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RESEARCH ARTICLE

IMPACT OF FINANCIAL SECTOR DEVELOPMENT ON ECONOMIC GROWTH IN RWANDA (2000-2015).

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Abstract

There have been heated debate empirical and theoretical debates as regards to the impact of financial sector on the growth of the economy in a country. While some studies concluded that financial sector drives economic growth, others have urged that it is economic growth that drives financial sector development. This work examines the impact of financial sector development on economic growth in Rwanda. It focused on the impact of financial sector development and bank deepening variables such as availability of credit to the private sector, bank deposits, interest rate and broad money and control variable Gross Fixed capital formation and real gross domestic product as variable for economic growth. The empirical analysis builds on quarterly data covering the period 2000Q1-2015Q4, using various econometric techniques such as Augmented Dickey Fuller (ADF) test, Johansen Multivariate Co-integration Test and vector error correction model. The major findings show that development in financial sector variables i.e private sector credit, bank deposits and gross fixed capital formation positively affect economic growth proxied by Real Gross Domestic Product. In addition, Empirical evidence linking financial sector development to economic growth has revealed a positive strong relationship between financial sector development and economic growth. The empirical results indicate that financial sector development granger causes economic growth in Rwanda, confirming the supply leading hypothesis. The Johansen co integration test revealed that a unit increase in gross fixed capital formation increase real gross domestic product by 0.64%, credit to private sector by 0.37% and bank deposits by 24% respectively. The variable of Bank Deposits has stronger effect than other variables as proved by the study. Findings are plausible because all variables are one of main drivers of growth in Rwanda. The results of Impulse response and variance decompositions also show a positive and significant effect of financial development on economic growth. This result is consistent with a number of earlier studies reviewed in the literature that found financial sector variables to positively affect real gross domestic product. The study therefore, recommends policies that improve access

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to affordable credit to private sector should be reinforced to generate sustainable economic growth.

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..... Introduction:-

Since the views of Schumpeter (1911) on the role of financial development on economic growth, backed by empirical studies of McKinnon (1973) and Shaw (1973), and major contribution of Levine (1997) who portrayed the functions through which financial development may affect economic growth, various studies have been carried out across regions and countries to provide further evidence on the link between financial sector development and economic growth. It is in this regard the researcher has carried out this study to determine if there is evidence of relationship between financial development and economic growth in Rwanda.

Over the last two decades the determinants of economic growth have attracted increasing attention in both theoretical and applied research. Yet, the process underlying economic performance is inadequately conceptualized and poorly understood, something which can be partly attributed to the lack of a generalized or unifying theory and the myopic way conventional economics approach the issue. Economic growth in a developing economy rest on an efficient financial sector that pools domestic saving and mobilizes foreign capital for productive investments. In the developing countries, industries need more funds to increase their investment so that they can meet globalization constraint, (Artelaris et al, 2007).

Hicks (1969) argue that in the nineteenth century, many private investment projects were so large that they could no longer be financed by individuals or from retained projects. The stock market then serves as an important tool in the mobilization and allocation of savings among competing uses which are critical to the growth and efficiency of the economy (Alile, 1984).

Recent theoretical literature on financial development and economic growth identifies three fundamental channels through which capital markets and other financial market and economic growth may be linked (Pagano, 1993): First, capital market development increases the proportion of savings that is channeled to investments; Second, capital market development may change the savings rate and hence, affect investments; Third, capital market development increases the efficiency of capital allocation.

It is well known that stock market and other financial market institutions play a major role in the economy through enhancing the efficiency in capital formation and allocation. They enable both corporations and the government to raise long-term and short term capital which enables them to finance new projects and expand other operations, In this regard, it is observed that the performance of the economy is boosted when capital is supplied to productive economic units.

The causality relationship between financial developments with particular emphasis on stock market, banks and economic growth issue has stirred debates in academic circles and the controversy has arisen from the fact that the relationship between the two variables is Dynamic in nature.

Theoretical literature has offered conflicting predictions on the role of financial sector development and economic growth. McKinnon (1973) And Shaw (1973) all argue that financial repression which characterized the Less Developed Countries (LDCs) tend to retard economic growth.

