# FACTORS INFLUENCING THE DEVELOPMENT OF CAPITAL MARKET IN RWANDA. A CASE STUDY OF RWANDA STOCK EXCHANGE.

**A Thesis Submitted in Partial Fulfilment of the Requirements for the Degree of Master of Science in Economics**

**SUBMITTED BY: UMUHOZA CYUZUZO GISELE**

**REG No: 215036810**

**JULY 2017**

UNIVERSITY of RWANDA

COLLEGE OF BUSINESS AND ECONOMICS

# APPROVAL SHEET

This thesis entitled **Factors Influencing the Development of Capital Market in Rwanda. A Case Study of Rwanda Stock Exchange** written and submitted by **UMUHOZA CYUZUZO GISELE** in partial fulfilment of the requirements for the degree of Master of Science in Economics, is hereby accepted and approved.

_____

Supervisor

_____

Date

The thesis is accepted in partial fulfillment of the requirements for the degree of Master of Business Administration.

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Member of the Jury Member of the Jury

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Date Date

_____

Coordinator of Postgraduate Studies

_____

Date

# DECLARATION

I, the undersigned UMUHOZA CYUZUZO Gisele a student at the University of Rwanda in Master of Science in Economics declare that the work presented in this thesis entitled ***"Factors influencing the development of Capital markets in Rwanda. A case study of Rwanda Stock Exchange"*** is mine, it has never been presented or submitted in any University or other higher learning institutions for similar award.

Ms UMUHOZA CYUZUZO Gisele

Signature: ……..

Date: …….

# DEDICATION

To my Mum, MUKAGATARE Catherine. You are always in my heart

# CERTIFICATION

It is certified that this research was completed at University of Rwanda, the data used are secondary data from The Rwanda Stock Exchange, The National Bank of Rwanda and the National Institute of Statistics of Rwanda

It is the work of UMUHOZA CYUZUZO Gisele, a student at University of Rwanda Masters of Science in Economics under my supervision.

Supervisor: Professor Almas HESHMATI

Date: ……...

Signature: ……

# ACKNOWLEDGMENT

I would like to express my gratitude to my family, friends and classmates for their support and encouragement, the Rwanda Stock Exchange for providing the data used and to my supervisor Proffessor Almas Heshmati for his instructive and thoughtful comments that made me work hard until I made it.

# Factors influencing the development of Capital markets in Rwanda. A case study of Rwanda Stock Exchange


## ABSTRACT

This study investigates the factors influencing the development of the capital markets in Rwanda. The main objective is to study how macroeconomic variables affect the growth and development of the Rwandan Stock Exchange (RSE). We have also analysed the contribution of the RSE on the economic growth of Rwanda. To achieve the objectives of the study, quarterly secondary data from 2011 up to 2016 were used and both the two model were estimated using the Generalised Linear Method (GLM) method. The RSE performance has been measured by market capitalization. The macroeconomic variables used are the key repo rate, the inflation rate, and the money supply. The consumption has been used as conditioning variable. To analyse the second model, we have used the GDP as the dependent variable, while the market capitalization was used as the independent variable along with the capital formation and consumption as the conditioning variables. A 2SLS regression method was used to overcome the endogeneity problem. Our results have shown that among the four macroeconomic variables only the money supply has a statistically significant relationship with the market capitalization, as we found that an increase in money supply by one Frw will lead to an increase of market capitalization ratio by 0.003. The results have also shown that there is a positive relationship between the market capitalization and the GDP where an increase of market capitalization by one unit will increase the GDP by 0.19.



Keywords: Capital market, economic growth, monetary policy, Investment, financial development

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| | |
|---|---|
| **BNR:** | Banque National du Rwanda |
| **CMA:** | Capital Market Authority |
| **CMAC:** | Rwanda Capital Market Advisory Council |
| **CDSC:** | Central Depository and Settlement Corporation |
| **CSD:** | Central Securities Depository |
| **CTL:** | Crystal Telecom Ltd |
| **CVL:** | Crystal Venture Ltd |
| **EDPRS:** | Economic Development and Poverty Reduction Strategy |
| **FRW:** | Franc Rwandais |
| **GLM:** | Generalised Linear Method |
| **GDP:** | Gross Domestic Production |
| **IPO:** | Initial Public Offering |
| **KCB:** | Kenya Commercial Bank |
| **MENA:** | Middle East and North Africa Countries |
| **MINECOFIN:** | Ministry of Economic Planning and Finance |
| **OTC:** | Over the Counter |
| **NISR:** | National Institute of Statistics |
| **RDB:** | Rwanda Development Board |
| **RIEPA:** | Rwanda Investment and Export Promotion Agency |
| **RNIT:** | Rwanda National Investment Trust |
| **RSE:** | Rwanda Stock Exchange |
| **RRA:** | Rwanda Revenue Authority |
| **USD:** | US Dollar |

# CHAPTER ONE: GENERAL INTRODUCTION

## 1.1. Introduction

Capital formation is one of the main factors responsible for economic and financial growth of a country. Developing countries need considerable investment capital for the provision of basic infrastructure, education facilities and the development of agricultural and industrial ventures. According to Arowolo (1971), success in mobilization of needed capital for development has varied among countries and has depended on the availability of domestic savings within the economy and the inflow of foreign capital. For a country like Rwanda which is still building its economy it is not easy to get debt from banks, mostly because the projects that are being developed in Rwanda are risky and take long to generate benefit. It is for this reason that the presence of a capital market is needed to play an alternative role of the banking sector which currently dominate the financial sector in Rwanda, but yet with expensive cost to the private sector willing to acquire capital from them. According to Yartey and Adjasi (2007) stock markets provide an opportunity for growing companies to raise capital at lower cost. They emphasize that companies in countries with developed stock markets are less dependent on bank financing.

The role of the capital market in boosting the economic growth of countries and offering alternative solution for people looking for capital is recognized by several authors. According to Levine (1998) capital markets boost savings and increase the quantity and the quality of investment by providing individuals with additional financial instrument that may better meet their risk preferences and liquidity needs capital markets. And according to Gursamy (2009) well developed financial markets play important role in mobilization of savings by collecting funds saved by households, public and private entities when they purchase shares or bonds;

in spurring investment by enabling companies to acquire capital needed, in increasing national growth by ensuring a transfer of surplus funds to deficit funds; in entrepreneurship and industrial growth by availing the necessary financial ressources.

Stock markets are considered by many economists as the pulse of an economy as in most of the cases they react quickly to any economic or political change of a certain country. According to Singh (2010), capital market in which security prices adjust rapidly to the arrival of new information is called an efficient capital market. The stock market behaviour is affected by several factors which can include macroeconomic factors being domestic or international, social, political and institutional factors, the market expectations about the future economic growth or any change in monetary and fiscal policy. Macroeconomic factors that mostly affect a stock market include the interest rate, inflation rate, money supply, economic growth or exchange rate among others.

In 2000, Rwanda adopted the vision 2020 which aims at transforming the country into a middle income country with a knowledge based economy. To achieve this, an annual economic growth target of 11.5% is required, and this can only be achieved with at least 20% savings of GDP and domestic investment of up to 30% of GDP. It is in this line that the Capital Market Authority was established under the Capital Market Act of 2011, to guide in the development of capital markets. Before the establishment of the Capital Market Authority (CMA), the Rwanda Capital Market Advisory Council (CMAC) had been established in 2007 to develop the Capital Market in Rwanda, facilitate the trading of debt and equity securities and enable securities transactions, as well as perform regulatory functions over the Rwanda Securities Exchange which was also created in 2011[1]. The RSE is a company limited by shares

[1]See https:// minecofin.gov.rw/capital markets

in which the government owns 20% and the remaining being owned by brokers and other stakeholders. It has eight listed companies within which 4 four are foreign owned. Transactions are carried out manually, and cleared electronically through a central securities depository system that is managed by the Central Bank.

The role of stock markets in increasing the economic growth of a country has been supported by several authors and it was proved in many developed countries and as said early it was on this basis that Rwanda has established the capital market authority in 2011. According to CMA (2015), the total amount of funds raised during the financial year 2014-2015 was FRW 55 billion compared to FRW 12.5 in the financial year 2013-2014. This was highly supported by the government long term debt issuance program launched in 2014 in order to support capital market development and to mobilize infrastructure funding. The government of Rwanda has adopted institutional and regulatory framework to support its development and it is in the same spirit that since 2014, it has launched the government long-term debt issuance program. However despite all the effort, during the year 2016, the market capitalization went down from 3.8 USD billions in 2015 to 3.3 billion. This was attributed to the overall country economic performance and other factors such as low clients turnover and the fact that there were few products that were traded at the RSE. It is in this line that this study is suggested, in order to assess how macroeconomic variables affect the stock market performance.

### 1.2. Problem statement

In countries where capital markets are more developed they have played a major role in economic and financial growth according to Dudley (2004). This is explained by their ability to mobilize funds that are then channelled to individuals or groups of people who need that money to start or expand their businesses which result in the growth of a country's economy.

Learning from these countries experience, Rwanda has created its capital market in 2011 and since then, it has adopted institutional and regulatory framework to support its development and it is in the same spirit that, since 2014 the government long-term debt issuance program was launched. This program consist in the issuance of a government treasure bond to the public, in order to increase available new product to the RSE, which will attract new investors and thus contribute to the development of the stock market. However despite all the effort, during the year 2016, the market capitalization went down from 3.8 USD billions in 2015 to 3.3 billion. This was attributed to the overall country economic performance and other factors such as low clients turnover and the fact that there were few products that were traded at the RSE. However, little is known about how the macroeconomic environment affects the stock market performance in Rwanda. It is from this backdrop that this study is suggested in order to assess which macroeconomic variables affect the stock market and at which extent they do so in order to formulate suitable recommendations that may be used to improve the RSE performance.

