified LR test statistic (LR), Final prediction error (FPE), Akaike information criteria (AIC), Schwarz Information criteria (SC) and the Hanna-Quinn information criteria (HQ). This is the lag order that will be used in the bounds test for cointegration.

4.2.2.3 Model selection

After testing for unit root and selecting the optimum lag order in the previous section, the next step will be to choose the optimum model. This is the optimum variety of the lags in the ARDL model that will yield the best regression coefficients. Using various mixes of the lags in the regressions (See Appendix A, Table 2), the regression with the least coefficient of the information criteria being selected. Table 4.6 below shows that the ARDL model with lag (4,4,4,4,3,3) was selected using the AIC and the BIC selection criteria. This is the model with the lowest estimates of the AIC and BIC information criteria. Therefore, Equation 4 can be written as follows:

$$DLGDPK_t = \alpha_0 + \sum_{i=1}^{1} \beta_i LGDP_{t-i} \quad + \sum_{i=0}^{1} \beta_i \, LGFCF_{t-i} \quad \sum_{i=0}^{0} \beta_i \, LLBF_{t-i} \quad + \sum_{i=0}^{0} \beta_i \, LTOR_{t-i} \quad + \sum_{i=0}^{0} \beta_i \, LMCAP_{t-i} + \sum_{i=0}^{0} \beta_i \, LJALSH_{t-i} + \varepsilon_t \qquad (10)$$

Table 4.6: Model Selection criteria

Model	LogL	AIC*	BIC	HQ	Adj. R-sq	Specification
7	208.7340	-7.8580	-6.7449	-7.4410	0.8314	ARDL(4, 4, 4, 4, 3, 3)
2	209.3209	-7.8400	-6.6872	-7.4082	0.8260	ARDL(4, 4, 4, 4, 4, 3)
257	206.0333	-7.8275	-6.7940	-7.4403	0.8293	ARDL(4, 4, 2, 4, 3, 3)
507	203.9415	-7.8235	-6.8695	-7.4661	0.8301	ARDL(4, 4, 0, 4, 3, 3)
6	208.7931	-7.8171	-6.6643	-7.3852	0.8219	ARDL(4, 4, 4, 4, 3, 4)
1	209.3840	-7.7993	-6.6067	-7.3526	0.8156	ARDL(4, 4, 4, 4, 4, 4)
512	202.3567	-7.7981	-6.8838	-7.4556	0.8259	ARDL(4, 4, 0, 4, 2, 3)
252	206.1067	-7.7872	-6.7139	-7.3852	0.8209	ARDL(4, 4, 2, 4, 4, 3)

4.2.2.4 Coefficient diagnostics

This Section explains the various tests that were done on the model coefficients to determine their significance leading to the determination of the long-run and short-run model estimations.

4.2.2.4.1 Bounds testing

For bounds testing, the researcher tests for the significance of the coefficients using the Wald test and then use the Pesaran tables to interpret the results. To make statistical inferences for bounds testing, we must look at the F-statistic of the Wald test and compare it with the lower and upper bounds tables, (Pesaran et al., 2001). If it is above the upper critical values, then there is cointegration, and if it falls below the lower critical value, then there is no cointegration. If it falls in between the lower and upper critical values, then it is inconclusive (Wong 2018).

Table 4.7: Results from the ARDL Bounds Test

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	6.110082	5
Critical Value Bounds		
Significance	Lower Bound	Upper Bound
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

Table 4.7 shows that there is a long-run cointegrating relationship between DLGDPK (economic growth) and the explanatory variables (Stock market growth) at a 1% significance level. K is the number of regressors. As elaborated in Section 3.6.2.3, since the F statistic of the bounds test is above the Upper bound critical value of 4.68, we can conclude that there is a long-run cointegrating relationship between JSE performance and economic growth.

4.2.2.4.2 Serial correlation

Table 4.8: Serial correlation test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.5365	Prob. F(2,16)	0.5950
Obs*R-squared	2.8908	Prob. Chi-Square(2)	0.2357
F-statistic	0.4524	Prob. F(4,14)	0.7692
Obs*R-squared	5.2654	Prob. Chi-Square(4)	0.2611

As explained in Section 3.6.6, it is necessary to test for serial correlation on the residuals of the model to make sure that it satisfies the prerequisite condition of the Ordinary Least Squares (OLS) on the time series regression. The Breusch – Godfrey Serial Correlation LM test was used to check if the residuals of the empirical regression model are not serially correlated. The selected model proved to have no serial correlation after using the Breusch-Godfrey serial correlation LM test resulting in a Prob—Chi-square (2) of 0.2357, which greater than 0.05. Moreover, the estimate of the Observed R^2 **c**hanges from 2.8908 to 5.2654 if 4 lags are chosen using the same test method, which shows that there is no serial correlation, making it more suitable to test for the long-run relationship.