The causality relationship between economic growth and financial development is a controversial issue. Basically, the debate has been centered on whether it is the financial development that leads the economic growth or economic growth leads to financial development.

In view of this puzzle, some empirical analysis is needed at national level to examine if it is the development of the financial sector that leads to economic growth or vice versa.

The Rwanda financial sector is largely dominated by banking sector which hold around 66.9 % of the total financial sector assets. The pension sub-sector comes second, with 17.1% of the total financial sector assets. Insurance institutions hold 9.7% of the total financial sector's assets. Microfinance institutions account for 6.3 % of

total financial sector assets. The National Bank of Rwanda (BNR) is the sole regulator of the above mentioned financial sector sub-sectors. Other integral components of the financial sector in Rwanda are: forex bureaus; capital market and; payment system (BNR Report 2015).

Between June 2014 and June 2015, the number of banks increased from 14 in June 2014 to 17 in June 2015. Three banks: AB Bank, Crane Bank and BRD commercial joined the Rwandan banking industry. In total, the Current Rwandan banking system is composed of 11 commercial banks, 4 microfinance banks, 1 development bank and 1 cooperative bank. Microfinance's sub-sector constitutes 13 limited companies, 64 SACCOs and 416 UMURENGE SACCOs. There are also 88 foreign exchange bureaus. Non-Bank Financial Institutions include: 10 private insurers, 2 public insurers, 8 loss adjusters, 6 brokers, 155 insurance agents and 1 public pension fund and 54 private funds.

Rwandan banking system is more privately and domestically owned. As of June 2015, close to 61% of banking assets were domestically owned. Foreign assets were 39 %. Private ownership stood at 55 % of the total banking system assets. Three of the foreign banks are subsidiaries of Kenyan big banks which were ranked among top 100 banks by return on assets in Africa.

Studies like those of King and Levine (1993) and Beck and Loayza (2000) showed the importance of financial development to economic growth and highlighted its correlation with economic growth. Some of the studies propose that in the early stages of development, financial development leads to growth, while in later stages growth may determine the speed of financial development. However, the causal relationship that is whether financial development causes growth or economic growth causes financial development remains unconcluded. The present current study attempts to investigate empirically the direction of causality between financial sector development and economic growth in Rwanda, using various econometric techniques such as Augmented Dickey Fuller (ADF) test, Johansen Multivariate Co-integration Test and vector error correction model.

The main objective of this study was to determine the impact of financial sector development on economic growth in Rwanda. In other words if financial sector development that influences economic growth (supply leading hypothesis) or it's the economic growth that influence financial sector development (demand flowing hypothesis) and specific objectives were: To assess the contribution of private sector credit on economic growth in Rwanda, To examine the impact of bank deposits on economic growth in Rwanda, To determine the impact of gross fixed capital formation on economic growth in Rwanda and to examine the effect of broad money on economic growth in Rwanda.

The rest of paper is organized as follows: Chapter two presents literature review. Chapter three discusses the methodological issue and the econometric modeling. Chapter four analyzes the data using the methods explained in chapter three and interprets the results obtained from E-views. Finally chapter five presents conclusion of the study and provides policy recommendations.

Literature Review:-

This chapter reviewed literature on relationship between financial sector development and economic growth. The literature reviewed in this chapter highlights the theoretical review, empirical review, relationship between financial sector development and economic growth.

Economic growth means either the growth in a nation's real GDP (an increase in a nation's output of goods and services) or the physical expansion of the nation's economy. So when people refer to economic growth, what they really mean is either 'growth of real output' or 'growth of the economy'.

Growing economies provide the means for people to enjoy better living standards and for more of us to find work, economic growth is the most watched economic indicator, it tells you how much more the economy is producing than it did before. If the economy is producing more, businesses are more profitable, and stock prices rise, this gives companies capital to invest and hire more employees. As more jobs are created, incomes rise; this gives consumers more money to buy more products and services, driving more economic growth, for this reason, all countries want positive economic growth.

