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

Gisele U. CYUZUZO

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Jönköping International Business School (JIBS),
Jönköping University, P.O. Box 1026,
SE-551 11 Jönköping, Sweden,
Web: http://www.ju.se/earp, E-mail: EARP@ju.se

Preface

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Editor: Almas Heshmati
Professor of Economics
Jönköping International Business School (JIBS),
Jönköping University, Room B5017,
P.O. Box 1026, SE-551 11 Jönköping, Sweden,
E-mail: Almas.Heshmati@ju.se

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Gisele Umuhoza Cyuzuzo[1]

University of Rwanda (UR)
College of Business and Economics
E-mail: ugisele29@gmail.com

Abstract

This study investigates the factors influencing the development of capital markets in Rwanda. Its main objective is to study how macroeconomic variables affect the growth and development of the Rwanda Stock Exchange (RSE). It also analyzes RSE's contribution to the increasing economic growth in Rwanda. The study uses quarterly secondary data from 2011 to 2016 and estimates two models using the GLM method. It measures RSE's performance by market capitalization. The macroeconomic variables that it uses are the key repo rate, inflation rate and money supply; consumption is used as a conditioning variable. It uses GDP as the dependent variable, market capitalization as the independent variable and capital formation and consumption as the conditioning variables to analyze the second model. It uses a 2SLS regression method to overcome the endogeneity problem. Our results show that among the four macroeconomic variables only money supply had a statistically significant relationship with market capitalization as we found that an increase in money supply by one Frw led to an increase in the market capitalization ratio by 0.003. The results also show that there was a positive relationship between market capitalization and GDP where an increase in market capitalization by one unit increased GDP by 0.19.

Keywords: Capital market, economic growth, monetary policy, investment, financial development.

JEL Classification Codes: G24; O47; E52; G23; E22; O16;

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1. Introduction

Capital formation is one of the main factors responsible for a country's economic and financial growth. Developing countries need considerable investment capital for providing basic infrastructure, education facilities and developing agricultural and industrial ventures. According to Arowolo (1971), success in mobilizing 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 loans from banks primarily because the projects that are being developed in Rwanda are risky and take long to generate benefits. Hence, Rwanda needs capital markets (CMA, 2012-2015) to play an alternative role for the banking sector which currently dominates the financial sector in Rwanda with high costs for the private sector willing to acquire capital from banks. According to Yartey and Adjasi (2007) stock markets provide an opportunity for growing companies to raise capital at lower costs. They emphasize that companies in countries with developed stock markets are less dependent on bank financing.

Several authors recognize the role of capital markets in boosting economic growth in countries and offering alternative solutions to people looking for capital. According to Levine and Zervos (1998) capital markets boost savings and increase the quantity and quality of investments by providing individuals with additional financial instruments that may better meet their risk preferences and liquidity needs. According to Gursamy (2009) well developed financial markets play an important role in mobilizing savings by collecting funds saved by households and public and private entities when they purchase shares or bonds; in spurring investments by enabling companies to acquire the needed capital and in increasing national growth by ensuring a transfer of surplus funds to deficit funds; and in entrepreneurship and industrial growth by availing necessary financial resources.

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

In 2000 Rwanda adopted 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 per cent is required which can only be achieved with at least 20 per cent savings of GDP and domestic investments of up to 30 per cent of GDP. The Capital Market Authority (CMA) was established under the Capital Market Act of 2011 to guide the development of capital markets. Earlier the Rwanda Capital Market Advisory Council (CMAC) was established in 2007 to develop the capital market in Rwanda, facilitate the trading of debt and equity securities and to enable securities transactions and perform regulatory functions over the Rwanda Securities Exchange

which was created in 2011.[2] This is a limited company in which the government owns 20 per cent while the remaining is owned by brokers and other stakeholders. It has eight listed companies of which 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.

Several authors support the role of stock markets in increasing economic growth in a country; this has also been proven in many developed countries. It was on this basis that Rwanda established the Capital Market Authority in 2011. According to CMA (2015), the total amount of funds raised during the financial year 2014-15 was Frw 55 billion compared to Frw 12.5 billion in financial year 2013-14. This increase was supported by the government's long-term debt issuance program launched in 2014 to support capital market development and for mobilizing infrastructure funding. The Government of Rwanda adopted an institutional and regulatory framework to support CMA's development and since 2014 it has launched the government's long-term debt issuance program. However, despite all these efforts, during 2016 market capitalization went down to US$ 3.3 billion from US$ 3.8 billion in 2015. This was attributed to the country's overall economic performance and other factors such as low client turnover and the fact that only a few products were traded on RSE. Hence, our study assesses how macroeconomic variables affect the stock market's performance.

The main objective of our study is to analyze the effects of macroeconomic variables on RSE's performance. Its specific objectives are analyzing the evolution of the performance of the Rwanda Stock Exchange, analyzing RSE's contribution to Rwanda's economic development and providing suitable policy measures that will contribute to an improvement in RSE's performance and also contribute to economic growth in Rwanda. Our study answers the following questions: What are the macroeconomic variables that affect RSE's performance? Does RSE's performance contribute to economic growth in the country? If yes, what is its contribution to this growth?

Based on these questions, we formulated two hypotheses: macroeconomic factors (inflation rate, exchange rate and key repo rate) have no significant relationship with RSE's performance and RSE does not contribute to economic development in Rwanda.

Our research focuses on the Rwanda Stock Exchange and the factors affecting its performance with the main focus on macroeconomic variables. It covers the period from 2011 up to the third quarter of 2016. We also study the effect of the capital market on economic growth in the country.

1.2. Problem statement

According to Dudley and Hubbard (2004) more developed capital markets have played a major role in countries' economic and financial growth as they have the ability to mobilize funds that are then channeled to individuals or groups of people who need the money to start or expand their businesses which result in growth in a country's economy.

Learning from these countries' experiences, Rwanda created its capital market in 2011 and since then it has adopted an institutional and regulatory framework to support its development. The government also launched the long-term debt issuance program in

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

2014. This program consists of issuance of government treasure bonds to the public to increase new products available on the RSE which will attract new investors and thus contribute to the development of the stock market. However, despite these efforts in 2016 market capitalization went down to US$ 3.3 billion from US$ 3.8 billion in 2015. This was attributed to the country's overall economic performance and other factors such as a low client turnover and only a few products being traded on RSE. However, little is known about how the macroeconomic environment affects the stock market's performance in Rwanda. It is in this backdrop that our study assesses which macroeconomic variables affect the stock market and to what extent so as to be able to formulate suitable recommendations that may be used to improve RSE's performance.

2. Literature Review

2.1. Introduction to the financial market and the capital market

According to Gursamy (2009), 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. Financial market transactions may take place in a stock exchange or by telephone or using other electronic media. Financial markets comprise of the money market where people lend or borrow money for a short period like one night or for a maximum of a year; capital market in which people lend or borrow money for more than one year; debt market which specializes in selling and buying bonds; and the Eurobond market in which bonds are sold and bought denominated in a currency that is not the national currency of the issuing country.