4.2.2.4.3 Model Stability

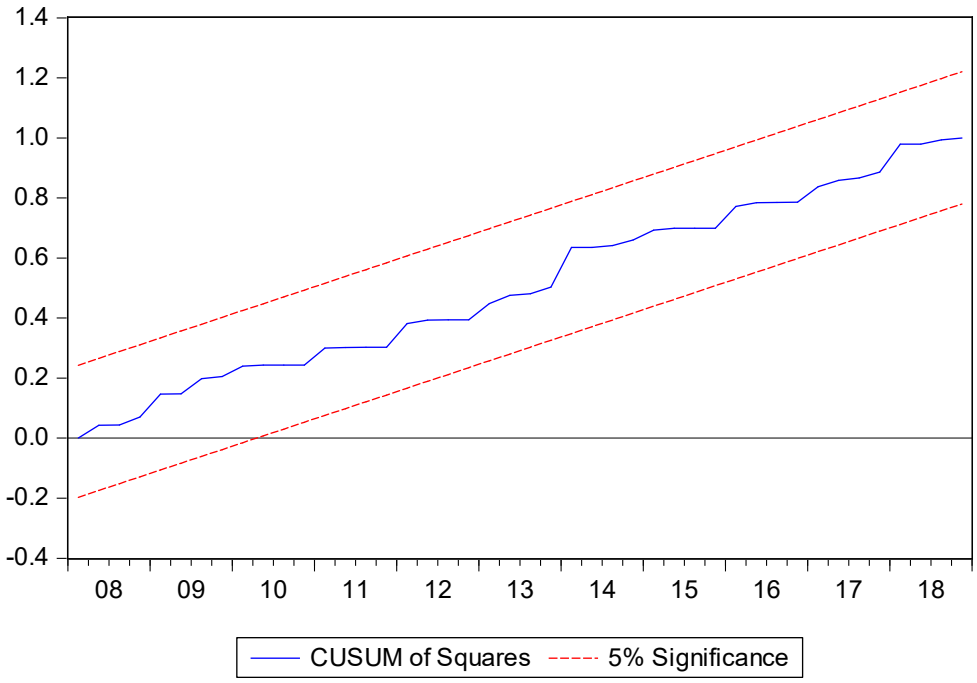


Figure 4. 2: Model Stability Test

Source: Author's computations

The diagram above shows results from the stability test carried out on the lagged variables used in the empirical model. Using the CUSUM of squares method explained in section 3.6.7, it can be concluded that the model is stable at a 5% significance level as the blue line falls in between the red line.

4.2.2.4.4 Estimating long-run and short-run coefficients

Table 4.9 below, shows results from the long-run and short-run ARDL model. This was a test for cointegration and since there is cointegration, the ECM model (Equation 8 and equation 9) will be specified as follows:

$$d(DLGDPK) = 0.7725d(DLGDPK(-1)) + 0.1814d(DLGDPK(-2)) - 0.4148d\big(DLGDPK(-3)\big) + 0.1106d(LGFCF) + 0.1107d(LGFCF(-1)) + 0.0570d\big(LGFCF(-2)\big) + 0.1437d\big(LGFCF(-3)\big) + 0.027d(LJALSH) + 0.0313d\big(LJALSH(-1)\big) - 0.0144d(LJALSH(-2)) + 0.0253d\big(LJALSH(-3)\big) - 0.3719d(LLBF) + 0.1645d\big(LLBF(-1)\big) - 0.2248d\big(LLBF(-2)\big) - 0.1905d\big(LLBF(-3)\big) + 0.0020d(LMKT) + 0.0028d\big(LMKT(-1)\big) - 0.0188d\big(LMKT(-2)\big) - 0.0054d(LTOR) - 0.0024d\big(LTOR(-1)\big) - 0.0043d\big(LTOR(-2)\big) - 2.4502ECM_{-1} \quad (11)$$

And,

$$ECM_{t-1} = DLGDPK - (-0.0019LGFCF + 0.000032LJALSH - 0.0952LLBF - 0.0003LTOR + 0.0159LMKT + 0.7994) \quad (12)$$

The results showed a negative coefficient of the cointegration equation, which indicates that there is convergence and therefore, cointegration in the long-run. This was also cemented by the p-value of the coefficient, which shows that it is statistically significant with a p-value of 0.0006.

The main objective of the research was to investigate the presence of a long-run relationship between the performance of the South African economy and the JSE market. As such, Table 4.9 Panel A shows results for the short-run model while Panel B shows the long run estimations.

4.2.2.4.5 Long-run effects: Addressing the first research question/objective

In response to the first objective, the results show a negative coefficient and statistically significant ECM term (Cointeq (-1)) which shows that there is a long-run relationship between the variables at 5% significant level.