Economic growth is measured by changes in the gross domestic product, or GDP, this measures a country's entire economic output for the past year. This takes into account all goods and services that are produced in this country for sale, whether they are sold domestically or sold overseas. It only measures final production, so that the parts manufactured to make a product are not counted. Exports are counted, because they are produced in this country. Imports are subtracted from economic growth.

Economic growth is watched to find out what stage of the business cycle the economy is in. The most desirable phase is expansion, when the economy is growing sustainably. If growth is too far beyond a health growth rate, however, then it can overheat and create an asset bubble. This is what happened in 2005-2006 with housing in America. As too much money chases too few goods and services, inflation kicks in. This is usually the "peak" phase in the business cycle. At some point, confidence in economic growth dissipates. When more people sell than buy, the economy enters the contraction phase of the business cycle. When economic growth becomes economic contraction, it's known as a recession. An economic depression is a recession that lasts for a decade. The only time this happened was during the Great Depression of 1929.

Government can stimulate the economy through expansive fiscal policy, which is spending on government programs or tax breaks, expansive fiscal policy is addictive. If the government keeps spending more and taxing less to spur economic growth, it leads to deficit spending. This works for a while, but eventually leads to higher debt levels. In time, as the debt to GDP ratio approaches 100%, it can slow economic growth. Foreign investors may stop investing funds in a country with a high debt ratio, because they are worried they won't get repaid, or that the money will be worth less.

Empirically, there have been various approaches to explore the relationship between finance and growth. Past researches were based on cross sectional data using standard OLS estimation methods, and this approach confirmed that there was a positive correlation between financial development and economic growth. While their findings suggest that finance helps to predict long term growth, a number of authors (Chuah and Thai, 2004) argue that conclusions based on cross sectional analysis are unreliable and have several econometric problems.

Goldsmith (1969) and McKinnon (1973), using the financial intermediary assets of a country as ratio of GDP as an indicator for financial development, Goldsmith (1969) analyzes 35 countries from 1860 to 1963. Although causality cannot be clarified, Goldsmith (1969) suggests a positive correlation between financial development and growth. McKinnon (1973) studies several historical cases of economic performance and financial development and emphasizes the importance of a vital finance sector. However, modern econometric methods provide tools to evaluate the relationship between finance and growth in a more profound way. Endogenous growth theory, on the other hand, provided a much more sophisticated theoretical framework. Hence, performing empirical investigations on the topic has kept being a valuable field of empirical research. This section focuses on the most important recent studies. Levine and Zervos (1996) recognize that liquid stock markets and growth banking sector lead to economic growth through increase in capital accumulation and production.

According to Greenwood and Jovanovic (1990), financial sector development will direct funds to higher yielding projects with the great involvement of information: the financial intermediaries produce better information, improve resource allocation and hence foster growth. Basically, the role of financial sector in easing access to information and leading to efficient financial market raises the quality of investment, leading to technological innovation and consequently to economic growth. Cameron (1961) confirmed the supply leading hypothesis after his study in France where he found a positive impact of financial development on economic development through mortgage.

Kargbo and Adamu (2009) examined the relationship between financial development and economic growth in Sierra Leone for the period 1970–2008. Their results corroborate the finance-led growth hypothesis in Sierra Leone with financial development exerting a significant positive growth effect. More importantly they show that investment is an important conduit via which financial development feeds economic growth.

In Ghana, empirical studies on the finance–growth hypothesis are scanty except for the work of Quartey and Prah (2008) and Esso (2010). In their paper, Quartey and Prah (2008) show that there is some evidence in support of demand-following hypothesis, when growth of broad money to GDP ratio is used as a measure of financial development. However, there is no evidence to support either the supply-leading or demand-following hypotheses when growth in domestic credit to GDP ratio, private credit to GDP ratio, and

private credit to domestic credit ratio are used as proxies for financial development. Finally, their findings reveal that there is no statistical evidence to support Patrick's stages of development hypothesis in Ghana.