Other components of the financial market include the equity market which is also called the stock market which has stocks of different companies listed on it; commodity market which specializes in the trading of primary goods like wheat, coffee and minerals; derivatives market for financial instruments like future contracts or options; futures market where people agree to trade specific quantities of commodities or financial instruments in the future at a given time; foreign exchange market where people buy or sell different currencies; financial services market that comprises of different institutions that provide financial services; depository market and non-depository market. Not all these constituents are available in all countries especially in developing countries like Rwanda where the capital market is still in its early stages.

Our study mainly focuses on the capital market which is a highly specialized and organized financial market that represents the facilities and institutional arrangements for the sale and purchase of medium- and long-term funds. Like any other market, the capital market has buyers who are borrowers of funds and sellers who are lenders of funds.[3] The capital market comprises of a primary market and a secondary market. The primary market deals with the issue of new securities. It is a market for raising fresh capital in the form of shares and debentures. The government or the corporate sector which is willing to raise capital funds through issuing securities approaches the primary market. Issuers exchange financial securities for long term funds.

[3] See https://en.wikipedia.org/wiki/Capital_market

The primary market allows the formation of capital in the country and for accelerated industrial and economic development. In this way newly issued financial assets are bought and sold. The popular ways by which capital funds are raised in the primary market are public issues or initial public offerings (IPOs) where a company willing to raise capital issues a certain number of its shares to the public depending on the amount of capital needed. Securities are issued to 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 calling the general public to buy its shares a company issues a certain number of shares that are proposed to existing shareholders as a pre-emptive right. Under this method, additional securities are offered for subscription to existing shareholders; and private placement is a method for a company to raise capital by issuing shares that are sold to a group of small investors.

The secondary market deals with people who want to acquire shares in companies by purchasing shares from investors who already have them in certain companies. In this market no fresh capital is made available to the producers on account of the transactions. The secondary market is crucial in a capital market as it offers an opportunity to investors who bought their shares in the primary market to sell them in case they want cash or no longer want to be investors in a 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 possible for existing companies to issue new shares because it shows how investors are thirsty to invest in them and it also makes the environment favorable for new companies to raise capital as active participants in the market are happy to have new products at their disposal. According to Yartey and Adjansi (2007) liquid stock markets enhance investments in the long term yielding profits and this leads to improved capital allocation and economic growth in the country. Buying and selling of securities in a secondary market is carried out through a stock exchange. Currently there is one stock exchange in Rwanda which is recognized by the government. This is different from other countries which have more than one stock exchange.

In the capital market, capital resources are raised using capital market instruments. The most frequently used capital market instruments include preferential shares which are shares whose dividends are paid before the announcement of the common dividend; preferential rights are those shares whose owner has the right to buy someone else's property in case of a certain event; and equity shares which are ordinary shares that are held by individuals or corporates in a certain company. The owners of these shares incur the profit and loss of a company. Then there are also non-voting equity shares which are shares that result in additional issuance of shares by a company which is done without changing the interests of the existing shareholders; convertible cumulative preference shares which have the advantage of accumulating arrears of dividend and can also be transformed into ordinary shares; company fixed deposits which are deposits made by an individual or a corporate in a certain company which will generate a safe interest rate independent of any market fluctuations; warrants which are a financial instrument which provides buyers the right to buy shares in a company at a given price during a certain fixed period; and debentures which are documents that show that a company has borrowed a certain amount of money that will be repaid following some agreed to terms and conditions.

A bond is like a loan which pays interest periodically, mostly every six months at a fixed interest rate, and repays the principal at a pre-decided time called maturity. The

differences between bonds depend on the nature of the issuer who can be a government or a private entity such as a bank or any other organization wanting to raise capital. Government bonds are considered 'risk-free' in the domestic market because the 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 are also called long bonds and offer maturities of 20 and 30 years. Treasury notes are issued with maturities of one, three, five, seven and 10 years.

Several variables are used for measuring a stock market's performance. According to Demirgiic-Kunt and Levine (1996) the traditional characteristics of a stock market are market capitalization which represents the value of all the shares listed on the stock market; amount of new stock offerings which is the number of new shares issued by the stock market; number of listed companies and turnover and institutional characteristics including regulations, information disclosure, transparency rules and trading costs; and asset pricing characteristics.

2.2. Effect of capital markets on economic growth

Stock markets are recognized by many economists because of the role that they play in a country's economic performance. According to Fama and French (2005) the primary role of the capital market is allocation of ownership of the economy's capital stock. He found that there is a positive dependence in day to day price changes and returns on common stocks. Naceur and Labidi (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 (MENA) countries from 1989 to 2005, Naceur found that a well-developed stock market led to an increased profit opportunity for banks which in turn spurred economic growth in a country. According to Pardy and Mundial (1992) the development of a 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 developed stock markets. This implies that a more developed stock market will allow firms to increase borrowings from financial intermediaries. According to him, a sound and efficient stock market can contribute to economic growth in the long run while in the short run it plays a role in financial deepening and liberalization.

According to Caporale et al., (2004) a well-developed stock market can foster economic growth in the long run. Their empirical work tested for causality in VARs using a sample of seven countries. They found that through the issuance and repurchase of government bonds, stock markets played an important role in formulating appropriate monetary policies. By running an autoregressive distributive lag regression Mauro (2003) found that there was a significant correlation between output growth and stock returns. However, Minier (2003) indicates that the effect of a stock market on economic growth may take some time to appear, particularly in countries with less developed stock markets. By running a regression tree technique he found that economic growth and financial development were positively correlated in countries with high market capitalization. However, he found that this relationship did not hold for countries with low market capitalization.

Dailami et al., (1990) share the same view. They discuss the Korean and Indian stock markets during the period 1980 to 1989 when the Korean market capitalization increased from 6.3 per cent of GNP in 1980 and went up to 73.1 per cent of GNP in 1989. The same thing happened in India though not to the same extent, where market capitalization rose from 4.4 per cent of GNP to 8.5 per cent of GNP in 1989. These spectacular results in the two countries were supported by important macroeconomic and policy changes where in Korea the period was characterized by reduced inflation, large household savings and a sharp turnaround balance of payments from deficit to surplus. However, the authors go further and talk about the costs 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 goals that are different from shareholders' profit aspirations. The second cost is the nature of stock markets which is sometimes volatile. The third cost relates to the role of stock markets in takeover activities and its impact on companies' competitiveness and efficiency.

Talking about the role of the stock market in China, Li (1994) emphasizes the role of securities markets by arguing that often stock markets are a means of overcoming the negative effects of government financial repression. He gives an example that if a privately owned firm cannot gain access to credit from the dominant state banking system, then an equity issue could represent a viable alternative funding source. He says this to support the idea of transforming state-owned enterprises into shareholding companies which would enable them to acquire the necessary funds to reform, modernize and reduce their dependence on debt finance and improve corporate governance.