### 1.3. Research Objectives

The objectives may be classified into general and specific parts as below

**General objective**

The main objective of this study is to investigate the relationship between RSE performance and the economic growth of Rwanda.

**Specific objectives**

i) To analyze the evolution of the performance of the Rwanda stock exchange,

ii) To analyze the contribution of the RSE to the economic development of Rwanda

iii) Formulate suitable policy measures that will contribute to the improvement of the RSE performance

### 1.4. Research Questions

i) What is the relationship between RSE performance and economic growth?

ii) Is there a mutual relationship between RSE performance and economic growth?

iii) What are other factors that contribute to the economic growth of Rwanda?

### 1.5. Hypothesis

Based on the objectives and research questions listed above, two hypotheses are formulated and tested:

- H10: There is no significant relationship between capital market and economic growth
- H11: There is a significant relationship between capital market and economic growth
- H20: There is no mutual relationship between RSE performance and economic growth.
- H21: There is a mutual relationship between RSE performance and economic growth.

### 1.6. Significance of the study

The capital market and thus the stock market play a major role in the economic growth of a country through their ability to mobilize long term savings for financing long term ventures, to improve efficiency of resource allocation through competitive pricing mechanisms, to provide risk capital (equity to entrepreneurs), and to encourage broader ownership of firms. Rwanda as an ambitious has also created its Stock market, the Rwanda stock exchange (RSE) and through government and private institutions people are being sensitized to join the RSE because it is a way of saving and investing and thus have ownership in big companies of the country like Bralirwa which is the biggest brewery in Rwanda or Bank of Kigali which is the largest bank in the country. Given the proved role of stock market in contributing to the economic growth of the country, since the stock market in Rwanda is still in its early stage and is not performing at its best knowing its real relationship will help in formulating suitable recommendations which may be used by policymakers. Also if the mutual relationship between stock market and economic growth is found, this will be a good tool that can be used to by policymakers as well as stakeholders in the Rwandan stock market to attract new investors because from what is known, the Rwandan economy is behaving well so this means that the Rwandan stock market will be performing better if the mutual relationship is proved.

### 1.7. Scope and organization of the Study

The study is about investigating the relationship between the Rwanda Stock Exchange performance and the economic growth of Rwanda. We use the market capitalisation ratio to measure the RSE performance and the GDP growth rate to measure the economic growth. Exchange rate, consumption, key repo rate as well as capital formation are used as

conditioning variables. Quarterly data from 2011 up to 2015 are used. We test the causal relationship between the dependent and independent variables after which the GLM regression method is used to estimate the data.

The study is divided into the following five chapters:

**Chapter one gives** an introduction to the relationship between capital market and Economic growth. It also gives some highlights about the Rwanda stock exchange. It is composed of background of the study, problem statement, research objectives, hypothesis, scope of the study and interest of the study.

**Chapter two** covers the literature review of the relevant theories and previous studies from different sources, and also provide key definitions, terms and concepts as well as frame work of the study.

**Chapter three** shows the research methodology used in the study which includes, data collection techniques, and tools used in data analysis.

**Chapter four** is about research findings, tabulations, outputs of the analysis and interpretation of the results in a suitable meaningful context.

**Chapter five** provides a summary of the findings, conclusion, recommendations and suggestions.

# CHAPTER TWO: LITERATURE REVIEW

## 2.1. Key definitions

### 2.1.1. Financial Market

A financial market is an institution or an arrangement that facilitates the exchange of financial instruments including deposits and loans, corporate bonds and stocks, government bonds and other instruments according to Gursamy (2009). Financial market transactions may take place in a stock exchange or by telephone, or other electronic media. Financial markets comprise money market which is a sort of market where people lend or borrow money for a short period of time like one night or a year maximum; capital market in which people lend or borrow money for a period that is more than one year; debt market which is a market specialized in the selling and buying of bonds; Eurobond market in which bonds are sold and bought denominated in a currency that is not the national currency of the issuing country.

### 2.1.2. Stock Market

A stock market is a market for stocks of different companies listed on it; commodity market which is specialized in the trading of primary goods like wheat, coffee or minerals; derivatives market is market for financial instruments like future contract or option; futures market is a market where people agree to trade a specific quantity of commodities or financial instrument in the future at a given time; foreign exchange market is a market where people buy or sell different currencies; financial services market which a market that is comprised of different institutions that provide financial services; depository market and non-depository market. Not all these constituents are available in all the countries especially in developing countries like Rwanda where the capital market is still at its early stage.

### 2.1.3. Capital Market

A capital market is a highly specialized and organized financial market that represents the facilities and institutional arrangements for the sale and purchase of medium-term and long-term funds. The capital market like any market has the buyers who are the borrowers of funds and the sellers who are the lenders of the funds.[2]The capital market is comprised of primary market and secondary market. Primary Market deals with the issue of new securities. It is a market for raising fresh capital in the form of shares and debentures. In this market, the government or the corporate sector which are willing to raise of raising capital funds through the issue of securities approach the primary market. Issuers exchange financial securities for long term funds.

The primary market allows for the formation of capital in the country and the accelerated industrial and the economic development. This way, newly issued financial assets are bought and sold. The popular ways by which capital funds are raised in the primary market are; the Public issue or Initial Public Offering (IPO) where a company willing to raise capital issue a certain number of its shares to the public depending on the amount of capital needed. The securities are issued to the members of the general public and it is the most popular method of raising long-term funds; the Rights issue where instead of going public and call the general public to buy its shares a company issue a certain number of shares that are proposed to the existing shareholders as a pre-emptive right. Under this method, additional securities are offered for subscription to the existing shareholders and the Private placement is a method a company raise capital by issuing shares that are sold to a group of small investors.

[2] Seehttps://en.wikipedia.org/wiki/Capital_market

Secondary market deals with people who want to acquire share in companies by purchasing those shares from the investors who already have them in a certain companies. In this market no fresh capital is made available to the producers on account of the transactions. Secondary market is crucial in a capital market as people it offer an opportunity for the investors who bought their shares in the primary market to sell them in case they want cash or no longer need to be investors in that company. The liquidity of the secondary market has a big impact on the primary market as when companies listed on the secondary market are actively trading it is more possible for the existing companies to issue new shares because it shows how investors are thirsty to invest in them and it also make the environment favourable for new companies to raise capital as the active participants of the market will be happy to have new products at their disposal. According to Yartey and Adjansi (2007) liquid stock markets enhance investment in long term yielding profits projects and by this there is an improved capital allocation and an economic growth the country. The activities of buying and selling of securities in a secondary market are carried out through a stock exchange. Currently there is one Stock exchange in Rwanda recognized by the government which is opposite to some other countries that have more than one Stock exchange in a country.

In capital market, capital ressources are raised using capital market instruments. Capital market instruments that are mostly used are; preferential shares which are shares whose dividend are paid before the announcement of the common dividends; the preferential rights are those shares whose owner has the right to buy someone else's property in case of a certain event; Equity shares are ordinary shares that are held by individual or corporate in a certain company. The owners of these shares will incur the profit of the company as well as its loss; Non-voting Equity shares which are shares that results in additional issuance of shares by a

company which is done without changing the interest of the existing shareholders; Convertible cumulative preference shares are shares with the advantage of accumulating arrears of dividends and can also be transformed into ordinary shares; Company fixed deposits which are deposits made by individual or corporate in a certain company which will generate a safe interest rate independent of any market fluctuation; Warrants which is a financial instrument which consist in providing to the buyer the right to buy shares in that company at given price during a certain fixed period; Debentures which is document that shows that a certain company have borrowed a certain amount of money that will be repaid back following some agreed terms and conditions.

Bond is like a loan which pays interest periodically mostly every six months at a fixed interest rate and will repay the principal at a convened time called maturity. The differences between bonds depend on the nature of the issuer who can be government or a private entity such as a bank or any other organization willing to raise capital. Government bonds are considered to be 'risk-free' in the domestic market because payment of interest and principal is certain. Some types of government bonds are Treasury bills which are short-term bonds that mature within one year or less. Treasury Bonds and Treasury notes also called "long bonds offer maturities of 20 and 30 years. Treasury notes which are issued with maturities of one, three, five, seven, and 10 years. To measure the stock market performance several variables are used. Traditional characteristics of a stock market according to Dermigiic (1996) are market capitalization which represent the value of all the shares listed shares on that stock market; amount of new stock offerings which is the number of new shares issued to that stock market, number of listed companies and turnover and institutional characteristics, which include

regulation, information disclosure, transparency rules and trading costs and finally asset pricing characteristic.

## 2.2. Empirical review

### 2.2.1. Effect of capital markets on the economic growth

Stock markets are recognized by many economists because of the role they are believed to play on a country's economic performance. According to Fama (2005) the primary role of the capital market is allocation of ownership of the economy's capital stock. In his study he found that there is a positive dependence in day to day price changes and returns on common stocks. Naceur (2010) argues that mature financial systems can cause high and sustained rates of economic growth given that they act as a source of finance for business set ups. In his study that covered 52 Middle East and North African Countries (MENA) from 1989 up to 2005, he found that a well-developed stock market lead to an increased profit opportunity for banks which in turn spur up the economic growth of a country. Pardy (1992) said that the development of the stock market is accompanied by financial deepening and that countries with more developed stock markets have financial systems that issue more credit to the private sector as a share of GDP than countries with less well developed stock markets. This implies that a more developed stock market would allow firms to increase borrowing from financial intermediaries. According to him, in the long run sound and efficient stock market can contribute to economic growth while in the short run they will play a role in financial deepening and liberalization.