The long-run model, Table 4.9 Panel B, shows that Labour and Market capitalisation have got statistically significant coefficients and can be targeted in trying to improve

the growth of the economy. The negative Labour coefficient shows that there is need to be more capital intensive to improve the conomy in the longrun. However, a 1% increase in the market capitalisation can result in a 0.02% improvement in economic growth thus making it one the most important variable when developing the economy. Even though its effect is not visible in the short run, market capitalisation should be considered when looking at achieving the future economic goals.

The constant (error term) of the long-run relationship is also statistically significant which aids in the reliability of the model, and it captures the effects of other variables that were not included in the model.

4.2.2.4.6 Short-run effects: Addressing the second research question/objective

It can be said that the Labour force has got a negative impact on economic growth and explained by the negative coefficient which is also statistically significant. The result shows that a 1% increase in the labor force decreases the economic growth rate by at least 0.19%. This is because labor costs are an expenditure that reduces profitability and hence the negative implications on economic growth. Moreover, this might also be due to the technological advancement in the country which has brought the need to use technology to reduce labour fees.

Gross fixed capital formation has the greatest positive short-run impact on economic growth as one of the variables of economic growth. The statistically significant coefficient of 0.1107 at 1% significant level shows that there is enough evidence to conclude that there is a positive relationship between economic growth (GDPK growth) and gross fixed capital formation. A 1% increase in Gross fixed capital formation can result in a 0.11% increase in the growth of the economy. This also shows that an increase in investments will increase the GDP of South Africa and that it is an essential variable to consider for economic growth.

The short-run model in Table 4.9, Panel A, shows that most coefficients are not statistically significant for the variables and it makes such coefficients not to be the best representation of the relationship. Even though the coefficient of the cointegrating equation is statistically significant, most variables do not have statistically significant coefficients in the long-run. It is worth noting that d(DLGDPK(-3)), d(LGFCF), d(LGFCF(-3)) have statistically signicant coefficients at 5% significance level while d(JALSH), d(LMKT(-2)), d(LTOR) and d(LTOR(-2))

have statistically significant coefficients at 10% significance. It shows that for a 1% increase in JALSH there will be a 0.025% increase in the growth of GDPK in the short-run. Policymakers may focus more on factors that help in increasing the All-share index and Gross fixed capital formation in a bid to get more positive results.

However, the estimated ECM model tells us that there is a long-run relationship but does not tell us the direction of causality. The third objective of this study was to determine the direction of the causality, which can be established using the Granger causality test. The next section will present the results of the Granger causality test.

Table 4.9: ARDL Cointegrating (Short-run) And Long Run Form

Dependent Variable: DLGDPK
Selected Model: ARDL(4, 4, 4, 4, 3, 3)
Sample: 2006Q2 2018Q4
Included observations: 46

Panel A: Shortrun coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DLGDPK(-1))	0.7725	0.4633	1.6677	0.1127
D(DLGDPK(-2))	0.1814	0.3233	0.5613	0.5815
D(DLGDPK(-3))	-0.4148	0.1792	-2.3144	0.0327
D(LGFCF)	0.1106	0.0453	2.4433	0.0251
D(LGFCF(-1))	0.1107	0.0743	1.4886	0.1539
D(LGFCF(-2))	0.0570	0.0632	0.9026	0.3787
D(LGFCF(-3))	0.1437	0.0635	2.2617	0.0363
D(LJALSH)	0.0270	0.0148	1.8265	0.0844
D(LJALSH(-1))	0.0313	0.0207	1.5153	0.1471
D(LJALSH(-2))	-0.0144	0.0222	-0.6510	0.5233
D(LJALSH(-3))	0.0253	0.0170	1.4916	0.1531
D(LLBF)	-0.3719	0.1395	-2.6668	0.0157
D(LLBF(-1))	0.1645	0.1125	1.4621	0.1610
D(LLBF(-2))	-0.2248	0.0968	-2.3214	0.0322
D(LLBF(-3))	-0.1905	0.1018	-1.8716	0.0776
D(LMKT)	0.0020	0.0091	0.2224	0.8265
D(LMKT(-1))	0.0028	0.0105	0.2646	0.7943
D(LMKT(-2))	-0.0188	0.0090	-2.0929	0.0508
D(LTOR)	-0.0054	0.0026	-2.0983	0.0503
D(LTOR(-1))	-0.0024	0.0027	-0.8994	0.3803
D(LTOR(-2))	-0.0043	0.0023	-1.8703	0.0778
CointEq(-1)	-2.4502	0.5928	-4.1334	0.0006

Cointeq = DLGDPK - (-0.0019*LGFCF -0.0000*LJALSH - 0.0952*LLBF+0.0159*LMKT-0.0003*LTOR+0.7994)

PANEL B: Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGFCF	-0.001900	0.0270	-0.0704	0.9447
LJALSH	-0.000032	0.0090	-0.0035	0.9972
LLBF	-0.095192	0.0335	-2.8410	0.0108
LMKT	0.015897	0.0074	2.1596	0.0445
LTOR	-0.000328	0.0014	-0.2321	0.8191
C	0.799360	0.1777	4.4983	0.0003