However, though stock markets have been praised for their proven role in accelerating economic growth in a country, some authors argue that stock markets can harm an economy due to the fact that some or even most of the time they tend to be volatile especially in developing countries where they are not yet stable. For example, Laurenceson (2001) argues that economic development in China would have been best served by focusing on reforming existing credit markets. In his study, he found that listing the state-owned enterprises (SOEs) was important in terms of raising funds for their reforms. However, on the macro-level their impact on the overall level of saving mobilization and allocation of capital was negligible. Singh (1997) and Singh and Weisse (1998) takes an even more extreme position and argues that stock markets are in fact likely to harm economic development due to their susceptibility to market failures which is often manifested in the volatile nature of stock markets especially 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.

2.3. Factors affecting a stock market's performance

Stock markets are affected by different factors and their performance is mostly defined by them. Different authors have argued that 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 a vibrant stock market it must have adequate institutions that oversee and regulate this sector. According to Pardy and Mundial (1992) the two pre-requisites for sound securities markets are the macroeconomic and fiscal environment that is conducive to the supply of good quality securities and sufficient demand for them and legal,

regulatory and institutional infrastructure capable of supporting efficient operations of the securities market. Roe (2006) argues that the reason why some rich nations have strong capital markets while others have weak ones is because they have suitable institutional laws that protect outside shareholders. However, he adds that it is not so much the type of institutions that have counted in the world's richest nations but whether a nation has used them to support its capital markets.

Supporting the same view Beck (2006) argues that financial systems require developed legal and information infrastructure to function well. In fact, outside investors are reluctant to invest in companies if they are not able to exert corporate governance and protect their investments by controlling shareholders/owners or the management of the companies. However, according to Crotty (2009) more regulations do not always mean better outcomes. Lightly regulated financial markets allow individual and institutional investors to achieve maximum returns for a given risk level and choose the amount of risk that is optimal for them. According to Levine (2011) political and powerful clans frequently use well-intentioned government interventions for their own benefits thus having suitable institutional laws and government regulations and for this a country's stock market is not enough and what is needed is proper implementation of the regulations.

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

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

Kendi (2014) found that there was a strong positive and significant relationship between voluntary disclosures and stock returns and concluded that firms can increase stock returns by increasing voluntary disclosures. According to her, governments should also have more regulations on disclosures to ensure that individuals investing in stock markets 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) did a study on the effect of voluntary disclosures 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 the NSE 20 share index were not affected by voluntary release of information.

The importance of information disclosure is emphasized by Demirgiic-Kunt and Levine (1996) who says that economies with strong information disclosure laws; internationally accepted accounting standards; and unrestricted international capital flows tend to have more liquid markets. He adds that developing markets are characterized as having low levels 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 this unless the company discloses the information. Another important factor to consider is shareholders' protection. Classens et al. (2001) argues that countries with strong shareholder protection are more likely to have well developed stock markets due to the fact that investors do not fear expropriation. The development of stock markets in these countries is explained by the liquidity of the stock markets given that ownership in such markets can be relatively dispersed. This is also emphasized by La Porta et al., (2000) when they say that the differences in stock market development in 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 for outside investors either by courts, government agencies or the market participants themselves.

Several studies have shown that stock markets are directly influenced by macroeconomic conditions. In fact, these variables are the fundamentals of every economy so much so that any change in one or all of these variables has important repercussions on the stock market's performance. According to Osei (1998) the macroeconomic environment is very important for foreign investors. Hence, if more foreign investors are expected to play an active role in emerging stock markets, then serious attempts need to be made to reduce inflation and rapidly depreciating currencies so that their capital base is not eroded. In Kenya high interest rates that have been rising because of domestic borrowings have led many investors to liquidate their equities in preference for high yielding government papers. According to Aurangzeb (2012) interest rates and inflation in South Asia have a negative relationship with stock market performance. Geetha et al. (2011) studied the relation between inflation and stock returns in three countries, the US, Malaysia and China. His results suggest a long run relationship between inflation and stock returns for the three countries.

Others like Ndunda (2016) have analyzed the effect of selected macroeconomic variables, inflation rate, money supply, exchange rate and GDP. Their studies show a significant relationship between market capitalization and inflation rate, GDP and money supply. Garcia and Liu (1999) in their study of macroeconomic determinants of stock market development using pooled data of 15 industrial and developing countries for the period 1980 to 1995 found that the real income rate, investment rate and financial intermediary development had a significant relationship with market capitalization while inflation rate did not have any important role in the growth of market capitalization. Maskay (2007) tested the two opposing theories between Keynesian economists and the theory of real activity and found that money supply increased stock prices. Christos and Alexandros

(2006) investigated the impact of monetary policy on stock returns and found that a decrease in money supply led to a decrease in stock market value.

Bernanke and Kuttner (2005) used vector autoregression to analyze the effect of change in the US federal fund rates and found that the market reacted fairly strongly to surprise fund rate changes and that the market reacted little or did not react to changes in the federal reserve rate if this was anticipated by market participants. According to Osei (1998) differences in effective tax rates on incomes 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 the macroeconomic environment, an effective tax rate and the political environment, particularly political stability are also crucial for the development of emerging stock markets as these reduce the chances of unexpected wars and unrest that threaten investments and life and this guarantees safety nets for investments (Mbaru 2003) (the summary of literature review is given in Table 1).

Table 1: Summary of literature review

Author	Year	Data period	Sample size	Method	Findings
Ben Narceur	2010	1989-2005	52	GMM	A stock market leads to high profits for banks
Bernanke and Kuttner	2004	1989-2002	131	VAR model regression	Stock markets react to federal fund rates
Caporale et al.	2004	1977-1998	21	VARs model regression	An efficient stock market enhances growth
Claessens et al.	2001	1994-1999	156	OLS	Market cap is explained by low inflation and shareholder protection
Crotty	2009	1930-2008	US	Critical assessment	More regulations do not always mean better outcomes
Dermirgiic and Ross Levine	1996	1986-1993	44	OLS	Developing markets are characterized as having a low level of liquidity, high information asymmetry and thin trading
William and Glenn	2004	1990-1994	5	Critical assessment	The development of capital markets leads to economic growth by creating more jobs and generating higher wages
Ioannidis and Kontonikas	2008	1972-2002	13	OLS	Monetary policy shifts affect stock returns significantly
Graciela Laura Kaminsky	2003	1973-2003	28	OLS	Financial liberalization leads to more stable markets in the long run
La Porta et al.	2000		49	Critical assessment	Investor protection by law explains stock market development
James Laurenceson	2002	1991-1998	902	EMH testing	On a macro-level, listing of state owned enterprises had a negligible