According to Caporale et al. (2004), well developed stock market can foster economic growth in the long run. Their empirical work tested for causality in VARs, and using a sample of seven countries. They have found that through the issuance and repurchase of government

bonds, stock market play an important role in the formulation of appropriate monetary policy. Mauro (2003) by running an autoregressive distributive lag regression, he found that there is a significant correlation between output growth and stock return. However Minier (2003) indicates that, the effect of stock market on economic growth may take some time to appear, particularly for countries with less developed stock markets. By running a regression tree technique he found that economic growth and financial development are positively correlated in countries with high market capitalization, however he found that this relationship does not hold for countries with low market capitalization.

Dailami et Al. (1990) share the same view with these authors. In their study they talk about the Korean and Indian stock market during the period between 1980 up to 1989 where the Korean market capitalization raised from 6.3% of GNP in 1980 to go up to 73.1% of GNP in 1989. The same thing happened in India though not on the same extent, where the market capitalization rose from 4.4% of GNP up to 8.5% of the GNP in the 1989. The tremendous results have been supported by important macroeconomic and policy changes, where in Korea that period was characterized by a reduced inflation, large household saving and a sharp turnaround balance of payment from deficits to surplus. However they go further and talk about the cost of adopting capital markets as an alternative to the usual banking system as a source of capital. The first cost is the possibility that managers may pursue other goals that are different from the shareholders profits aspirations. The second cost is the nature of stock markets which are sometimes volatile. The third cost relates to the role of stock market in takeover activities and its impact on competitiveness and efficiency of companies.

Talking about the role of stock market in China, Li (1994) emphasized the role of securities markets by arguing that often stock markets are a means of overcoming the negative effects

of government financial repression. He gave an example that, if a privately owned firm could not gain access to credit from the dominant state banking system, then an equity issue could represent a viable alternative funding source. This was said to support the idea of transforming state owned enterprises into shareholding companies which enable them to acquire the necessary funds to reform and modernize and reduce their dependence upon debt finance and improve corporate governance.

However though the stock markets have been praised for their proved role in accelerating the economic growth of a country, some authors argue the contrary, where they say that these can harm the economy due to the fact that some or even most of the time they tend to be volatile especially in developing countries where these stock markets are not yet stable. This is the case of Laurenceson (2000) who argue that the economic development of China would have been best served by focusing on the reform of existing credit markets. In his study he found that listing the state owned enterprise (SOE's) has been important in terms of raising funds for their reform. However, on the macro level their impact on the overall level of saving mobilization and allocation of capital has been negligible. Singh (1997) and Singh (1998); take an even more extreme position and argue that stock markets are in fact likely to harm economic development due to their susceptibility to market failure, which is often manifested in the volatile nature of stock markets especially found in many developing countries. They recommend that less developed countries should promote bank based systems, influence the scale and composition of capital inflows and prevent a market for corporate control from emerging.

### 2.2.2. Factors affecting the stock market performance

Stock markets are affected by different factors and their performance is mostly defined by them. Different authors have argued that in order for a stock market to be efficient and thus perform at its best, suitable rules and regulations have to be put in place. Also for a country to have vibrant stock market, it must have adequate institutions that oversee and regulate this sector.

According to Pardy (1992) the two prerequisite conditions to have a sound security markets are macro-economic and fiscal environment conducive to the supply of good quality securities and sufficient demand for them; and a legal, regulatory and institutional infrastructure capable of supporting efficient operation of the securities market. Roe (2006) argues that the reason why some rich nations have strong capital markets while others are weak is because they have suitable institutional law that protect outside shareholders. However he says that it is not so much the type of institutions that have counted in the World's richest nations but whether the nation has used them to support capital markets.

Supporting the same view Beck (2006) argues that financial systems require developed legal and information infrastructures to function well. In fact outside investors are reluctant to invest in companies if they will not be able to exert corporate governance and protect their investment from controlling shareholders/owners or the management of the companies. However according to Crotty (2009) more regulations not always mean better outcome. For lightly regulated financial markets allow individual and institutional investors to achieve the maximum return for a given risk level and choose the amount of risk that is optimal for them. According to Levine (2011) politically and powerful clans frequently use well -intentioned government interventions to their own benefits, thus having suitable institutional laws and

government regulations for stock market of a country is not enough, but what is needed is the implementation of the regulations.

Another key element to be considered for the development of a stock market of a country is the liberalization of stock markets. This means that no institution being public or private, should not intervene directly influence the conduct of the stock markets. This argument is supported by Kaminsky (2003) who says that, when equity markets are not liberalized then these market will not develop and this will affect economic development of a country as investors may opt to go and seek for funds from economies that have grown equity markets that are fully liberalized. The role of market liberalization is also proved by Li (2012) whose empirical work consisted in running an OLS and an IV regression using data of 95 countries from all over the World from 1975 up to 2000. He found that countries of sub Saharan Africa that have had tremendous economic development had their equity markets liberalized sometimes back and their economies have continued to develop very well. These countries include Kenya, Nigeria while those that have still unliberalized equity markets are still facing challenges of low economic development in their respective economies.

Buying a stock in a certain company means that, one has become the owner of that company which means that he would like to know if his business is profitable or not; actually that is his right to know all the relevant information about the company in which she has invested. That is why information disclosure is important for a stock market to develop, especially the financial information. Meek (1995) defines voluntary disclosures as free choices on the part of company managements to provide accounting and other information deemed relevant, to the decision making needs of users of their annual reports. He argues that most organizations gain some benefits by disclosing informations to its stakeholders.

In her study, Kendi (2014) found that there was a strong positive significant relationship between voluntary disclosure and stock returns and therefore concluded that the firms can increase stock returns by increasing voluntary disclosure, and according to her, governments should also put more regulation on disclosure to ensure that individuals investing in stock market get more information. According to Cooke (1989) disclosed financial information is essential for investors to efficiently allocate scarce resources and assess investment options. However Asava (2013) in his study on the effect of voluntary disclosure on stock returns of companies registered on the Nairobi Stock Exchange using SPSS he conducted a regression analysis on each voluntary disclosure category with stock returns and found that stock returns of companies composing NSE 20 Share index are not affected by voluntary release of information.

The importance of information disclosure is emphasized by Dermirgiic (1996) who says that, economies with strong information disclosed laws; internationally accepted accounting standards and unrestricted international capital flow tend to have more liquid markets. He says that developing markets are characterized as having a low level of liquidity, high information asymmetry and thin trading because of their weak institutional infrastructure. This is explained by the fact that, if one knows that a given company is performing well, she will invest in it and there is no other way of knowing it, if this company does not disclose information about it. Another important factor to consider is the shareholders protection. Classens (2000) argues that countries with strong shareholders protection are more likely to have well developed stock markets due to the fact that investors do not fear expropriation. Also the development of stock market in these countries is explained by the liquidity of the stock market given that ownership in such markets can be relatively dispersed. This is also

emphasized by La Porta et Al. (2000), in their book; investor protection and corporate governance, where they say that the difference between stock market developments of different countries is explained by how well investors are protected by law from expropriation by managers and controlling shareholders of firms. According to them financial markets need some protection of outside investors either by courts, government agencies or market participants themselves.

Several studies have shown that stock markets are directly influenced by macroeconomic conditions. In fact these variables are the fundamental of every economy that any change in one or all of these variables has important repercussion on stock market performance as it was probed in several countries all over the World. According to Osei (1998) the macroeconomic environment seems very important for foreign investors, that if more foreign investors are expected to play an active role in emerging stock market, then serious attempts should be made to reduce inflation and rapidly depreciating currency so that their capital base is not eroded. In Kenya the high interest rates that have been rising because of domestic borrowing, have caused many investors to liquidate their equities in preferences for high yielding government papers and South Asia interest rate and inflation have negative relationship with their stock market performance according to Aurangzeb (2012). In his study Geetha (2011) has studied the relation between inflation and stock returns in three countries which are namely the US, Malaysia and China. The results suggested a long run relationship between inflation and stock returns for the three countries.

Other authors like Ndunda (2016) analysed the effect of selected macroeconomic variables which are namely the inflation rate, money supply, exchange rate as well as the GDP. The study showed a significant relationship between the market capitalization and the inflation

rate, GDP and money supply. Garcia and Liu (1999) in their study macroeconomic determinants of stock market development by using pooled data of 15 industrial and developing countries for the period of 1980 to 1995, they have found that the real income rate, investment rate as well as financial intermediary development have a significant relationship with market capitalization while inflation rate has been found to do not have any important role in market capitalization growth. In his study Maskay (2007) by testing the two antagonist theory between the Keynesian economists and the theory of real activity economists he found that money supply increase stock prices. In their study Monetary Policy and the Stock Market Christos and Alexandros (2006) investigate the impact of monetary policy on stock returns and found that a decrease in money supply lead to a decrease of the stock market value.

Bernanke and Kuttner (2005) by using a vector auto regression they analysed the effect of change in the US federal funds rate and found that the market react fairly strongly to surprise funds rate change and that market react little or not even react to the change of the federal reserve rate if this was anticipated by market participants. According to Osei, (1998) differences in effective tax rates on income from different financial Instruments can influence how investors make their financial and investment decisions. He argues that differences also determine whether an individual should invest in securities or whether a corporate body should raise funds through equity or debt instruments. Therefore high tax rates may discourage investors from investing in financial instruments. Apart from macroeconomic environment, effective tax rate, the political environment and particularly political stability is also crucial to the development of emerging stock markets as the as it reduces the chances of unexpected wars and unrest that threaten investments and life and this guarantee safety nets for investments Mbaru (2003).