In South Africa, Odhiambo (2009) examined the dynamic relationship between interest rate reforms, financial development and economic growth. The author concludes that the causal relationship between financial depth and economic growth exhibit a demand-following path. However, emerging issue in the discussion in finance–growth literature is the issue of direction of causality between financial development and economic growth (Chee-Keong and Chan, 2011). As a result, myriads of theoretical and empirical studies have made attempts at delving deeper into the understanding of this relationship (Chee-Keong and Chan, 2011). For instance, Al-Yousif (2002) opines that most of the existing studies seem to over-emphasize the correlation between financial development and economic growth, while failing to acknowledge that the existence of a high correlation between two variables is a mere depiction of linear association rather than causality.

The great majority of empirical studies are organized around studies that measure each of the functions of the financial system, or on measures to the size of banks or financial markets. Fisman and Love (2003) concludes that firms frequently act as financial intermediaries in providing trade credit. This source of financial intermediation may be very important, especially in countries with restrictions on financial intermediaries and standardization in countries with less developed legal systems, which do not effectively support the formal financial development.

The first work on the relationship between finance and growth, led by R. Goldsmith (1969) motivated his breaking study of finance and growth as follows: One of the most important problems in the field of finance, if not the single most important one, is the effect that financial structure and development have on economic growth. Therefore, Goldsmith seeks to assess whether financial development exerts a causal influence on growth and if markets and intermediaries, which operate in an economy, have an influence on economic growth. Towards this end, Goldsmith shows, during the period from 1860 to 1963, for a sample of 35 countries, the value of the financial intermediation assets to GDP has a positive influence on economic performance. He found that the size of the financial intermediary sector is directly correlated with the quality of financial functions provided by the financial system.

Development during the thirty years after the original empirical research Goldsmith, Statistical Information and econometric tools, helped complete the study of Goldsmith. The finance-growth link was detailed benefit, particularly with the work of King and Levine (1993) who solved the most problems in the original study (Goldsmith, 1969), taking into account the lack valid proxy measures of the global financial development. The authors examined several possibilities: the best savings mobilization, effective risk diversification, the development of investment projects are all functions performed by the financial system, which may explain this positive influence on economic growth. Indeed, the authors, a sample of 80 countries between 1960 and 1989, have included other factors affecting the growth of long-period (control variables). They examined the canals of capital accumulation and productivity growth, built additional proxy measures for financial development level and tested the impact of financial development on long-run economic growth, capital stock and productivity growth.

While highlighting, the deficiencies in the early works of Goldsmith, cross-country growth regressions do not eliminate them. King and Levine (1993) have improved measures of financial development and showed that these indicators are positively and significantly correlated with economic growth and its sources. They focused, on only one segment of the financial system, banks and their indicators do not directly measure the degree to which financial systems affect the information costs and transaction costs. Note, however, that if the correlation is properly admitted, the causal direction remains disputed between, on one hand, financial development exogenous (driven by the supply of financial services), on the other hand, the endogenous financial development (demand-driven financial services).

In addition, Arestis and Demetriades (1997) have pointed out some weaknesses of the statistical basis of their results. They also stressed that the growth of countries in the sample has been frequently unstable and therefore, the results could be somewhat robust to changes in the reporting period. Empirical studies have long recognized that financial development of the banking sector; there are good reasons for studying the relationship between economic growth and long-run operation of equity markets. First, the theoretical discussion does not state that grants the largest and most liquid exert a positive or negative influence on economic growth and its sources. Secondly, some theories focus on the roles of competition from banks and markets to finance companies. Others submit to a

constraint that banks and markets can arise, coexist and prosper by providing various financial functions in the economy. Other theories still emphasize complementarities between banks and markets. Competing theories have shown that the independent roles of markets and banks stimulate more economic growth.

Data and Methodology:-

The study covered the time series data on quarterly basis from 2000Q1 – 2015Q4. The researcher also used the data from the published sources of National Bank of Rwanda. This study employed regression analysis or methodology, where useful tests of time-series were used like Augmented Dick Fuller test, Co-integration and Vector Error Correction Model where, the short run and long run relationship between financial sector development and Economic growth were analyzed. The mentioned tests were used to analyze the impact of financial sector development on economic growth in Rwanda.