					impact on the level of saving and capital allocation in China
Levine and Zervos	1998	1976-1993	44	CAPM Integration and APT Integration	The level of capital market development has statistically significant relationships with future values of output growth
Ross Levine	2011	1960-1995	71	OLS	Suitable regulations have a positive impact on stock market development
Paolo Mauro	2003	1989-1998	25	Autoregressive distributive lag regression	High market capitalization leads to output growth
Jenny Minier	2003	1976-1993	31	Regression tree techniques	Growth and financial development are positively correlated in countries with high levels of market capitalization
Meek et al.	1995	1989	226	OLS	Organizations gain some benefits by disclosing information
Maskay	2007	1959-2006	178	Two stage regression model	There is a positive relationship between changes in money supply and stock prices
Pardy and Mundial	1992	1984-2000	32	Critical assessment	There is a significant relationship between stock market development and financial depth
M.J. Roe	2006	1913-1945	14	Empirical analysis of data	The reason why some rich nations have strong capital markets while others have weak ones is because they have suitable institutional laws that protect outside shareholders
Li	2012	1975-2000	95	OLS and IV	Equity market liberalization leads to economic development
Mwangi and Mwiti	2014	2009-1913	20	The Pearson Product Moment	A positive and significant relationship exists between voluntary disclosures and stock returns
Geetha et al.	2011	2000-2009	10	Vector Error Correction Modeling	A long run relationship between inflation and stock returns for three countries
Ndunda	2014	2005-2014	62	OLS	Inflation, money supply, GDP have a significant relationship with market capitalization
Christos and Ianodis	2006	1972-2002	13	OLS	A decrease in money supply leads to a decrease in stock market value
Garcia and Liu	1999	1980-1998	15	OLS	The real income rate, investment rate and financial intermediary development have a significant relationship with market capitalization while the inflation rate has no important role in the growth of market capitalization

3. Overview of the Rwandan economy, monetary policy and capital market

3.1. Evolution of the Rwandan economy

The Rwandan gross domestic product reached Frw 6,618 billion in 2016 up from Frw 5,956 billion in 2015, and like many years since 2011 the services sector had a large share of contribution to the economic growth (47 per cent of total GDP). The agriculture sector contributed 31 per cent of the GDP while the industry sector contributed 17 per cent of the GDP. For a long time now, a large part of the Rwandan population has been engaged in agriculture which is mostly subsistence. This is also the reason why though this sector employs a large number of people, it contributes very little to economic growth in the country.

Before colonialization, the Rwandan economy was dominated by agriculture and cattle raising. Agriculture was subsistence and trade in goods and services was paid through a barter system. Other professions like arts and craft, hunting and iron work were also practiced. The introduction of money as a medium of exchange by the Germans and Belgians changed the Rwandan economy where the value given to cattle as a sign of wealth was replaced by money. The Central Bank was founded in 1964, two years after independence and it was assigned the role of regulating and supervising the financial, monetary and payment systems in the country. The forming of the Central Bank led to significant economic growth till the end of 1980 when the prices of tea and coffee -- major exports of the country -- declined. The consequences of this poor economic performance combined with a high rate of population growth resulted in declining per capita GDP throughout the 1980s and 1990s.

In 1990 the liberation war started which was followed by the 1994 genocide against the Tutsi which destroyed the fragile economy. The proportion of the population below the poverty line increased from 53 per cent to 70 per cent between 1993 and 1997 and the country was destroyed in all political and socioeconomic aspects. To recover from this tragedy, the Government of Rwanda started several programs among which was the privatization of state owned enterprises. These programs combined with humanitarian aid resulted in the recovery of the economy where GDP grew at 9 per cent in 1995 and at 13 per cent in 1996; this trend 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 Vision 2020, which aimed to transform the country into a knowledge-based, middle-income country by 2020. Rwanda also adopted the millennium development goals in 2000 and at the end of this program the country had achieved almost all the goals. To achieve Vision 2020, Rwanda undertook 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) and the Rwanda Investment and Export Promotion Agency (RIEPA) and it was given the mission to fast track the country's economic development. A mid-term strategy, the Economic Development and Poverty Reduction Strategy (EDPRS) was also developed. It was conducted in two

phases which were divided into five years each. EDPRS 1 which ended in 2012 saw the GDP growth averaging at 8.2 per cent annually, which translated into GDP per capita growth of 5.1 per cent per year and significant poverty reduction. The second phase of EDPRS started in 2013 and had a target of 11.5 per cent annual GDP growth, 28 per cent increase in exports and less than 10 per cent (from 24 per cent) of Rwandan household to be in extreme poverty. Since 2000, Rwanda has been one of the fastest growing economies in Africa and in the world. From 2000 to 2016, its average annual GDP growth rate was 7.75 per cent.

3.2. Monetary Policy

Monetary policy in Rwanda is formulated and implemented by the Central Bank of Rwanda (BNR). Its evolution can be seen in three periods. In the first period (1964 to 1990) the Central Bank used the direct monetary instrument (one-to-one correspondence between the instrument and the policy objective). 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. Its main missions were maintaining monetary stability, implementing credit and exchange rate policies conducive to harmonious economic development, issuing the national currency and playing the role of the government treasury. In 1981, BNR's role was expanded to include the formulation of the monetary policy, the credit and exchange policy to support the implementation of the government's economic policy and to protect the overall stability of the national currency. Left here

The second phase started in 1990 and ended in 1995. During this period BNR started financial liberalization. This was done after the realization that the direct monetary policy was inefficient especially in terms of optimal allocation of resources. BNR became fully liberalized in 1995 when 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 the nominal anchor, reserve money as the operating target and price stability as the ultimate objective. It was after this move that BNR started removing all the foreign exchange, capital movement and credit controls and opened up the economy which consequently led to the emergence of commercial banks. In 2004 BNR reviewed its regulatory framework and increased the minimum capital requirements for banks from Frw 1.5 billion to Frw 5 billion.

At that time regional banks in Rwanda started opening their doors. BNR successfully carried out its core mandate of ensuring price stability helping Rwanda maintain the lowest levels of inflation in the region even during the most economically volatile times. BNR used 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, BNR's monetary policy committee announces whether it has increased or reduced the key repo rate every quarter and this has an impact on the behavior of the markets which impacts control of inflation.

In 2016, BNR maintained a prudent monetary policy in a context of high pressures on the Frw exchange rate due to the global economic crisis as well as high demand for the dollar which got accelerated by an increase in imports and the fact that agriculture

performed poorly during the period. An increase in food prices and transport costs led to an increase in inflation from 4.5 per cent in January 2016 to 7.3 per cent in December 2016. The rising food prices stemmed from reduced food supply following poor performance in agricultural production. Broad money (M3) grew by 7.5 per cent in 2016 to Frw 1592.7 billion, lower than 21.1 per cent recorded in December 2015. The deceleration in money supply growth in 2016 was due to a reduction in the growth of net domestic assets to 1.7 per cent as compared to 57.3 per cent in 2015 despite an expansion of 15 per cent in foreign assets in 2016 after a contraction of 6.9 per cent in 2015.