The Rwandan gross domestic product reached Frw 6,618 billion in 2016 up from 5.956 billion in 2015, and like any many years since 2011 the service sector had a large share of contribution to the economic growth as it was 47% of the total GDP. The agriculture sector contributed 31% of the GDP while the industry sector contributed 17% of the GDP. Since long time ago, a large part of the population of Rwanda is engaged in agriculture which is mostly subsistent, reason why though this sector employs a large number of people, it is contributing few to the economic growth of the country.

Before colonialism, the Rwandan economy was dominated by agriculture and cattle raising. The agriculture was subsistent and the trade of good and services were paid through a barter system. Other profession like art craft, hunting and iron work were also practiced in Rwanda. The introduction of money as a medium of exchange by Germans and Belgians changed the Rwandan economy where the value given to the cattle as sign of wealth was replaced by money. The Central Bank was founded in 1964, two years after independence where it was assigned the role to regulate and supervise the financial system, monetary system and payment system in the country. The foundation of the central bank led to a significant economic growth until the end of the 1980, where the prices of tea and coffee which were the major exports of the country declined. The consequence of this poor economic performance combined with high rates of population growth resulted in declining of the per capita GDP throughout the 1980s and 1990s.

In 1990 the liberation war started followed by 1994 Genocide against the Tutsi which destroyed the then fragile economy. The proportion of population below the poverty line rose from 53% to 70 % between 1993 and 1997 and the country was destroyed in all the political and socio economic aspect. To recover from this tragedy, the government of Rwanda

embarked on several programs among which the privatization of state owned enterprises. These programs combined with the humanitarian aid have resulted in the recovery of the economy where the GDP grew at 9% in 1995 and at 13% in 1996 which continued during the emergency transitional period that ended in 2000.

After the end of this period, the government of Rwanda embarked on a long run strategy known as the vision 2020, which aims to transform the country into a knowledge-based, middle-income country by the year 2020. Rwanda also adopted the Millennium Development Goals in 2000 and at the end of this program; the country had reached almost all the goals. To achieve the vision 2020, Rwanda conducted institutional reforms which saw the creation of the Ministry of Finance and Economic Planning (MINECOFIN) and the Rwanda Revenue Authority (RRA) in 1997. The office of the auditor general was established in 1998 to improve financial accountability. The Rwanda Development Board (RDB) was created in 2008 with the merger of several important government institutions such as the Office Rwandais du Tourisme et Parc Nationaux (ORTPN), Rwanda Investment and Export Promotion Agency (RIEPA) and so on and was given the mission to fast track the country's economic development. Also to achieve the Vision 2020, mid-term strategy named the Economic Development and Poverty Reduction Strategy (EDPRS) was developed. It was conducted into 2 phases which were divided in 5 years each. The EDPRS 1 which ended in 2012 saw the country GDP growth averaged at 8.2% annually, which translated into GDP per capita growth of 5.1% per year and significant poverty reduction achieved. The second phase of the EDPRS started in 2013 and had the target of 11.5% annual GDP growth, 28% increase of exports and less than 10% of Rwandan household to be in extreme poverty from 24%. Since 2000, Rwanda

is one of the fastest growing economies in Africa and in the world. Since 2000 up to 2016, the average annual GDP growth rate is 7.75 percent.

Monetary policy in Rwanda is formulated and implemented by the central Bank of Rwanda (BNR). Its evolution can be classified in three periods. The first period is from 1964 up to 1990 where the central Bank was using direct monetary instrument which refers to the one-to-one correspondence between the instrument and the policy objective. According to BNR, this period was characterized by direct monetary controls by BNR, regulating the demand and supply of money, controlling exchange rates and directing credit to priority sectors for the government. The main missions were to maintain monetary stability, implement credit and exchange rate policies conducive to harmonious economic development, issue national currency and play the role of the Government treasury. In 1981, the role of BNR expanded to the formulation of the monetary policy, the credit and exchange policy to support the implementation of the Government economic policy and protect the overall stability of the national currency.

The second phase started in 1990 to end in 1995. During this period the BNR started financial liberalization. It was done after realizing that the direct monetary policy was inefficient especially in terms of optimal allocation of resources. However the BNR became fully liberalized in 1995, where direct measures were progressively replaced by indirect instruments such as open market operations, the discount window and the required reserve ratio. Since 1995, BNR is using a monetary targeting regime with broad money as nominal anchor, reserve money as operating target and price stability as ultimate objective. It was after that move, that the BNR has started removing all the foreign exchange, capital movement and credit controls

and opened up economy which consequently led to the emergence of commercial banks. In 2004 the BNR reviewed its regulatory framework, where it increased the minimum capital requirement for banks from 1.5 billion frw up to 5 billion.

It is at this time that regional banks started to open their doors in Rwanda. BNR has successfully carried out its core mandate of ensuring price stability helping Rwanda to maintain the lowest levels of inflation in the region even during the most economically volatile times. The BNR uses monetary aggregates and currency reserves like repos and treasury bills to manage the money in circulation. In 2009, the bank introduced the Key Repo Rate and also introduced interest rates as a monetary policy tool. Today, every quarter, the monetary policy committee of BNR announces whether they have increased or reduced the key repo rate and this has an impact on the behavior of the markets which impacts on the control of inflation.

In 2016, BNR maintained a prudent monetary policy in a context of high pressures on the FRW exchange rate which was due to the global economic crisis as well as high demand of the dollar which was accelerated by the increase of imports and the fact that agriculture had poor performed during the same period. The rise in food prices and transport costs led to an increase in inflation from 4.5 percent in January 2016 to 7.3 percent in December 2016. The rising food prices stemmed from reduced food supply, following the poor performance in agricultural production. Broad money (M3) grew by 7.5 percent in 2016 to FRW 1592.7 billion lower than 21.1 percent recorded in December 2015. The deceleration in money supply growth in 2016 is due to a reduction in the growth of net domestic assets to 1.7 percent compared with 57.3 percent in 2015, despite an expansion of 15.0 percent in foreign assets in 2016 after a contraction of 6.9 percent realized in 2015.

The key repo rate was maintained at 6.5 percent to ensure that the banking sector continues to finance economic activities while limiting inflationary pressures from the monetary sector. In line with economic activities, total new authorized loans to the private sector increased by 6.3 percent in 2016 compared to 13.7 percent in 2015; total outstanding credit to the private sector expanded by 7.8 percent in 2016, while broad money increased by 7.5 percent Headline inflation increased from 4.5 percent in January 2016 to 7.3 percent in December 2016. It went up from an average of 2.5 percent in 2015 to 5.7 percent in 2016, mainly driven by rising food prices and transport costs.

Rwanda's capital market was established in 2011, to guide in the development of capital markets. Before its establishment, the Rwanda Capital Market Advisory Council was created in 2007 to develop the Capital Market in Rwanda, facilitate the trading of debt and equity securities and enable securities transactions, but also to regulate the Rwanda Securities Exchange[3].

The CMA conducts its business under 7 laws which are the investment code law, the law providing for incentives under capital market, law governing the holding and circulation of securities, the law governing the establishments and creation of trusts and trustees, the law establishing the capital market, the law regulating the collective investment scheme and the law regulating the capital market business in Rwanda. As stipulated in the special official gazette published on 28th May 2010, the capital market in Rwanda offer tax incentives which include income tax exemption; capital gain tax where secondary market transaction on listed

[3]See https:// minecofin.gov.rw/capital markets

Securities is exempted from capital gains tax; corporate income tax which stipulate that newly listed companies on capital market are taxed for a period of 5 years at 20% if those companies sell at least 40% of their shares to the public; 25% if those companies sell at least 30% of their shares to the public; 28% if those companies sell at least 20% of their shares to the public. For Rwandan and East African community region residents, withholding tax on dividends and interest income on securities listed on capital markets and interest arising from investments in listed bonds are reduced to 5%.

The first ever IPO in Rwanda happened in 2011, when the government of Rwanda decided to sell its 30% stake in Brasserie et Limonaderie du Rwanda (BRALIRWA), among which 25% were sold to the public and 5% sold to Heineken International. The IPO was oversubscribed at the level of 274% in all investor pools. In the same year, the government has decided to sell its 20% stake in Bank of Kigali (BK) to the public and the bank simultaneously raised new capital which was equivalent to 25% of company's capital. In 2013 the Government issued a sovereign bond worth USD 400 million. A strong vote of confidence for Rwanda's economy and the country has led to the massive oversubscription of the sovereign bond at 650%. The bond has a maturity of ten years at a fixed interest rate of 6.875 percent. In the same year CMA assisted in the establishment of the Rwanda National Investment Trust (RNIT).

The government being the big player in the capital market development has published its bond issuance program in February 2014, where it will be coming to the market every quarter. It is in that spirit that a 3year Treasury bond worth Frw 12.5 billion was issued in February 2014. And again this bond was oversubscribed for at a level of 240% signaling investor confidence in the outlook for Rwanda's currency and economy. To price the bond, book building method was used and the bond was priced at a fixed 11.475% coupon rate with an average yield of

11.625%. In May 2014, the International Finance Corporation (IFC) issued a 5 year Bond worth Frw 15 billion. This bond nicknamed "Umuganda," was the first placement by a nonresident issuer in Rwanda's domestic capital market. The bond was the second corporate bond on the market after the one issued in 2008 BCR currently known as I&M Bank. It was issued following the IFC program which was established to support capital market development in the region. Orders were received from different public and private institutions including pension funds, insurance companies, Banks and other financial institutions and it has been oversubscribed 2.19 times. The bond was priced with a yield of 12.25% percent per annum. In November 2014, after undergoing an internal International Organization of Securities Commission's review (IOSCO), CMA became an associate member of IOSCO.