This study intended to use econometric models to reveal the impacts and causal relationships between financial sector development and economic growth. In this section of the study, the researcher made a presentation of the econometric model that was used.

The researcher considered a VAR of this form;

$$Y_1 = \beta_0 + \beta_1 crp + \beta_2 GFCF + \beta_3 M_3 + \beta_4 bd + \beta_5 LR + \epsilon_t \dots (1)$$

Y1: Real GDP, crp: Credit to private sector, GFCF: Gross Fixed Capital Formation, M3: Broad Money and bd: Bank deposits, β : Parameters to be estimated, LR: Interest rate, ϵ_t : Error term or other factors which are not explicitly included in the model.

The method of estimation was the vector error correction model (VECM), the vector autoregressive (VAR) model with k explicative variables was used to specify the nature of the VECM. This study used the ADF as a test of stationarity, Johansen co-integration test and VECM modeling. The tests were used in order to arrive at a conclusion that is free from any doubt and which can lead to the acceptance of conclusions and recommendations of this study.

Results and Discussion:-

This section highlight the results of the unit root, co integration test, vector error correction, Granger causality tests, impulse responses and variance decomposition conducted in this study using secondary data and interpretations.

Table 1:-Descriptive Statistics

Statistics	RGDP	GFCF	CRPS	BD	LR	M3
Mean	6.432924	4.705544	5.534158	5.749943	16.49531	5.918673
Median	6.601881	5.046516	5.574998	5.890508	16.50000	6.049370
Maximum	7.175490	5.958425	7.045881	7.200029	17.50000	7.301215
Minimum	5.515322	3.318178	4.142023	4.340032	15.40000	4.559126
Std. Dev.	0.541131	0.937598	0.883573	0.865644	0.580757	0.827045
Skewness	-0.312024	-0.299214	0.016090	0.035344	0.053564	0.016182
Kurtosis	1.525868	1.411896	1.757402	1.722621	2.061084	1.719449
Jarque-Bera	6.833335	7.680513	4.120225	4.364517	2.381437	4.375626
Probability	0.032822	0.021488	0.127440	0.112787	0.304003	0.112162
Sum	411.7071	301.1548	354.1861	367.9964	1055.700	378.7951
Sum Sq. Dev.	18.44786	55.38262	49.18416	47.20838	21.24859	43.09227
Observations	64	64	64	64	64	64

Source: Researcher's compilation from E-views 8 results

Table1 shows the descriptive statistics of the variables. The results indicate that the mean values for variables are: real gross domestic product (RGDP) is 6.4, ratio of gross fixed capital formation (GFCF) 4.7, credit to private sector (CRPS) is 5.5, bank deposits (BD) is 5.7, lending rate (LR) 16.5, and money supply (M3) is 5.9. Therefore Jarque-Bera statistics indicates that all explanatory variables are normally distributed at the 5% level of significance. Considering the standard deviation of the above variables indicate that the data are clustered around the mean and hence more reliable. In addition, it indicates that all the explanatory variables have influence on economic growth in Rwanda as indicated by positive mean values and standard deviation.

Unit root tests:-

The established standard procedure for co integration analysis is to start with unit root tests on the time series data being analyzed. The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root test are used to test for the presence of unit roots and establish the order of integration of the variables in the model.

Table 2:-Unit Root Test

VARIABLES	ADF Test			PP Test		
	LEVEL	1 st difference	I(d)	Level	1 st difference	I(d)
RGDP	-0.921563	-3.5401983*	I(1)	-0.921563	-3.540198*	I(1)
GFCF	-0.912909	-3.540198*	I(1)	-0.912909	-3.540198*	I(1)
CRPS	-0.837031	-3.5401981*	I(1)	-0.837031	-3.540198*	I(1)
BD	-1.316238	-3.5482080*	I(1)	-1.106938	-3.540198*	I(1)
LR	-1.848733	-3.542097*	I(1)	-1.335909	-3.540198*	I(1)
M3	-1.349378	-3.548208*	I(1)	-1.346871	-3.540198*	I(1)

Source: author's compilation and values obtained from Eviews: Note: *(**) denote significant at 1% and 5% level of significance respectively.