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

3.3. The Capital market in Rwanda

Rwanda's capital market was established in 2011. 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, enable securities transactions and also to regulate the Rwanda Securities Exchange.[4]

CMA conducts its business under seven laws: the investment code law, law providing for incentives under the capital market, law governing the holding and circulation of securities, law governing the establishment and creation of trusts and trustees, law establishing the capital market, law regulating collective investment schemes and law regulating the capital market business in Rwanda. As stipulated in the special official gazette published on 28 May 2010, the capital market in Rwanda offered tax incentives including income tax exemption; capital gain tax where secondary market transactions in listed securities is exempt from the capital gains tax; corporate income tax which stipulates that newly listed companies in the capital market are taxed for a period of five years at 20 per cent if these companies sell at least 40 per cent of their shares to the public, at 25 per cent if these companies sell at least 30 per cent of their shares to the public and 28 per cent if these companies sell at least 20 per cent of their shares to the public. For Rwandans and the East African Community's residents withholding tax on dividends and interest income on securities listed on the capital market and interest arising from investments in listed bonds were reduced to 5 per cent.

The first IPO in Rwanda was in 2011 when the Government of Rwanda decided to sell its 30 per cent stake in Brasserie et Limonaderie du Rwanda (BRALIRWA) of which 25 per cent was sold to the public and 5 per cent was sold to Heineken International. The IPO was over-subscribed by 274 per cent in all investor pools. In the same year, the government decided to sell its 20 per cent stake in Bank of Kigali (BK) to the public and the bank simultaneously raised new capital which was equivalent to 25 per cent of the

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

company's capital. In 2013 the government issued sovereign bonds worth US$ 400 million. A strong vote of confidence for Rwanda's economy and the country led to a massive over-subscription of the sovereign bonds at 650 per cent. The bonds have a maturity of ten years at a fixed interest rate of 6.875 per cent. In the same year CMA assisted in the establishment of the Rwanda National Investment Trust (RNIT).

Being a big player in capital market development the government published its bond issuance program in February 2014 to come to the market every quarter. It is in that spirit that a 3-year treasury bond worth Frw 12.5 billion was issued in February 2014. This bond too was over-subscribed by 240 per cent signaling investor confidence in the outlook for Rwanda's currency and economy. The book building method was used to price the bond and the bond was priced at a fixed 11.475 per cent coupon rate with an average yield of 11.625 per cent. 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 non-resident issuer in Rwanda's domestic capital market. The bond was the second corporate bond in 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 was over-subscribed 2.19 times. The bond was priced with a yield of 12.25 per cent per annum. In November 2014 after undergoing an internal International Organization of Securities Commission's (IOSCO) review, CMA became an associate member of IOSCO.

The third IPO was by the Crystal Telecom Limited (CTL) holding company established by Crystal Ventures Limited (CVL) on 21 May 2015 where 270,177,320 shares were issued to the public. The shares had a face value of Frw 50 per share and were offered at Frw 105 per share. The offer was over-subscribed 124 per cent. In the same year the Government of Rwanda issued four bonds totaling Frw 55 billion with different maturities ranging between three and 10 years under the Treasury Bond Issuance Program. In 2016 the primary equity market did not record any new IPOs. However, the Government of Rwanda through the quarterly bond issuance program issued four bonds with a total face value of Frw 55 billion. The maturities of the bonds are three, five and 15 years, the latter being the longest in the market so far. Currently, 12 bonds are listed on RSE among which ten were issued by the Government of Rwanda and the remaining two are corporate bonds.

In February 2017, the Government of Rwanda through the Ministry of Finance and Economic Planning sold its 19.81 per cent shares in I&M Bank Rwanda Ltd. to the public through an IPO. This was done in line with the government's program of disinvesting public enterprises. In this IPO, a total of 99,030,400 I&M Bank Rwanda Ltd.'s shares held by the government were sold to the public.[5]

Before the Rwanda Stock Exchange started its operations in 2011, transactions took place in the over-the-counter (OTC) market which was established by the Capital Market Advisory Council in January 2008. The OTC market was activated with the cross-listing of the Kenya Commercial Bank (KCB) on 18 June 2009 and two government bonds. A total of 91,600 shares were traded at an opening price of Frw 160 per share with the

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

lowest price of Frw 140 and the highest price of Frw 182 per share. The traded shares yielded a turnover of Frw 15,129,100 in 66 transactions. The first bond (FXD1/2010/2yrs) worth Frw 2.5 billion at a fixed rate of 9.5 per cent was issued on 14 January 2010 with maturity in 2012. The second one (FXD2/2010/3yrs) worth Frw 2.5 billion was issued on 25 April 2010 and matured in 2013 at a fixed rate of 9.75 per cent. There was one government and one corporate outstanding bond. The government bond (FXD3/2008/3yr) worth Frw 5 billion matured in 2011 and Banque Commerciale du Rwanda's (BCR) corporate bond worth Frw 1 billion matures in 2017.

RSE was officially launched on 31 January 2011. Since then trading operations are taken up on RSE which was demutualized from the start as it was registered as a limited company. RSE is 60 per cent owned by brokers, 20 per cent by the Government of Rwanda and 20 per cent by other institutional shareholders. It conducts trading through a dual process -- an open outcry trading session is conducted on the trading floor during formal trading hours (9 am – 12 pm) and an OTC market where a member is allowed to buy or sell directly to clients in their offices. RSE's rules permit brokers or traders to transact either face to face or over the telephone after formal trading hours on normal working days after which all OTC transactions have to be reported to RSE not later than an hour after the transaction. OTC transactions are reported in the next formal trading session for settlement.

From July 2012 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 2011-12. This represent an increase of 94 per cent in money terms and an increase of about 2 per cent in the number of shares traded. The market was driven by the activities on the counters of domestic companies which amounted to 99.9 per cent in the total turnover. At the end of June 2012, RSE's market capitalization was Frw 1,261 billion compared to Frw 846.8 billion as of 30 June 2011, translating into an increase of 49 per cent. This increase in market capitalization was a result of the increase in the prices of three stocks, BRALIRWA, BK and KCB.

In the financial year ended June 2014, the secondary market for equities recorded an increase of 9 per cent in the value of shares traded reaching Frw 42.6 billion, up from Frw 39.2 billion recorded in 2012-13. The number of shares traded in 2013-13 dropped by 32 per cent 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 2013-14 while the year before recorded 1,873 deals. By 30 June 2014, RSE's market capitalization stood at Frw 1,399 billion compared to a market capitalization of Frw 1,261 billion as of 30 June 2013. The increase of Frw 138 billion in market capitalization resulted from the cross-listing of Uchumi shares on RSE and changes in share prices of listed securities.