The third IPO was done by Crystal Telecom Limited (CTL) holding company established by Crystal Ventures Limited (CVL) on 21st May 2015, where 270,177,320 shares were issued to the public. The shares had a face value of FRW 50 share and were offered at FRW 105 per share. The offer was oversubscribed at 124%. In the same year the Government of Rwanda issued four bonds totaling FRW 55 billion with different maturities ranging between 3 and 10 years under the Treasury Bond Issuance Program. In 2016 the primary equity market did not record any new Initial Public Offers, however The Government of Rwanda through the quarterly bond issuance programme issued four bonds with a total face value of Frw 55 billion. The maturities of the bonds are 3, 5 and 15 years the latter being the longest in the market so far. Currently, twelve bonds are listed on the RSE among which 10 were issued by the government of Rwanda and two remaining being corporate.

In February 2017, Through the Ministry of Finance and Economic Planning the government of Rwanda sold its 19.81 percent shares that it owned in I&M Bank Rwanda Ltd, to the public

through an Initial Public Offer. This was done in line with the government program of disinvesting from public enterprises. During this IPO, 99,030,400 I& M Bank Rwanda Ltd shares representing 19.81 percent were of the.[4]

Before the Rwanda Stock Exchange starts its operations in 2011, transactions occurred on Rwanda Over-the-Counter (OTC) Market which was established by the Capital Market Advisory Council in January 2008. The OTC market which was by then dormant has been activated with the cross listing of the Kenya Commercial Bank (KCB) on 18th June 2009, and two Government Bonds. A total of 91,600 shares were traded at the opening price of Frws 160 per share, lowest price of frws140 and highest price of Frws 182 per share. The traded shares yielded a turnover of Frws. 15,129,100 in 66 transactions. The first bond (FXD1/2010/2yrs) worth Frws 2.5 Billion at a fixed rate of 9.5% was issued on 14/01/2010 and will mature in 2012. The second one (FXD2/2010/3yrs) worth Rwf2.5 billion was issued on 25/04/2010 and matured in 2013 at a fixed rate of 9.75%. There was one Government and one corporate outstanding bond. The Government bond (FXD3/2008/3yr) worth Rwf5 billion matured in 2011 and Banque Commerciale du Rwanda (BCR) corporate bond worth Rwf1billion matures in 2017.

The RSE was officially launched on 31st January 2011. Since the launch, trading operations are undertaken on the RSE, which was demutualized from the start as it was registered as a company limited by shares. The RSE is 60% owned by brokers, 20% by the Government of Rwanda and 20% by other institutional shareholders. It conducts trading through a dual process; an open outcry trading session is conducted at the trading floor during formal trading hours (9:00 a.m. – 12:00 p.m.) and an Over the Counter market where a member is allowed

[4]See https://www.cma.rw

to buy or sell directly to clients in their offices. Also the RSE rule permits brokers or traders to transact either face to face or through the telephone after the formal trading hours of the normal working days, after which all OTC transactions have to be reported to RSE not later than 1 hour after the transaction. The OTC transactions are reported in the next formal trading session for settlement.

From July 2012 up to June 2013, RSE recorded a total turnover of Frw 39.2 billion from 124.2 million shares traded in 1,873 deals compared to Frw 20.2 billion from 122.1 million shares traded in 1,983 deals registered in 2011/2012.That represent an increase of 94% in money terms and an increase of about 2 percent in the number of shares traded. The market was driven by the activities on the counters of domestic companies which amount to 99.9 percent in the total turnover. At the end of June 2012, the RSE market capitalization was Frw1,261 billion compared to Frw 846.8 billion as of 30th June 2011, translating into an increase of 49 percent. The increase of the market capitalization resulted from the increase in the prices of three stocks namely BRALIRWA, BK and KCB.

In the financial year ended June 2014, the secondary market for equities recorded an increase of 9% in the value of shares traded reaching Frw 42.6 billion up from Frw 39.2 billion recorded in the year 2012/2013. The number of shares traded in 2013/2013 dropped by 32% compared to the previous year as 84.9 million shares were traded as opposed to 124.2 million shares traded in the previous financial year. 1,652 transactions were registered in 2013/2014 while the year before recorded 1,873 deals. By 30th June 2014, the RSE market capitalization stood at Frw 1,399 billion compared to a market capitalization of Frw 1,261 billion as of 30th June 2013. The increase of Frw 138 billion in market capitalization resulted from the cross listing of Uchumi shares on RSE and changes in shares prices of listed securities.

In the twelve months period ending June 2015, the secondary market for equities recorded an increase in the value of shares traded by 35% reaching FRW 57.5 billion up from FRW 42.6 billion recorded in the year 2013/2014. The number of shares traded in 2014/2015 more than doubled to 187.4 million shares up from 84.9 million shares traded in the previous financial year. By 30th June 2015, the Rwanda Stock Exchange market capitalization rise from FRW 1,399billion in June 2014 up to FRW 2,893 billion which represent the double of the previous year and this was explained by the cross listing of Equity Bank shares on Rwanda Stock. Secondary Bond Market in 2014/2015, bonds worth FRW 1.7 billion were transacted on the secondary market compared to a turnover of FRW 57 million registered in the previous year.

In the twelve months period ending June 2016, the secondary market for equities recorded a decrease of 41% in the value of shares traded to Frw 16.43 billion down from Frw 57.49 billion recorded in the year 2014/2015. The numbers of shares traded in 2015/2016 were 88.2 million down from 187.4 million shares traded in the previous financial year. By 30th June 2016, the Rwanda Stock Exchange market capitalization reduced from Frw 2,893 Billion in the same period of the previous year to reach Frw 2,808 billion.

Secondary market forms an integral part of the capital market in Rwanda. Rwanda has one Stock Exchange recognized by the government which is opposite to some other countries that have more than one Stock exchange in a country. The Exchange operates through a number of electronically linked counters at different locations giving rise to a national trading system. It aims at helping small and start-up companies to overcome the problems of raising capital through a public issue at exorbitant cost. It also helps investors to overcome the problems of illiquidity, inaccessibility, delayed settlement and transfers that are abound with the traditional stock exchanges. Equity shares also known as ‘ordinary shares’ are the most traded instrument

at the RSE. The BNR like other central banks worldwide exercises supervision and oversight of payment and settlement systems. Holding and transfer services were outsourced to CDSC (Central Depository and Settlement Corporation) Kenya until the Rwanda Central Securities Depository (CSD) was established in 2011.

# CHAPTER THREE: RESEARCH METHODOLOGY

### 3.1. Research design and data source

This section presents the data used and the reason they were selected for this study. Quarterly time series data starting from the Q1:2011 up to Q3:2016 were used; which lead us to 23 observations. The data on market capitalization ratio were obtained from the RSE secretariat. The data of key repo, exchange rate, money supply and inflation were obtained from the BNR website and all others were obtained from the website of the National institute of statistics of Rwanda (NISR).

## 3.2. Research variables

In this study we will analyse two models. In the first model we will analyze the effect of macroeconomic variables on the capital market, while in the second model we will analyze the effect of the capital market on the economic growth.

For the analysis of the effect of macroeconomics variables on the capital market performance, we use the following:

**The Market capitalization ratio (MCR)** which measures the stock market size and it will serve as the dependent variable. It is calculated as the ratio of the market capitalization (which measure the value of a stock market) of the stock market to Gross domestic product (GDP) of the country. Its selection is motivated by data availability.

The macroeconomic variables include:

**The Key repo (KR)** which is the rate at which the commercial banks borrow from the central Bank. This is the main monetary instrument that is used by the central bank of Rwanda in conducting the monetary policy. The expected sign for this variable is positive, given that an increase in the key repo rate will lead the commercial banks to increase their lending rate to the private sector which will prefer to raise capital through capital market rather than using the banking system which is expensive at that period.

**The Money supply (MS)** which is the amount of money in circulation in the economy at any point of time. To measure the money supply monetary base (M1) is used in our study. The expected sign for the money supply is positive. This is explained by the fact that expansionary monetary policy are likely to stimulate the economy, which makes it more possible for firms to get credit for the production expansion. This will lead to an increase in sale and thus increased earnings for those firms. An increase in earnings for the firm means that they will give a bigger dividend which in turn will have a positive impact on the capital market, as more people will be willing to invest in firms given that they will be attractive due to their high profits.

**The inflation (INFL)** which is a sustained increase in the general price level of goods and services in an economy, over a period of time resulting in a loss of value of currency according to Mishikin (2007). The expected sign for the inflation is negative as high rates of inflation increase the cost of living and a shift of resources from investments to consumption. This leads to a fall in the demand for market instruments and subsequently leads to a reduction in the volume of stock traded which in turn will affect negatively the stock market performance.

**Consumption (CSPN)** The expected sign for this variable is positive as an increase in consumption raises the production capacity utilization, with positive effects on profits and this

will have a positive effect on the stock price which in turn will increase the market capitalization of the stock market.

For the analysis of the effect of the capital market on the overall economy we will use the following:

**The Gross Domestic Production (GDP)** as the measure of the economic growth.

**The Market capitalization (MC)** which measures the stock market size. The expected sign for this variable is positive, because a good performance of as stock market means that, firms are able to raise money from the public which will help them to expand their business and this will have a positive impact on the economic growth of the country.

**Consumption (CSPN)** which represents the overall consumption of the population. The expected sign for this variable is positive. The contribution of the consumption to the economic growth is positive because as people consume, the firms' revenue increase and this will translate into the overall economic growth of a country.

**The Capital formation (CF)** which is an increase of the combination of capital stock with labor to provide services and produce goods. The expected sign for this variable is positive. Because the increase in capital formation always lead to an increase in produced goods, which means more profits made by companies that will lead to the rise of economic growth.