4.2.3 Granger Causality Tests:

Table 4.10: Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
LGFCF does not Granger Cause DLGDPK	46	3.61933	0.0138
DLGDPK does not Granger Cause LGFCF		2.94473	0.0329
LJALSH does not Granger Cause DLGDPK	46	8.98285	0.0000
DLGDPK does not Granger Cause LJALSH		1.30574	0.2858
LLBF does not Granger Cause DLGDPK	46	2.05882	0.1061
DLGDPK does not Granger Cause LLBF		4.65652	0.0038
LMKT does not Granger Cause DLGDPK	46	1.60748	0.1929
DLGDPK does not Granger Cause LMKT		1.51156	0.2188
LTOR does not Granger Cause DLGDPK	46	0.36970	0.8287
DLGDPK does not Granger Cause LTOR		0.32067	0.8623
LJALSH does not Granger Cause LGFCF	47	3.01462	0.0297
LGFCF does not Granger Cause LJALSH		1.06612	0.3866
LLBF does not Granger Cause LGFCF	47	0.59735	0.6668
LGFCF does not Granger Cause LLBF		5.26544	0.0018
LMKT does not Granger Cause LGFCF	47	1.52786	0.2136
LGFCF does not Granger Cause LMKT		1.52729	0.2138
LTOR does not Granger Cause LGFCF	47	0.39440	0.8114
LGFCF does not Granger Cause LTOR		1.97984	0.1172
LLBF does not Granger Cause LJALSH	47	0.46271	0.7626
LJALSH does not Granger Cause LLBF		5.13884	0.0021
LMKT does not Granger Cause LJALSH	47	2.31869	0.0746
LJALSH does not Granger Cause LMKT		5.55411	0.0013
LTOR does not Granger Cause LJALSH	47	0.48867	0.7440
LJALSH does not Granger Cause LTOR		0.78093	0.5446
LMKT does not Granger Cause LLBF	47	3.99152	0.0084
LLBF does not Granger Cause LMKT		1.58973	0.1969
LTOR does not Granger Cause LLBF	47	0.85105	0.5019
LLBF does not Granger Cause LTOR		0.20410	0.9346
LTOR does not Granger Cause LMKT	47	1.51621	0.2169
LMKT does not Granger Cause LTOR		0.10143	0.9813

The above table shows the results of the causality between the logged variables of stock market growth and economic growth. From the results above, it can be concluded that GDP granger causes GFCF while JALSH Granger causes GDP growth. Even though JALSH Granger causes GFCF at a 10% significance level, GFCF does not granger cause an increase in JALSH. It can also be seen that GFCF granger causes an increase in the Labour force, but an increase in LLBF does not granger cause GFCF. This relationship is important as it shows a series of events that are applicable in life and will assist policymakers in decision-making. Odili and Ugwu (2015) established that there is a positive relationship between the Gross fixed capital formation and the all-share index in Nigeria. This makes these results much more important as they elaborate on the growth in investments in the country and its relationship with the stock market.

However, from the causality effects in South Africa, the market growth is highly motivated by the growth in investments in the country. It also shows that an increase in the level of investments will result in a high market capitalization through the increase in JALSH, which has got a bi-directional causality with Stock market capitalization. In nutshell, there is bi-directional causality between the JSE all-share index and market capitalization. Also, there is causality from Market capitalization to Gross fixed capital formation. Moreover, there is causality from Gross domestic product to Gross fixed capital formation. More importantly, there is causality between the JSE all-share index and the Gross domestic product.

4.3 Discussion of Results

As interpreted in the previous sections, it can be concluded that there is a long-run relationship between the performance of the Johannesburg Stock Exchange market and economic growth. The results from Equation 11 and 12 managed to respond to the first and second objectives of this research with regards to the long run and short-run impact of the JSE performance on economic growth in South Africa. As shown by the diagnostic tests in Section 4.2.2.4, the model managed to satisfy all conditions tested that, proving that the model is stable with no serial correlation and supported the presence of the long-run relationship.

It is worth noting that the coefficient of the Error correction term was negative and statistically significant, which validated the presence of the long-run relationship.

However, the coefficients of turnover ratio and market capitalization were not statistically significant, which shows that these variables do not best explain the relationship between stock market growth and economic growth using the available data. Moreover, this supports the results of Greenwood and Smith (1997), that market development should follow a period of real development of which in South Africa, there has been a decrease in the growth of real development. It is also in line with Deb et al. (2019), who asserts that the relationship between economic growths is weak during periods of economic depression. This has been the case for South Africa since the global financial crisis of 2008. This shows that the results are a true representation of what has been happening in the country for the period under review.