In the 12-month period ending June 2015, the secondary market for equities recorded an increase in the value of shares traded by 35 per cent reaching Frw 57.5 billion up from Frw 42.6 billion recorded in 2013-14. The number of shares traded in 2014-15 more than doubled to 187.4 million up from 84.9 million shares traded in the previous financial year. By 30 June 2015, RSE's market capitalization had increased from Frw 1,399 billion in June 2014 to Frw 2,893 billion or double the previous year. This is explained by the cross-listing of Equity Bank's shares on RSE. In 2014-15 in the secondary bonds market,

bonds worth Frw 1.7 billion were transacted compared to a turnover of Frw 57 million registered in the previous year.

In the 12-month period ending June 2016, the secondary market for equities recorded a decrease of 41 per cent in the value of shares traded to Frw 16.43 billion down from Frw 57.49 billion recorded in 2014-15. The number of shares traded in 2015-16 was 88.2 million, down from 187.4 million shares traded in the previous financial year. By 30 June 2016, RSE's market capitalization had reduced to Frw 2,808 billion from Frw 2,893 billion in the same period in the previous year.

The secondary market forms an integral part of the capital market in Rwanda. Rwanda has one stock exchange that is recognized by the government. This exchange operates through a number of electronically linked counters at different locations thus making it a national trading system. It aims at helping small companies and start-ups to overcome the problems of raising capital through public issues at exorbitant costs. It also helps investors to overcome the problems of ill-liquidity, inaccessibility, delayed settlements and transfers that abound in traditional stock exchanges. Equity shares or 'ordinary shares' are the most traded instrument on the RSE. Like other central banks worldwide BNR exercises supervision and oversight of payment and settlement systems. Holding and transfer services were outsourced to the Central Depository and Settlement Corporation (CDSC), Kenya till the Rwanda Central Securities Depository (CSD) was established in 2011.

4. Data

This section presents the data used and the reasons why it was selected for our study. Quarterly time series data starting from the Q1-2011 to Q3-2016 was used which led to 23 observations. The data on market capitalization ratio was obtained from the RSE secretariat. Data on key repo, exchange rate, money supply and inflation was obtained from BNR's website and all other data was obtained from the website of the National Institute of Statistics of Rwanda (NISR).

We analyze two models: In the first the effect of macroeconomic variables on the capital market and in the second the effect of the capital market on economic growth were analyzed. For an analysis of the effect of macroeconomics variables on the capital market's performance we used the market capitalization ratio (MCR) which measures the stock market's size; this is the dependent variable in our study. It is calculated as the ratio of market capitalization (which measures the value of a stock market) of the stock market to the country's GDP. Its selection is motivated by data availability.

The macroeconomic variables include key repo (KR) which is the rate at which the commercial banks borrow from the Central Bank. This is the main monetary instrument used by the Central Bank of Rwanda in conducting monetary policy. The expected sign for this variable is positive given that an increase in the key repo rate leads commercial banks to increase their lending rates to the private sector. The private sector in turn prefers to raise capital through the capital market rather than using the banking system. The second macroeconomic variable used is money supply (MS) which is the amount of money in circulation in the economy at any point of time. We used the monetary base (M1) to price the bond. The expected sign for money supply is positive because an expansionary monetary policy is likely to stimulate the economy making it possible for

firms to get credit for production expansion. This leads to an increase in sales and thus increased earnings for these firms. An increase in earnings means that the firms will give bigger dividends which in turn will have a positive impact on the capital market as more people will be willing to invest in them.

The third macroeconomic variable used is inflation (INFL). According to Mishikin (2007) this 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 in the value of the currency. The expected sign for 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 to a reduction in the volume of stocks traded. This in turn negatively affects the stock market's performance. The last variable which is a conditioning variable is consumption (CSPN). The expected sign for this variable is positive as an increase in consumption raises production capacity utilization with positive effects on profits. This in turn has a positive effect on stock prices which increase the market capitalization of the stock market.

For an analysis of the effect of the capital market on the overall economy we used GDP as a measure of economic growth. The dependent variable is market capitalization (MC) which measures the stock market's size. The expected sign for this variable is positive because the stock market's good performance means that firms are able to raise money from the public which helps them expand their businesses and this has a positive impact on economic growth in the country. The second variable is consumption (CSPN) which represents the overall consumption of the population. The expected sign for this variable is positive. The contribution of consumption to economic growth is positive because as people consume more firms' revenues increase and this translates into overall economic growth in a country. The third and last variable is capital formation (CF) which is an increase in the combination of capital stock with labor to provide services and produce goods. The expected sign for this variable is positive because an increase in capital formation always leads to an increase in produced goods. This means more profits by companies that lead to economic growth.

Table 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: Author's compilation.

Table 2 shows the correlation coefficients of all the variables. We produce the correlation matrix to assess the relationship between the variables. The coefficients show that market

capitalization was highly correlated with money supply; the correlation coefficient between the two variables is 0.83. Inflation and consumption have a relatively small correlation with the market capitalization ratio; their correlation coefficients are -0.41 and 0.42 respectively. There is small or almost no correlation between the key repo rate and the market capitalization ratio; the correlation coefficient is only -0.14. The coefficient of correlation between money supply and inflation is 0.55 while the coefficient of correlation between money supply and consumption is 0.56. The coefficient of correlation between 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 GDP. Market capitalization is highly correlated with GDP as the coefficient of correlation between the two variables is 0.86. Capital formation is also highly correlated with GDP as the coefficient of the correlation is 0.95 and this is also true of GDP and consumption where the coefficient of correlation is 0.85.

Table 2: Summary statistics of data (N=23)

	Mean	Std. Dev.	Maximum	Minimum
MCR	1.1336	0.4670	2.1200	0.2300
KR	6.7894	0.5000	7.5000	6.0000
MS	497.7504	135.0994	840.4325	345.0000
INFL	4.1263	2.2491	8.3000	0.2000
GDP	1,267.1300	218.8470	1,662.0000	877.0000
MC	1,650.4350	837.3657	2,928.0000	815.0000
CF	329.3913	68.9207	459.0000	200.0000
CSPN	1,100.3910	251.3261	1,411.0000	233.0000

Source: Author's compilation.

Table 3 shows the summary statistics of the dependent and independent variables. The market capitalization ratio has a mean of 1.13 with a standard deviation of 0.46. The highest value of the market capitalization ratio is 2.122 while its lowest value is 0.23. The mean of key repo is 6.7 with a standard deviation of 0.5. The highest value of the key repo rate is 7.5 while the lowest value is 6. The mean of money supply is 497.7 with a standard deviation of 135. The highest value of money supply is 840 while its lowest value is 345. The mean of inflation is 4.12 with a standard deviation of 2.2. The highest value of inflation is 8.3 and the lowest value is 0.2. The mean of consumption is 1,041 with a standard deviation of 236. The highest value of consumption is 1,288 while the lowest value is 233.

The average GDP is Frw 1,267 billion. The highest value of GDP is Frw 1,662 billion while its lowest value is Frw 877 million, all with a standard deviation of 218. The market capitalization average is Frw 1,650 billion; its highest value is of Frw 2,928 billion while its lowest value is Frw 815 million, all with a standard deviation of 837. The average capital formation is Frw 329 million; the highest value of capital formation is Frw 459 million while the lowest value is Frw 200 million. The standard deviation is 68. The

average consumption is Frw 1,100 billion; the highest value of consumption is Frw 1,411 billion while the lowest value is Frw 233. The standard deviation is 251.