Table 3 1. Correlations matrix of variables, N= 23.

| | MC | KR | MS | INFL | CSPN | GDP | CF | CSPN |
|---|---|---|---|---|---|---|---|---|
| MCR | 1 | | | | | | | |
| KR | -0.1461 | 1 | | | | | | |
| MS | 0.8351 | -0.1425 | 1 | | | | | |
| INFL | -0.4105 | 0.1847 | -0.5508 | 1 | | | | |
| CSPN | 0.4278 | 0.2360 | 0.6552 | -0.5624 | 1 | | | |
| GDP | | | | | | 1 | | |
| CF | | | | | | 0.9523 | 1 | |
| CSPN | | | | | | 0.8672 | 0.8313 | 1 |

Source: Researcher

The table 1 shows the correlation coefficients of all the variables. We have produced the correlation matrix in order to assess the relationship between the variables. The coefficients show that the market capitalization is highly correlated with the money supply where the correlation coefficient between the two variables is 0.83. The inflation and consumption have a relatively small correlation with the market capitalization ratio where their correlation coefficients -0.41 and 0.42 respectively. There is small or almost no correlation between the key repo rate and the market capitalization ratio where the correlation coefficient is only of -0.14. The coefficient of correlation between the money supply and inflation is of 0.55 while the coefficient of correlation between the money supply and the consumption is of 0.56. The coefficient of correlation between the key repo and money supply is 0.14. The correlation coefficient between key repo and inflation is 0.18, the correlation coefficient between key repo and consumption is 0.23. The correlation between inflation and consumption is 0.56.

For the second model, the coefficients show that all the independent variables are highly correlated with the GDP. The market capitalization is highly correlated with the GDP as the coefficient of correlation between the two variables is of 0.86. The capital formation is also highly correlated with correlated at the GDP as the coefficient of correlation is of 0.95 and the same case is applied between GDP and consumption where the coefficient of correlation is of 0.85.

### 3.3 Data processing and analysis

In this study we investigate the relationship between stock market performances represented by the RSE market capitalization ratio with macroeconomic variables namely money supply, repo rate, inflation rate and consumption as conditional variables.

The real activity theorists' argument that an increase in money supply increases stock prices and vice versa and the Keynesian economists argue that there is a negative relationship between stock prices and money supply (Sellin, 2001). Mishikin (2007) defines interest rate as the cost of borrowing or the price paid for the rental of funds. Any change in this variable result in the fluctuation of stock price, because it affects the profitability of businesses. Mishikin (2007), also define inflation as a continual increase in price level. High rates of inflation increase the cost of living and a shift of resources from investments to consumption. This leads to a fall in the demand for market instruments and subsequently leads to a reduction in the volume of stock traded. An increase in consumption raises the production capacity utilization, with positive effects on profits and this will have a positive effect on the stock price of a given company. Based on the above information we will regress the following model to estimate the effect of macroeconomic variables on the market capitalization ratio

(1) $MCR = \beta 0 + \beta 1KR + \beta 2INFL + \beta 3MS + \beta 4CSPN + \varepsilon$

In this study we will also investigate the relationship between economic growth of Rwanda and the stock market performance. We will use the market capitalization of the RSE, consumption and capital formation as independent variables. According to Seetanah (2012), a well- developed stock market contributes to a country's economic growth by increasing the saving rate and investment. Consumption being a component of GDP has an immediate effect on it, as other things remaining constant a raise in consumption will raise the GDP by the same amount. An increase in capital formation of a nation lead to a nation's economic growth as this is caused by the growth of capacity of production and thus an increase of goods and service produced and at the same time an increase in national income level. Our model will be

(2) $GDP = \beta 0 + \beta 1MC + \beta 2CF + \beta 3CSPN + \varepsilon$

In order to get suitable model the data were transformed from linear into nonlinear data which give us the following model

(3) $\ln GDP = \beta 0 + \beta 1\ln(MC) + \beta 2\ln(CF) + \beta 3\ln(CSPN) + \varepsilon$

In order to fix the endogeneity problem between the GDP and the market capitalization we have done the 2SLS where an instrument variable (IV) has been selected. For this purpose we have selected the number of listed company at the RSE. This has led us to a new model as it follows

(4) $\ln MC = \beta 0 + \beta 1\ln(CF) + \beta 2\ln(CSPN) + \beta 3\ln(LC) + \varepsilon$

After estimation of this new model the results will be used to calculate the estimated market capitalization which will be used in the initial model (3), with the EMC being the estimated market capitalization. The model to be estimated is

(5) $\ln GDP = \beta 0 + \beta 1 \ln(EMC) + \beta 2 \ln(CF) + \beta 3 \ln(CSPN) + \varepsilon$

Table 3 2. Comparison of the models

| Model | R2 | SSR | F stat |
|---|---|---|---|
| $MCR = \beta 0 + \beta 1 KR + \varepsilon$ | 0.044 | 4.55 | 0.97 |
| $MCR = \beta 0 + \beta 1 MS + \varepsilon$ | 0.57 | 2 | 28 |
| $MCR = \beta 0 + \beta 1 INFL + \varepsilon$ | 0.074 | 4.40 | 1.69 |
| $MCR = \beta 0 + \beta 1 KR + \beta 2 INFL + \varepsilon$ | 0.10 | 4.25 | 1.18 |
| $MCR = \beta 0 + \beta 1 MS + \beta 2 INFL + \varepsilon$ | 0.58 | 1.96 | 14 |
| $MCR = \beta 0 + \beta 1 KR + \beta 3 MS + \varepsilon$ | 0.58 | 1.96 | 13 |
| $MCR = \beta 0 + \beta 1 KR + \beta 2 INFL + \beta 3 MS + \beta 4 CSPN + \varepsilon$ | 0.61 | 1.81 | 7 |
| $\ln GDP = \beta 0 + \beta 1 \ln(EMC) + \varepsilon$ | 0.90 | 0.069 | 189 |
| $\ln GDP = \beta 0 + \beta 1 \ln(EMC) + \beta 2 \ln(CF) + \varepsilon$ | 0.95 | 0.03 | 204 |
| $\ln GDP = \beta 0 + \beta 1 \ln(EMC) + \beta 2 \ln(CF) + \beta 3 \ln(CSPN) + \varepsilon$ | 0.95 | 0.032 | 129 |

Source: Researcher

Based on the above results in the table, the model that contains all the four macroeconomic variables is preferred to analyze the effect of macroeconomic variables on the market capitalization. It is selected because it has the highest coefficient of determination ($R^2$) which is equal at 0.61, low sum of square residuals of 1.81 compared to other models. For the

analysis of the effect of market capitalization on the economic growth we select the last model for the same reason of high $R^2$ of 0.95 and low sum of square residuals.

# CHAPTER FOUR: DATA ANALYSIS AND INTERPRETATION OF THE RESULTS

In this study two models are to be estimated. In the first model we analyse the effect of macroeconomic variables on the market capitalization. In the second model we analyse the relationship between economic growth of Rwanda and the stock market performance.

## 4.1. Empirical results

The data were regressed using the Eviews 8 by running the GLM estimation. We have used this method in order to overcome the problem of multicollinearity. But before that we have tested the Heteroscedasticity using the Breusch-Pagan-Godfrey, autocorrelation and normality in order to make sure that the estimates are BLUE. While testing for the Heteroscedasticity, we used the F test rule which states that when the numerical value of the computed f-statistics exceeds absolute 3, then the test is statistically significant and when the value of f-statistics is less 3, then the test is statistically insignificant in other words it means that at 5% level of significance we will reject the null hypothesis which state that there is no Heteroscedasticity when f statistics exceeds absolute 3 and we will fail to reject the null hypothesis when f statistics is less than 3. In our case as the f statistic is 1.222474 which is less than 3, this implies that we fail to reject the null hypothesis and thus conclude that there is no Heteroscedasticity. Also using the P values, we find that at 5% level of significance we fail to reject the null hypothesis as the P value is 0.3454 which is higher than 0.05 and thus conclude that there is no Heteroscedasticity.

The f test for autocorrelation has shown that the f statistic of 0.762238 is less than 3 which lead us to conclude that at 5 % level of significance we fail to reject the null hypothesis and

hence conclude that there is no autocorrelation. Also the P-value of 0.6947 is greater than 0.05 which lead us to conclude that there is no autocorrelation. In order to get the R2 which is the goodness of fit, which is a statistical measure of how close the data are to the fitted regression line. Given that we used the GLM (Generalized Linear Model) to estimate our model we had to calculate it using the results of the estimation which led us to the value of 0.95, which means that our data close to the fitted regression line. Also based the LR statistic was less than 0.05 which lead us to believe that the model is significant.

In the second model the results in the correlation matrix have shown that there is a high multicollinearity as the coefficient of correlation is higher than 0.70. Here again we have estimated this model using the GLM. In order to solve the problem of endogeneity before applying the GLM we have applied the 2SLS (Two Stage Least Square) where the number of listed companies on the RSE has been selected as the IV (instrument variable). The results for the two models estimations are presented in table 5 below.

Table 3 3. Parameter estimates with standard errors, N=23

| | | Model 1 | | Model 2 | |
|---|---|---|---|---|---|
| Variable | Variable definition | coefficient | std error | coefficient | std error |
| C | constant | -0.1550[a] | 1.1285 | 3.3767 | 0.2841 |
| KR | key repo | 0.0892[a] | 0.1695 | | |
| INFL | inflation | -0.0361[a] | 0.0361 | | |
| MS | Money supply | 0.0029[a] | 0.0007 | | |
| CSPN | consumption | -0.0006[a] | 0.0005 | 0.0048[a] | 0.04072 |
| CF | capital formation | | | 0.4086[a] | 0.1177 |
| MC | Market capitalization | | | 0.1876[a] | 0.0447 |
| R2 adjusted | | 0.95 | | 0.96 | |

Source: Researcher.