The other factor to look at is the maximum lag order selected which shows how it has been difficult in the period under review to rely on past information in determining the direction of economic growth. The optimum model selected in Section 4.2.2.3 does not rely on any past values of market capitalization, Turnover ratio and JSE all-share index in explaining the relationship between economic growth and stock market growth. This might be the result of the economic downturn and the increased volatility in the stock market.

On the other hand, the statistically significant error correction term was the major factor in concluding the long-run relationship and convergence in model estimates. It shows that at least 2.45% of the variability is corrected in a single period. This supports the result by Nordin (2016) of a positive relationship between economic growth and stock market growth. Moreover, the long-run coefficients of labor and capital are statistically insignificant. This might be a representation of the increase in the unemployment rate and the delisting and scaling down of companies as they face financial distress. The labor coefficient may be explained by the introduction of new technologies and the retrenchments that have been going on in the country.

The results of the Granger causality tests were in response to the third objective of the research, which is the direction of the causality between the two variables. It can be concluded that there is bidirectional causality from the Gross fixed capital formation to economic growth. The increase in the market capitalisation might show that the companies on the Stock market are performing better through profitability from improved efficiency and productivity. This implies that the companies are producing

more of a good than the previous production levels, which has a direct impact on national output, GDP. Moreover, an increase in GDP as a result of a rise in consumption levels and demand from the general public may force companies to increase their productivity to meet the demand levels. This will also assist in the profitability of the companies and will increase the All-share index which has a bidirectional causality with the Market capitalisation.

The bidirectional causality between the All-share index and the market capitalization can be explained by the composition of the All-share index. The JSE all-share index is a market capitalization weighted index that shows the movement in the index in relation to market capitalization. Besides, the all-share index includes about 99% of the listed companies. The bidirectional causality implies that the JSE all-share index granger causes market capitalization whilst market capitalization granger causes the JSE all-share index. This implies that an increase in one variable triggers a change in another and vice versa.

The relationship between these variables can best be explained using the Demand-following hypothesis, which postulates that, an increase in the need for financial services is mainly a result of the growth in real production and the development in other primary sectors of the economy. Looking at the economic structure of South Africa, which is still considered an emerging market, this conclusion is in line with the results of Acaravci et al. (2009) who postulated that the demand-following hypothesis is more prominent in developing countries.

4.4 Conclusion

The Augmented Dickey-Fuller test was carried out to determine the stationarity of the variables as required by the bounds test. It was evident that all other variables are stationary after first differencing whilst the turnover ratio is level stationery. This meant that all the variables were fit to be used in an ARDL bounce testing model. Using the VAR method, an optimum lag order of 1 was specified based on the AIC BIC information criteria. The researcher went on to test for autocorrelation and the results showed no evidence of serial correlation. The CUSUM sum of squares method was implemented to test for stability, and it proved that the model was stable at a 5% significance level.

From the results of the bounds test, it can be concluded that there is a long-run relationship between stock market growth and economic growth in the long-run. The results from the bounds test, complement the conclusions made by Deb et al. (2019) that the relationship between economic growth and stock market growth is very weak during the period of economic depression. South Africa has been experiencing slow growth with a negative GDP growth rate since the global financial crisis of 2008 any growth or increase in trades and turnover from the stock market has been matched with the negative growth rates of the economy. Moreover, most companies have not been performing well on the stock market because of the structural economic challenges. This explains the statistically insignificant regression coefficients of Turnover ratio and market capitalization in the model.

A negative statistically significant coefficient of labor may be interpreted as being the result of various automation strategies being implemented by companies. For example, the increase in the use of robots to do the repetitive tasks has made it difficult to calculate the marginal utility to labor on a national level since different companies apply different strategies to increase labor efficiency.

In addition, the labor force used in the research is employed human resources, which does not account for technological efficiencies. However, the short-run model best describes the downturn in economic growth being experienced by the country over the years. The results from the causality tests support the supply-leading hypothesis as evidenced by the causality between GDP per capita and JSE All-share index and Gross fixed capital formation and the Market capitalization. This shows that output aids in stock market development.

In contrast to Nyasha and Odhiambo (2018), who explained that the relationship between the stock market performance and economic growth is inconclusive at best, this research found evidence that there is a long-run relationship between the variables at 1% significance level. An R^2 coefficient of a high magnitude of 92% shows how good the variables best explain the dependent variable. This coefficient of determination measures how well-observed outcomes are mirrored in the statistical model.

This Chapter has presented the results from the regression analysis of the empirical model used in this research. The next chapter offers the conclusion of the whole study

and gives recommendations in solving the problems identified in the problem statement.

CHAPTER FIVE

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.1 Introduction

This chapter briefly elaborates on the core findings of the research and offers recommendations for current and other future studies within the same spectrum. Recommendations are based on the conclusions of this research and addressing the research problem. Finally, it points out the areas that may require further drill down.