5. Methods

We investigated the relationship between the stock market's performance represented by the RSE market capitalization ratio with macroeconomic variables money supply, repo rate, inflation rate and consumption as the conditional variables.

Real activity theorists argue that an increase in money supply increases stock prices and vice versa and 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 results in a fluctuation in stock prices because it affects the profitability of businesses. Mishikin (2007) also defines inflation as a continual increase in the 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 to a reduction in the volume of stocks traded. An increase in consumption raises production capacity utilization with positive effects on profits and this has a positive effect on the stock prices of a given company. We now regress the following model to estimate the effect of macroeconomic variables on the market capitalization ratio:

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

We also investigated the relationship between economic growth in Rwanda and stock market performance. We used RSE's market capitalization, consumption and capital formation as independent variables. According to Seetanah et al. (2012), a well-developed stock market contributes to a country's economic growth by increasing the savings rate and investments. Consumption being a component of GDP it has an immediate effect on this as other things remaining constant an increase in consumption will raise the GDP by the same amount. An increase in capital formation of a nation leads to a nation's economic growth as this is caused by the growth in the production capacity and thus an increase in the goods and services produced and at the same time an increase in the national income level. Therefore, our model will be:

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

In order to get suitable model the data was transformed from linear into non-linear data which gives 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 GDP and market capitalization we did the 2SLS where an instrument variable (IV) was selected. We selected the number of listed companies on RSE. This led us to a new model:

(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 were used to calculate the estimated market capitalization which is used in Equation 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: A 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: Author's compilation.

Based on the results in Table 4, the model that contains all the four macroeconomic variables was preferred for analyzing the effect of macroeconomic variables on market capitalization. This was selected because it had the highest coefficient of determination (R^2) (equal to 0.61) and a low sum of square residuals of 1.81 compared to other models. For an analysis of the effect of market capitalization on economic growth we selected the last model for the same reason of high R^2 of 0.95 and low sum of square residuals.

6. Empirical results and interpretation

We estimated two models in our study. In the first model we analyzed the effect of macroeconomic variables on market capitalization. The data was regressed using E-views 8 by running the GLM estimation. We used this method to overcome the problem of multicollinearity. But before that we tested the heteroscedasticity using Breusch-Pagan-Godfrey, autocorrelation and normality to make sure that the estimates were BLUE. While testing for heteroscedasticity we used the F-test rule which states that when the numerical value of the computed f-statistic exceeds absolute 3 then the test is statistically significant and when the value of f-statistic is less than 3 then the test is statistically insignificant. In other words this means that at a 5 per cent level of significance we will reject the null hypothesis that there is no heteroscedasticity when the f-statistic exceeds absolute 3 and we will fail to reject the null hypothesis when f-statistic is less than 3. In our case as the f-statistic is 1.222474 which is less than 3; this implies that we failed to reject the null hypothesis. We thus conclude that there is no heteroscedasticity. Also using the p-values we find that at the 5 per cent level of significance we failed to reject the null hypothesis as the p-value is 0.3454 which is higher than 0.05. We, therefore, conclude that there is no heteroscedasticity.

The f-test for autocorrelation shows that the f-statistic is 0.762238 which is less than 3. This leads us to conclude that at the 5 per cent level of significance we failed to reject the null hypothesis. We hence conclude that there is no autocorrelation. Also, the p-value of 0.6947 is greater than 0.05 which leads us to conclude that there is no autocorrelation. To get R2 which is the goodness of fit, a statistical measure of how close the data is to

the fitted regression line was done. Given that we used the generalized linear model (GLM) to estimate our model we had to calculate it using the results of the estimation which led us to a value of 0.95. This means that our data was close to the fitted regression line. Further, the LR statistic was less than 0.05 which led us to believe that the model was significant.

In the second model, the results in the correlation matrix showed that there was high multicollinearity as the coefficient of correlation was higher than 0.70. Here again we estimated this model using GLM. To solve the problem of endogeneity before applying GLM we applied the 2SLS (two stage least square) where the number of listed companies on RSE was selected as the IV (instrument variable). The results of the two models' estimations are presented in Table 5.

Table 4: 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: Author's calculations.
Note: Significant at the 5 per cent level of significance.

6.1. Determinants of market capitalization

Column 3 in Table 5 shows the estimation results of the first model in which we regressed market capitalization on the macroeconomic variables (money supply, inflation, key repo rate) with consumption as the conditional variable. The p-value test shows that within the four variables only money supply was statistically significant. The results also show that an increase in money supply by one franc increased the market capitalization rate by 0.0029. This approves the real activity economists' theory that an increase in money supply means that money demand is increasing in anticipation of economic activity. This further implies higher expected profitability which causes stock prices to rise and thus results in an increase in the market capitalization ratio of a stock market. It is also in accordance with Ndunda (2016) who analyzed the effect of selected macroeconomic variables, inflation rate, money supply, exchange rate and GDP. Ndunda's study shows a significant relationship between market capitalization and inflation rate, GDP and money supply. The only difference is that in our study we did not find any other variables to be significant.

In our study all the other variables were not statistically significant. Though not statistically significant key repo was positively related to the market capitalization ratio where an increase in key repo by one unit led to an increase in market capitalization by

0.089. This is in accordance with Bernanke and Kuttner (2005) who analyzed the effects of unanticipated changes in the federal fund rates on equity and found that stock markets reacted mostly to unannounced changes in federal fund rates.

Inflation rate had a negative relationship with the market capitalization ratio where an increase in inflation by one unit decreased the market capitalization rate by 0.036. This is in accordance with Geetha's (2016) study which shows that there was a long-run relationship between inflation rate and stock prices. It is also in accordance with Ndunda (2016) though there is no significance. For all the authors an increase in inflation led to a decline in stock market prices. Finally, if consumption increased by one unit this decreased market capitalization by 0.0006. This is in accordance with our theory which states that an increase in consumption raises production capacity utilization with positive effects on profits and this will have a positive effect on the stock prices of a given company. Based on this information we regressed the model to estimate the effect of macroeconomic variables on the market capitalization ratio.