Note: Significant at 5% level of significance

### 4.2 Interpretation of the results

The column three of table 5 shows the estimation results of the first model, in which we have regressed the market capitalization on the macroeconomic variables which are namely the money supply, inflation, key repo rate and the consumption as the conditional variable. The P-value test has shown that within the four variables only the money supply was statistically significant. The results showed that the increase in money supply by one franc will increase the market capitalization rate by 0.0029. This comes to approve the theory of real activity economists who believe that increase in money supply means that money demand is increasing in anticipation in economic activity which imply higher expected profitability which causes stock prices to rise and thus in an increase in market capitalization ratio of a stock market. It is also in accordance with Ndunda (2016) who has analyzed the effect of selected macroeconomic variables which are namely the inflation rate, money supply, exchange rate as well as the GDP. The study showed a significant relationship between the market capitalization and the inflation rate, GDP and money supply. The only difference between them is that in our study we did not find significance of other variables.

As for the other variables, they were all not statistically significant. Though not statistically significant the key repo is positively related to the market capitalization ratio where an increase in key repo by one unit will lead to an increase by 0.089 the market capitalization. This is in accordance with Bernanke and Kuttner (2005) who analyzed the effect of the Unanticipated changes in the federal funds rate on equity and they found that stock markets react mostly to unannounced changes in the federal funds rate.

The inflation rate has a negative relationship with the market capitalization ratio where an increase of the inflation by one unit will decrease the market capitalization rate by 0.036. This is in accordance with the study of Geetha (2016) whose study revealed that there is long run relationship between inflation rate and stock prices, it also in accordance with Ndunda (2016) though there is no significance, but for all the authors, the increase of inflation has led to a decline in stock market prices. Finally the consumption increase by one unit will decrease the market capitalization by 0.0006. This is in accordance with our theory which states that, an increase in consumption raises the production capacity utilization, with positive effects on profits and this will have a positive effect on the stock price of a given company. Based on the above information we will regress the following model to estimate the effect of macroeconomic variables on the market capitalization ratio.

The fourth column of table 5 shows the estimation of the second model, in which we have regressed the GDP growth ratio on the market capitalization, capital formation and consumption. The P-value test has shown that the capital formation has a positive and significant relationship with the GDP, where an increase of capital formation by one unit will lead to an increase in GDP by 0.40 and an increase in market capitalization by one unit will lead to an increase in GDP by 0.18. The significance of the capital formation is supported by Dania and Shuaib (2015) whose study found that there is a significant relationship between capital formation and economic development in Nigeria. The significance of the capital formation is also supported by the study of Bakare (2011); Ainabor, et al (2014) who showed that capital formation has a direct relationship with economic growth. The results corroborated with the Harrod-Domar model which proved that the growth rate of national income will

directly be related to saving ratio and/or capital formation which means that the more an economy is able to save and invest out, the greater will be the growth of that economy. The results have also shown that the market capitalization has a positive relationship with the economic growth where, an increase of market capitalization by one unit will increase the GDP by 0.18. This is in accordance with what was said by Narceur (2010); Pardy (1992); Levine (1998) who says that economic development of a country depends on the robustness of its stock markets as they act as a source of finance for business set ups and by the fact that apart from providing a means of diversifying risk for both capital raisers and investors, they can also play a role in capital allocation and corporate monitoring. They can also be a means for government to exercise market based rather than direct fiscal and monetary policies. Also capital markets are expected to accelerate economic growth by providing a boost to domestic savings and increasing the quantity and the quality of investment, provide individuals with additional financial instrument that may better meet their risk preferences and liquidity need. The relationship between consumption and economic growth was found to be positive though not statistically significant. An increase in consumption by one unit will lead to an increase by 0.0048 of the economic growth.

# CHAPTER FIVE: MAJOR FINDINGS, CONCLUSION AND RECOMMENDATIONS

## 5.1. Major findings

The main objective of this study was to analyse the effect of the macroeconomic variables on the development of the Rwanda Stock Exchange, with the specific of objectives to analyse the evolution of the performance of the RSE and to analyse the contribution of the RSE development on the general economic growth of Rwanda. For this purpose we have developed 2 models that were analysed by Eviews by doing the GLM estimation.

In our first model the results have shown that among the four macroeconomic variables which were regressed on the market capitalization ratio only the money supply has a statistically significant relationship with the market capitalization where we found that an increase in money supply by one Rwf will lead to an increase of market capitalization ratio by 0.003. The other variables which are the key repo rate, the inflation rate and the consumption have shown no statistical relationship with the stock market performance. In the second model the market capitalization has shown a positive statistically significance relationship with the economic growth where an increase in the market capitalization by one unit will increase the economic growth by 0.18.

The capital formation has also shown a positive statistically significant relationship with the economic growth where an increase of capital formation by one unit will lead to an increase in GDP by 0.40. Based on these results we have tested the hypothesis a at 5% level of significance we have rejected the null hypothesis that states that money supply has no

statistically significant relationship with RSE performance and concluded that the money supply influence the RSE performance. At 5% level of significance we failed to reject the null hypothesis that states that inflation rate, key repo rate and consumption has no statistically significant relationship with RSE performance and concludes that the three variables do not have any significant influence on the RSE performance. At 5% level of significance we rejected the null hypothesis that states that the Rwanda stock exchange does not contribute to the economic development of Rwanda and conclude that the RSE performance has an impact on the economic growth of Rwanda.

### 5.2. Summary and conclusion

The main objective of this study was to analyze the effect of the macroeconomic variables on the development of the Rwanda Stock Exchange, with the specific of objectives to analyze the evolution of the performance of the RSE and to analyze the contribution of the RSE development on the general economic growth of Rwanda. We also had the objective to formulate suitable policy recommendations that will contribute to the development of the RSE. In order to achieve those objectives, quarterly time series data from January 2011 up to the third quarter of December 2016 have been collected and analyzed using Eviews by doing GLM estimation for the first model, where we studied the effect of macroeconomic variables on the market capitalization using consumption as the conditioning variable. For the second model where we have studied the effect of market capitalization on the GDP using capital formation and consumption as the conditioning variable. In order to solve the problem of endogeneity we have used the 2SLS where the number of listed companies has been used as IV (Instrument Variable).

In this study we had 2 hypotheses that were tested against the obtained results and we have been able to answer the research questions. In our first model the results have shown that among the four macroeconomic variables which were regressed on the market capitalization ratio only the money supply has a statistically significant relationship with the market capitalization where we found that an increase in money supply by one Rwf will lead to an increase of market capitalization ratio by 0.003. The other variables which are the key repo rate, the inflation rate and the consumption have shown no statistical relationship with the stock market performance. In the second model the market capitalization has shown a positive statistically significance relationship with the economic growth where an increase in the market capitalization by one unit will increase the economic growth by 0.18.

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RSE performance contribute to the economic growth of the country? If yes what is its contribution to the economic growth? To the first question the answer is that among the four selected macroeconomic variables, the money supply is the only one affecting the RSE performance. To the second question, the answer is yes, the RSE performance contributes to the economic growth of the country and an increase of market capitalization by one unit increase the GDP by 0.18.

Given the significance of the performance of the RSE to the economic growth and given that Rwanda has already well-established institutional and legal framework and that the country is experiencing a long period of peace and political stability we suggest that more effort be made to strengthen the RSE by increasing the awareness and education about this sector among Rwandans. The regional integration with other stock market will also be useful as it will open the RSE to many new participants and this will boost its performance and have a positive impact to the economic growth. The fact that the money supply has an impact on the RSE performance, the central Bank should use this instrument as a way to influence this sector which may play an alternative role of source of capital for investment as well as a way of saving, given that the banking sector is practically an expensive source of capital. Also the government should continue to contribute to the development of capital market by continuing to issue shares from private companies in which it is a shareholder in order to increase the number of products available to the stock market as this has a positive impact on the performance of stock market.

## 5.3. Recommendations and suggestions for future data and research

The main goal of vision 2020 is to transform Rwanda into middle income country with a knowledge based economy and in order to achieve that the country has set the target of 11.5% gdp annual growth rate and the private sector is expected to be the backbone of the economy. In order to spur the economy, the Central Bank has been using the accommodative monetary policy, where it has kept the key repo rate which is the rate at which the Central Bank lends to commercial Banks at 6.5%. By doing so, the Central Bank was intending to support the private sector where it was hoped that the commercial Banks will decrease their lending rate and thus help the private sector to acquire the loans from banks at a low cost. However the commercial Banks did not react as it was expected given that, the lending interest rate is between 16% and 18% which is still high compared to other countries in the region.

This shows that the Banking sector of Rwanda is not highly influenced by the monetary instruments of the Central Bank and this is hurting the private sector as their access to capital for investment in the commercial banks which are the main source of capital in Rwanda is very expensive and this hurt the Rwandan economic growth at the same time. Considering that the global economy is facing financial crisis and that it not easy to get debt especially for a developing country like Rwanda which is undertaking risky and long gestation projects, and having realized that the stock market is responsive to the change in money supply which can be influenced by the Central Bank, i recommend that the central Bank start to consider how to apply a monetary policy that will target the capital market as an alternative way to use if the country is to achieve its vision. But before that based on the theory of market efficiency which states that an efficient market is the one whose prices incorporate and reflect all relevant

information, I would suggest that a study to investigate whether the RSE is efficient be done in order to illuminate the policy makers so that they can start to formulate policy that will promote the use of stock market as a source of capital for investors. This is also supported by our second model where the market capitalization has shown a positive significance relationship with the GDP which means that developing the stock market will spur the economic growth of the country.