5.2 Summary and Conclusion

The research looked at the relationship between economic growth and stock market growth. Share turnover ratio, market capitalization, and JSE all-share index were used as proxies for the growth of the stock market. The main objectives of the study were to find evidence of a long-run relationship (cointegration) and to determine the direction of the causality. These objectives were identified from the need to find solutions to the decrease in the economic growth rate and a reduction in the levels of investments in the country, as explained by the World Bank in 2018. The African Development Bank (ADB 2019) also identified these problems, and they added on saying that this was a result of the slow growth in the services, manufacturing and mining sectors.

In a bid to find methods of utilizing the stock market as an efficient tool to stimulate economic growth problem, the researcher discovered a gap in the available literature. Few studies have been done focusing on the Southern African region, which prompted the need for this research. Moreover, the JSE is the largest stock market in the SADC region, and this meant that the results of this study would still be valid as a representation of the other countries in the SADC region. The empirical literature evidence available was split between a positive long-run relationship, inconclusive and no long-run relationship between the variables.

Gross fixed capital formation, and South Africa's employed labor force was used as a representation of Capital and Labour, respectively as the Cobb-Douglas theoretical model was modified to the empirical model. An ARDL bounce testing approach by

Pesaran et al. (2001) was selected as the analytical model for the study. The Augmented Dicky-Fuller test was done to determine the stationarity of the data variables before carrying out the regression of the ARDL model. After selecting the appropriate lag length using the various information criteria, the bounds test was carried out to determine if a long-run relationship exists between the variables. The results showed that the economic growth and stock market growth are cointegrated in the long-run. The coefficient of the error correction term was statistically significant, supporting the notion of a long-run steady relationship. It was also evident that the JSE All Share significantly and positively influence economic growth in both the short-run and long-run. However, the regression coefficients for both long-run and short-run coefficients of turnover ratio and stock market capitalization were not significant, which was explained as structural difficulties within the country and explanations are provided in Chapter 4. These include a surge in inflation, political risk, stock market volatility, unemployment and the fluctuations in the global economy. All of the above factors affect the performance of the listed companies. They have left companies in financial distress as evidenced by companies like Cashbuild, which closed some of its branches. Overall, based on the JSE All Share index, the conclusion of this study is that the JSE stock market development has a positive impact on economic growth. Nevertheless, this study also shows that the results regarding the effect of the stock market development on economic growth may depend on the type of proxy for stock market development.

These results complement findings from other researchers like Grassa and Gazdar (2014), and imply that the South African government and policymakers need to consider the efficient use of the JSE to improve the level of investment and thereby economic growth in the country. Such policies should aim at encouraging the participation of companies in the market to efficiently manage a country's financial resources.

5.3 Recommendations

This research has added valuable contribution to the available literature with regards to the subject line, which is the impact of the JSE stock exchange to South African economic growth. The researcher recommends that policymakers should put in place policies that promote investments and use the stock market as a tool to distribute

financial resources in the country efficiently. Since the JSE has got a market where small-cap companies can list, it is of utmost importance for the Government to increase its participation in such a market and monitor its efficiency as a way of promoting investments within the country.

There is a need to educate all stakeholders both in the industries and the public about the importance of the stock market and try to promote an investment culture within the country. This will assist in pulling the much-needed liquidity that will be directed towards the productive sectors of the economy. One of the reasons why citizen participation in the JSE is low is because of a lack of technical know-how, and lack of trust in the trading systems.

There is a need to address the issue of financial information distribution to all industries and sectors to create awareness and increase competition and participation from every stakeholder. This helps in building a more efficient financial system that can aid in channeling funds from deficit spending units to surplus spending units. An effective financial intermediation process can be a key driver for growth.

The regulation authorities should try to set laws that offer protection as well as enabling companies that are key drivers of the economy to take risky positions with government support. Such laws should promote healthy competition and offering tax holidays to new investors up to a certain threshold. Company registration processes should not be such that discourages investment in the country with too many procedures and unnecessary documentation.

5.4 Areas of Further Research

While the scope of this study permits us to estimate the short-run and long-run effects of JSE performance on economic growth, further research may extend the analysis by investigating the extent to which economic growth can influence the stock market performance. Moreover, future researches may be focused on the relationship between government spending and financial development within the country. This can include the issue of political instability and the downgrading of the country's credit ratings as a variable used to explain financial development. That is one of the areas that has not been researched enough in South Africa as it has been rhetoric on national media, but very few people understand how the downgrading affects their day to day lives.

Moreover, other studies may also incorporate political or institutional factors in the model for the stock market and economic growth in South Africa. Other variables to consider may include foreign direct investments. This is a very critical area of the study looking at how the SADC community has been affected by economic challenges in neighboring countries, which resulted in capital flight and economic pressure on other countries.