6.2. Determinants of economic growth

Column 4 in Table 5 shows the estimation of the second model in which we regressed the GDP growth ratio on market capitalization, capital formation and consumption. The p-value test shows that capital formation had a positive and significant relationship with GDP, where an increase in capital formation by one unit led to an increase in GDP by 0.40 and an increase in market capitalization by one unit led to an increase in GDP by 0.18. The significance of capital formation is supported by Shuaib and Ndidi (2015) whose study found a significant relationship between capital formation and economic development in Nigeria. The significance of capital formation is also supported by Bakare (2011) and Ainabor et al., (2014) who show that capital formation has a direct relationship with economic growth. The results corroborated the Harrod-Domar model which proved that the growth rate of the national income is directly related to the 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. Our results also show that market capitalization has a positive relationship with economic growth where an increase in market capitalization by one unit increases GDP by 0.18. This is in accordance with Levine and Zervos (1998); Narceur (2010) and Pardy and Mundial (1992) who say that the economic development of a country depends on the robustness of its stock markets as they act as a source of finance for businesses and by the fact that apart from providing a means of diversifying risks 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 governments to exercise market based rather than direct fiscal and monetary policies. Capital markets are also expected to accelerate economic growth by providing a boost to domestic savings and increasing the quantity and quality of investments; they also provide individuals with additional financial instruments that may better meet their risk preferences and liquidity needs. We found the relationship between consumption and economic growth to be positive though not statistically significant. An increase in consumption by one unit led to an increase in economic growth by 0.0048.

7. Usefulness of the results and policy recommendations

Vision 2020's main goal is transforming Rwanda into a middle-income country with a knowledge-based economy for which the country has set a target of 11.5 per cent annual GDP growth; 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 kept the key repo rate at 6.5 per cent. By doing so, the Central Bank intended to support the private sector and it was hoped that the commercial banks will decrease their lending rates and thus help the private sector to acquire loans from banks at low costs. However, the commercial banks did not react as expected as the lending interest rate is between 16 18 per cent which is still high compared to other countries in the region.

This shows that the banking sector in Rwanda is not influenced by the Central Bank's monetary instruments and this is hurting the private sector as its access to capital from commercial banks which is the main source of capital in Rwanda is very expensive and this is also hurting Rwandan economic growth. Considering that the global economy is facing a financial crisis and that it is 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 changes in money supply which can be influenced by the Central Bank, it is recommended that the Central Bank should consider a monetary policy that targets the capital market as an alternative way if the country is to achieve its vision. But before that based on the theory of market efficiency we would suggest that a study to investigate whether the RSE is efficient be done to educate policymakers so that they can start formulating policies that promote the use of the stock market as a source of capital. This is also supported by our second model where market capitalization shows a positive and significant relationship with GDP which means that developing the stock market will spur economic growth in the country.

Based on the Harrod-Domar model which proved that the growth rate of national income was directly related to the saving ratio and/or capital formation we would recommend that initiatives like ITERAMBERE funds which encourage the population to save be given more priority as this will contribute to achieving the country's savings targets that will help it to achieve Vision 2020. All the actions undertaken will not mean anything if the Rwanda stock market is not active and attractive enough for investors to be willing to join it. It is in this backdrop that we recommend that much effort be put into educating the public about the stock market. This will increase the number of new investors and increase the activities on the stock market which will make it more attractive for regional and international investors.

RSE and CMA officials should start if they have not done so yet to educate corporate organizations about raising capital using the stock market. This too will increase the number of products available on the stock market which will make it more attractive for new investors. All of this will lead to better stock market performance and economic growth. It will also facilitate companies to get capital at lower prices, which will lead to increased investments and economic growth. The government should continue to contribute to the development of the capital market by issuing shares from private companies in which it is a shareholder to increase the number of products available on the stock market as this has a positive impact on the performance of the stock market.

Quarterly issues of bonds should also be maintained to develop the stock market and at the same time to contribute to economic growth.

8. Summary, conclusion and suggestions for future data and research

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 objective of analyzing RSE's evolution and the impact of its development on general economic growth in Rwanda. This was done with the aim of formulating suitable policy recommendations that will contribute to RSE's development. We collected quarterly time series data from January 2011 up to the third quarter of December 2016 which was analyzed using E-views by doing GLM estimation for the first model. Here we studied the effect of macroeconomic variables on market capitalization using consumption as the conditioning variable. For the second model we studied the effect of market capitalization on GDP using capital formation and consumption as the conditioning variable. To solve the problem of endogeneity we used the 2SLS where the number of listed companies was used as the instrument variable.

We tested two hypotheses against the obtained results and were able to answer the research questions. In our first model our results showed that among the four macroeconomic variables which were regressed on the market capitalization ratio only money supply had a statistically significant relationship with market capitalization where we found that an increase in money supply by one Frw led to an increase in market capitalization ratio by 0.003. The other variables (key repo rate, inflation rate and consumption) showed no statistical relationship with the stock market's performance. In the second model market capitalization showed a positive and statistically significant relationship with economic growth where an increase in market capitalization by one unit increased economic growth by 0.18.

Capital formation also showed a positive and statistically significant relationship with economic growth where an increase in capital formation by one unit led to an increase in GDP by 0.40. Based on these results we tested the hypothesis at the 5 per cent level of significance and rejected the null hypothesis that money supply has no statistically significant relationship with RSE's performance and concluded that money supply influenced RSE's performance. At the 5 per cent level of significance we failed to reject the null hypothesis that inflation rate, key repo rate and consumption had no statistically significant relationship with RSE's performance. We concluded that the three variables did not have any significant influence on RSE's performance. At the 5 per cent level of significance we rejected the null hypothesis that RSE does not contribute to the country's economic development and concluded that RSE's performance had an impact on economic growth in Rwanda. We set out with three questions: What are the macroeconomic variables that affect RSE's performance? Does RSE's performance contribute to economic growth? If yes what is its contribution to this growth? To answer to the first question is that among the four selected macroeconomic variables, money supply was the only one that affected RSE's performance. To the second question, the answer is yes, RSE's performance contributed to economic growth in the country and an increase in market capitalization by one unit increased GDP by 0.18.

Given the significance of RSE's performance on economic growth and given that Rwanda already has a 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 put to strengthen RSE by increasing awareness and educating Rwandans about it. Regional integration with other stock markets will also be useful as it will open RSE to new participants and this will boost its performance and have a positive impact on economic growth. Given the fact that money supply has an impact on RSE's performance, the Central Bank should use this instrument to influence this sector which may play an alternative role as a source of capital for investments and as a way of saving. The government should also continue developing the capital market by issuing shares from private companies in which it is a shareholder to increase the number of products available on the stock market.

Given that the stock market in Rwanda is still new we encountered the problem of finding little information. Time and financial means were also a constraint and we did not manage to go to the field to collect data from stakeholders. Hence, for future research we recommend that primary data from market players be collected to analyze qualitative data to see if the well-established institutional and legal frameworks are contributing to RSE's effective development. Based on the theory of market efficiency we suggest that a study investigating whether RSE is efficient be done to inform policymakers so that they can start formulating policies that will promote the use of the stock market as a source of capital for investors. We suggest that a study be done on the impact of the regional integration of Rwanda on RSE's performance.

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Appendix A

Data used to estimate the effect of macroeconomic variables on the 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; the Rwanda Stock Exchange.

Data used to estimate the effect of market capitalization on 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: The 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: The 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: The Rwanda Stock Exchange.

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: The 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: Author's calculations.

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: Author's calculations.