Based on the Harrod-Domar model which proved that the growth rate of national income will directly be related to saving ratio and/or capital formation which means that the more an economy is able to save and invest out, the greater will be the growth of that economy and the fact that the capital formation has a positive significant relationship with GDP shows that an increase in savings is important for economic growth and the stock market development has proved to be one way of saving for a country. I would recommend that initiative like ITERAMBERE funds which encourage the population to save be given more priority as this will contribute a lot to achieve the country's saving target that will help it to achieve the Vision 2020. All the actions undertaken will not mean anything if the Rwanda stock market is not active and attractive enough for the investors to be willing to join it. It is from this backdrop that I recommend that much effort be put in educating the public about stock market especially among Rwandans. This will increase the number of new investors and increase the activities on the stock which will make it more attractive for regional and international investors. Also the RSE and CMA officials should start if not yet to educate corporate organizations about raising capital using the stock markets. This again will increase the number of the products available on the stock market which will make it again more attractive to new investors and all of this will lead to a higher stock market performance and economic growth of the country

at the same time. It will also facilitate these companies to get capital at lower price, which will lead to increased investment and economic growth of Rwanda. The government should continue to contribute to the development of capital market by continuing to issue shares from private companies in which it is a shareholder in order to increase the number of products available to the stock market as this has a positive impact on the performance of stock market. The quarterly issue of bonds should also be maintained as way to develop the stock market and at the same time contribute to the economic growth. For further research I would recommend that primary data from market players be collected in order to analyse qualitative data in order to see if really those so well established institutional and legal framework are contributing to the effective development of the RSE. Based on the theory of market efficiency which states that an efficient market whose prices incorporate and reflect all relevant information, I would suggest that a study to investigate whether the RSE is efficient be done in order to illuminate the policy makers so that they can start to formulate policy that will promote the use of stock market as a source of capital for investors. I would also suggest that a study be done on the impact of regional integration of Rwanda on the RSE performance.

## 5.4. Limitations

During this study I have encountered the problem of little information given that the stock market in Rwanda is still a new sector. Also time and financial means have been a constraint and I did not manage to go to the field to collect data from direct stakeholders of the sectors.

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# APPENDIX

Data used to estimate the effect of macroeconomic variables on market capitalization ratio

| Period | MCR | KR | CSPN | inflation | MS |
|---|---|---|---|---|---|
| Q1:2011 | 0.23 | 6 | 905 | 4.1 | 345 |
| Q2:2011 | 1.04 | 6 | 233 | 5.8 | 361.6 |
| Q3:2011 | 1.02 | 6 | 868 | 6.6 | 357.6 |
| Q4:2011 | 0.94 | 7 | 946 | 8.3 | 373.7 |
| Q1:2012 | 0.8 | 7 | 950 | 8.2 | 426.1 |
| Q2:2012 | 0.83 | 7.5 | 932 | 5.9 | 424.4 |
| Q3:2012 | 0.89 | 7.5 | 1010 | 5.6 | 407.5 |
| Q4:2012 | 0.92 | 7.5 | 1106 | 3.9 | 422.6 |
| Q1:2013 | 1.03 | 7.5 | 1054 | 3.2 | 451.3 |
| Q2:2013 | 1.11 | 7 | 1007 | 3.7 | 500.4 |
| Q3:2013 | 1.06 | 7 | 1051 | 5.1 | 476.8 |
| Q4:2013 | 1.11 | 7 | 1108 | 3.6 | 486 |
| Q1:2014 | 1.15 | 7 | 1215 | 3.4 | 495.4 |
| Q2:2014 | 1.13 | 6.5 | 1164 | 1.4 | 564.5 |
| Q3:2014 | 1.08 | 6.5 | 1193 | 0.2 | 548.3 |
| Q4:2014 | 0.96 | 6.5 | 1276 | 2.1 | 569.6 |
| Q1:2015 | 2.12 | 6.5 | 1238 | 0.8 | 598.1 |
| Q2:2015 | 2.05 | 6.5 | 1240 | 2.8 | 751.1 |
| Q3:2015 | 1.92 | 6.5 | 1288 | 3.7 | 700.9 |
| Q4:2015 | 1.04 | 6.5 | 1395 | 4.5 | 757.2 |
| Q1:2016 | 1.82 | 6.5 | 1381 | 4.6 | 760.7 |
| Q2:2016 | 1.81 | 6.5 | 1338 | 5.5 | 780.8 |
| Q3:2016 | 1.66 | 6.5 | 1411 | 5.8 | 882 |

Source: National Bank of Rwanda, Rwanda Stock Exchange.

Data used to estimate the effect of market capitalization on the economic growth

| Period | GDP | CF | MC | CSPN |
|---|---|---|---|---|
| Q1:2011 | 877 | 233 | 821 | 905 |
| Q2:2011 | 918 | 200 | 815 | 233 |
| Q3:2011 | 1018 | 227 | 940 | 868 |
| Q4:2011 | 1039 | 245 | 960 | 946 |
| Q1:2012 | 1019 | 273 | 829 | 950 |
| Q2:2012 | 1059 | 250 | 846 | 932 |
| Q3:2012 | 1166 | 294 | 946 | 1010 |
| Q4:2012 | 1193 | 331 | 1069 | 1106 |
| Q1:2013 | 1138 | 322 | 1234 | 1054 |
| Q2:2013 | 1185 | 307 | 1260 | 1007 |
| Q3:2013 | 1233 | 318 | 1261 | 1051 |
| Q4:2013 | 1308 | 344 | 1372 | 1108 |
| Q1:2014 | 1282 | 341 | 1449 | 1215 |
| Q2:2014 | 1314 | 343 | 1445 | 1164 |
| Q3:2014 | 1395 | 339 | 1417 | 1193 |
| Q4:2014 | 1394 | 383 | 1339 | 1276 |
| Q1:2015 | 1378 | 373 | 2928 | 1238 |
| Q2:2015 | 1414 | 369 | 2892 | 1240 |
| Q3:2015 | 1520 | 371 | 2925 | 1288 |
| Q4:2015 | 1541 | 426 | 2820 | 1395 |
| Q1:2016 | 1542 | 459 | 2817 | 1381 |
| Q2:2016 | 1549 | 402 | 2802 | 1338 |
| Q3:2016 | 1662 | 426 | 2773 | 1411 |

Source: Rwanda Stock Exchange, National Institute of Statistics.

**Listed companies on the Rwanda Stock Exchange**

| Companies | Origin |
|---|---|
| BRALIRWA (BLR) | Rwanda |
| Bank of Kigali (BoK) | Rwanda |
| Crystal Telecom (CTL) | Rwanda |
| I&M Bank (IMR) | Rwanda |
| Kenya Commercial Bank (KCB) | Kenya ( Cross listed) |
| Uchumi Supermarket Ltd(USL) | Kenya ( Cross listed) |
| Equity Bank | Kenya (Cross listed) |
| National Media Group (NMG) | Kenya (Cross listed) |

Source: Rwanda Stock Exchange

Ownership of Rwanda Stock Exchange

| Institution | Share |
|---|---|
| Government of Rwanda | 20% |
| CDH Capital Ltd | 10% |
| Baraka Capital Ltd | 10% |
| Dyer and Blair Rwanda | 10% |
| Faida Security | 10% |
| MBEA Brokerage and financial services Rwanda | 10% |
| African Alliance Rwanda | 10% |
| SONARWA | 1% |
| Development Bank of Rwanda (BRD) | 8% |
| SORAS | 1% |
| Rwanda Social Security Board | 10% |

Source: Rwanda Stock Exchange

List of Bonds listed on the Rwanda Stock Exchange

| Code of the bond | issuer | Maturity Year | Face Value (frw) | Coupon rate |
|---|---|---|---|---|
| RW000A19BPS5 | Government of Rwanda | 2019 | 10 Billion | 12% fixed |
| RW0001ZX0A8 | Government of Rwanda | 2018 | 15 billion | 11.55% fixed |
| RW0001ZTAM0 | Government of Rwanda | 20121 | 15 billion | 12.47% fixed |
| RW000A19D0U5 | Government of Rwanda | 2022 | 10 billion | 12.375% fixed |
| RW0001Z2RJ7 | Government of Rwanda | 2025 | 10 billion | 12.925% fixed |
| RW0001Z5Z93 | Government of Rwanda | 2020 | 15 billion | 11.950% fixed |
| RW00018VK03 | Government of Rwanda | 2018 | 15 billion | 11.80% fixed |
| RW000187KN1 | Government of Rwanda | 2021 | 15 billion | 12.00% fixed |
| RW000182K48 | Government of Rwanda | 2021 | 10 billion | 13.50% fixed |
| RW000A185V91 | Government of Rwanda | 2021 | 15 billion | 12.25% |
| RW0001GQRL2 | I&M Bank | 2018 | 1 billion | 10.50% |
| RW0001ZJZU1 | IFC | 2019 | 15 billion | 12.25% |

Source: Rwanda Stock Exchange

Heteroscedasticity test: Breusch- Pagan- Godfrey results

| | | | |
|---|---|---|---|
| F-statistic | 1.222474 | Prob. F(4,14) | 0.3454 |
| Obs*R-squared | 4.918398 | Prob. Chi-Square(4) | 0.2958 |
| Scaled explained SS | 6.334830 | Prob. Chi-Square(4) | 0.1755 |

Source: Researcher

Autocorrelation test: Breusch-Godfrey correlation LM test results

| | | | |
|---|---|---|---|
| F-statistic | 0.762238 | Prob. F(12,2) | 0.6947 |
| Obs*R-squared | 15.59097 | Prob. Chi-Square(12) | 0.2107 |

Source: Researcher