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APPENDIXES

Appendix A: Description of variables

	Table A1			
	VARIABLE	**DESCRIPTION**	**PERIOD**	**SOURCE**
a)	Market Capitalisation	The total market value of a company; price of a share of stock times the total number of shares outstanding, (Cecchetti & Schoenholtz 2015, pp 727)	2006-2019	-The global economy website -Bloomberg analytics -IMF data -World Bank: Research datasets and analytical tools.
b)	**Share turnover ratio**	The total number of securities in the market that has been traded or changed hands in each period. It is the ratio of stock market turnover to market capitalization.	2006-2019	-World trade organization -Bloomberg analytics -Bank of international settlements -Iress.com
c)	JSE Stock market index (All-share index)	Stock market indexes are index numbers that provide a sense of whether the value of the market is going up or down (Cecchetti & Schoenholtz 2015, pp 730).	2006-2019	-Unctadstat.unctad.org -the global economy website -Bloomberg analytics -Iress.com
d)	South Africa's Gross Domestic Product Growth per capita (GDP per capita)	The total market value of final goods and services produced in the economy during a year devided by the population, (Cecchetti & Schoenholtz 2015, pp 18).	2006-2019	-Unctadstat.unctad.org -The global economy website -Bloomberg analytics -Iress.com
e)	Labour Input	The total number of people hours worked in a year (Josheski 2011).	2006-2019	-Bloomberg -Iress.com -South African statistical Authority -Government websites

	Table A1			
	VARIABLE	**DESCRIPTION**	**PERIOD**	**SOURCE**
f)	Capital input (Gross fixed capital formation)	The monetary worth of all machinery, equipment, and buildings, (Josheski 2011).	2006-2019	-Bloomberg -South Africa Reserve bank data portal -Iress.com -South African statistical Authority -Government websites

Appendix B: Model Selection Criteria

Top 20 results

Model	LogL	AIC*	BIC	HQ	Adj. R-sq	Specification
7	208.7340	-7.8580	-6.7449	-7.4410	0.8314	ARDL(4, 4, 4, 4, 3, 3)
2	209.3209	-7.8400	-6.6872	-7.4082	0.8260	ARDL(4, 4, 4, 4, 4, 3)
257	206.0333	-7.8275	-6.7940	-7.4403	0.8293	ARDL(4, 4, 2, 4, 3, 3)
507	203.9415	-7.8235	-6.8695	-7.4661	0.8301	ARDL(4, 4, 0, 4, 3, 3)
6	208.7931	-7.8171	-6.6643	-7.3852	0.8219	ARDL(4, 4, 4, 4, 3, 4)
1	209.3840	-7.7993	-6.6067	-7.3526	0.8156	ARDL(4, 4, 4, 4, 4, 4)
512	202.3567	-7.7981	-6.8838	-7.4556	0.8259	ARDL(4, 4, 0, 4, 2, 3)
252	206.1067	-7.7872	-6.7139	-7.3852	0.8209	ARDL(4, 4, 2, 4, 4, 3)
132	206.0535	-7.7849	-6.7116	-7.3829	0.8205	ARDL(4, 4, 3, 4, 3, 3)
256	206.0384	-7.7843	-6.7109	-7.3822	0.8204	ARDL(4, 4, 2, 4, 3, 4)
506	203.9754	-7.7815	-6.7877	-7.4092	0.8223	ARDL(4, 4, 0, 4, 3, 4)
502	203.9660	-7.7811	-6.7873	-7.4088	0.8222	ARDL(4, 4, 0, 4, 4, 3)
382	203.9432	-7.7801	-6.7863	-7.4078	0.8220	ARDL(4, 4, 1, 4, 3, 3)
517	200.6058	-7.7655	-6.8909	-7.4379	0.8199	ARDL(4, 4, 0, 4, 1, 3)
511	202.4223	-7.7575	-6.8034	-7.4001	0.8185	ARDL(4, 4, 0, 4, 2, 4)
387	202.3770	-7.7555	-6.8014	-7.3981	0.8181	ARDL(4, 4, 1, 4, 2, 3)
251	206.1084	-7.7438	-6.6308	-7.3269	0.8110	ARDL(4, 4, 2, 4, 4, 4)
127	206.1068	-7.7438	-6.6307	-7.3268	0.8110	ARDL(4, 4, 3, 4, 4, 3)
131	206.0573	-7.7416	-6.6285	-7.3247	0.8106	ARDL(4, 4, 3, 4, 3, 4)
392	201.0035	-7.7393	-6.8250	-7.3968	0.8153	ARDL(4, 4, 1, 4, 1, 3)

Appendix C: ARDL Cointegrating And Long-run Form

Table A3

Dependent Variable: DLGDPK
Selected Model: ARDL(4, 4, 4, 4, 3, 3)
Sample: 2006Q2 2018Q4
Included observations: 46

Panel A: Shortrun coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DLGDPK(-1))	0.7725	0.4633	1.6677	0.1127
D(DLGDPK(-2))	0.1814	0.3233	0.5613	0.5815
D(DLGDPK(-3))	-0.4148	0.1792	-2.3144	0.0327
D(LGFCF)	0.1106	0.0453	2.4433	0.0251
D(LGFCF(-1))	0.1107	0.0743	1.4887	0.1539
D(LGFCF(-2))	0.0570	0.0632	0.9026	0.3787
D(LGFCF(-3))	0.1437	0.0635	2.2617	0.0363
D(LJALSH)	0.0270	0.0148	1.8265	0.0844
D(LJALSH(-1))	0.0313	0.0207	1.5153	0.1471
D(LJALSH(-2))	-0.0144	0.0222	-0.6510	0.5233
D(LJALSH(-3))	0.0253	0.0170	1.4916	0.1531
D(LLBF)	-0.3719	0.1395	-2.6668	0.0157
D(LLBF(-1))	0.1645	0.1125	1.4621	0.1610
D(LLBF(-2))	-0.2248	0.0968	-2.3214	0.0322
D(LLBF(-3))	-0.1905	0.1018	-1.8716	0.0776
D(LMKT)	0.0020	0.0091	0.2224	0.8265
D(LMKT(-1))	0.0028	0.0105	0.2646	0.7943
D(LMKT(-2))	-0.0188	0.0090	-2.0929	0.0508
D(LTOR)	-0.0054	0.0026	-2.0983	0.0503
D(LTOR(-1))	-0.0024	0.0027	-0.8994	0.3803
D(LTOR(-2))	-0.0043	0.0023	-1.8703	0.0778
CointEq(-1)	-2.4502	0.5928	-4.1334	0.0006

Cointeq = DLGDPK - (-0.0019*LGFCF -0.0000*LJALSH -0.0952*LLBF+0.0159*LMKT-0.0003*LTOR+0.7994)

PANEL B: Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGFCF	-0.0019	0.026997	-0.070377	0.9447
LJALSH	-0.000032	0.009013	-0.003531	0.9972
LLBF	-0.095192	0.033506	-2.841023	0.0108
LMKT	0.015897	0.007361	2.159638	0.0445
LTOR	-0.000328	0.001414	-0.232118	0.8191
C	0.799360	0.177701	4.498342	0.0003

Appendix D: ARDL Bounds Test

ARDL Bounds Test
Sample: 2007Q3 2018Q4
Included observations: 46
Null Hypothesis: No long-run relationships exist

Test Statistic		Value		k
F-statistic		6.110082		5
Critical Value Bounds				
Significance		I0 Bound		I1 Bound
10%		2.26		3.35
5%		2.62		3.79
2.5%		2.96		4.18
1%		3.41		4.68

Test Equation:
Dependent Variable: D(DLGDPK)
Method: Least Squares
Included observations: 46

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DLGDPK(-1))	0.7725	0.4633	1.6677	0.1127
D(DLGDPK(-2))	0.1814	0.3233	0.5613	0.5815
D(DLGDPK(-3))	-0.4148	0.1792	-2.3144	0.0327
D(LGFCF)	0.1106	0.0453	2.4433	0.0251
D(LGFCF(-1))	0.3114	0.0723	4.3052	0.0004
D(LGFCF(-2))	0.2007	0.0809	2.4818	0.0232
D(LGFCF(-3))	0.1437	0.0635	2.2617	0.0363
D(LJALSH)	0.0270	0.0148	1.8265	0.0844
D(LJALSH(-1))	0.0422	0.0235	1.7928	0.0898
D(LJALSH(-2))	0.0109	0.0199	0.5490	0.5898
D(LJALSH(-3))	0.0253	0.0170	1.4916	0.1531
D(LLBF)	-0.3719	0.1395	-2.6668	0.0157
D(LLBF(-1))	-0.2508	0.1095	-2.2903	0.0343
D(LLBF(-2))	-0.4153	0.1176	-3.5324	0.0024
D(LLBF(-3))	-0.1905	0.1018	-1.8716	0.0776
D(LMKT)	0.0020	0.0091	0.2224	0.8265
D(LMKT(-1))	-0.0160	0.0104	-1.5407	0.1408
D(LMKT(-2))	-0.0188	0.0090	-2.0929	0.0508
D(LTOR)	-0.0054	0.0026	-2.0983	0.0503
D(LTOR(-1))	-0.0067	0.0030	-2.2342	0.0384
D(LTOR(-2))	-0.0043	0.0023	-1.8703	0.0778
C	1.9586	0.6943	2.8211	0.0113
LGFCF(-1)	-0.0047	0.0669	-0.0696	0.9453
LJALSH(-1)	-7.80E-05	0.0221	-0.0035	0.9972
LLBF(-1)	-0.2332	0.0656	-3.5572	0.0023
LMKT(-1)	0.0390	0.0139	2.8020	0.0118
LTOR(-1)	-0.000804	0.0035	-0.2282	0.8221
DLGDPK(-1)	-2.450166	0.5928	-4.1334	0.0006