Like in other time series data, the variables RGDP, GFCF, CRPS, BD, LR should be tested for stationarity before running the causality test. For this case, the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron tests are used. The results of the stationarity tests at level (not shown here) indicate that all such variables are non-stationary. Having found that the variables are not stationary at level, the next step is to difference the variables once in order to perform stationarity tests on differenced variables. The results of the stationarity tests on differenced variables are presented in Tables 2

The results revealed in Table2 indicate that after differencing the variables once, all were confirmed to be stationary. The ADF and Phillips Perron tests applied to the first difference of the data series reject the null hypothesis of non-stationarity for all the variables used in this study. Hence it can be concluded that all the variables are integrated of order one I (1).

Co integration Test:-

Having found that all variables included in the causality test are integrated of order one, the following step is to test for the existence of cointegration relationship between each of the proxies of financial development (GFCF, CRPS, BD, LR and M3) and real GDP. Due to this reason, the study used the Johansen (1991) cointegration test procedure. If cointegration is seen between these variables, then the prevailing of Granger causality in either direction cannot be ruled out. The results for the Johansen co integration test based on trace and maximum Eigen values test statistics are shown in table 3.

Table 3:-The Johansen co-integration test based on trace and maximal Eigen value – RGDP

Hypothesized	Trace statistics	0.05 critical value	P-value	Maximum Eigen Statistic	0.05 critical value	P-value
None *	102.1001	95.75366	0.0170	34.64243	40.07757	0.1804
At most 1 *	67.45770	69.81889	0.0760	31.48264	33.87687	0.0940
At most 2	35.97506	47.85613	0.3976	16.13465	27.58434	0.6543
At most 3	19.84042	29.79707	0.4337	12.09561	21.13162	0.5382
At most 4	7.744810	15.49471	0.4931	7.642438	14.26460	0.4162
At most 5	0.102373	3.841466	0.7490	0.102373	3.841466	0.7490

Source: Author's estimation from Eviews 8

Trace test indicates 2 co integrating eqn(s) at the 0.05 level

*denotes rejection of the hypothesis at the 0.05 level

** MacKinnon-Haug-Michelis (1999) p-values

From the table above showing Johansen co-integration test based on trace and maximal Eigen value in dependent variable that is RGDP both the trace test and the Max-Eigen test statistics show the presence of at least two co-integrating equations at 5% level of significance. This means that real gross product and the dependent variables are co-integrated, it also shows that there is a long-run relationship between financial sector development and economic

growth. Hence the hypothesis of no co-integration was rejected and went further for finding the co-integrating relationship.

Normalized co integrating relationship:-

The result of the normalized co integrating vectors as shown in table 4 indicates a long run relationship between real gross product and financial sector indicators as the explanatory variables. The results in the table 4 are explained with respect to the signs and magnitude of the variables in the normalized co integration results.

Table 4:-Long-run Dynamics: Normalized Co integration coefficients RGDP

RGDP	GFCF	CRPS	BD	LR	M3
1.000000	0.641865	0.373615	24.11641	-1.370665	-23.97189
(SE)	(0.32730)	(1.39445)	(7.59098)	(0.24505)	(8.32960)
[t-stat]	[1.9611]	[0.2679]	[3.1770]	[-5.5934]	[-2.8779]

Source: Author's estimation from Eviews 8

Normalized equation:-

$$RGDP = 0.641865GFCF + 0.373615CRPS + 24.11641BD - 1.370665LR - 23.97189M3$$

Except money supply(M3) and Lending rate(LR) all other variables are quite significant and correctly signed implying that gross fixed capital formation, private sector credit and bank deposit have a significant and positive relationship with economic growth.

A unit increase in gross fixed capital formation increase real gross domestic product by 0.64%, this finding is plausible because both public and private investment have been one of the drivers of growth in Rwanda.

A unit increase in private sector credit as a proxy for financial sector development increases real gross domestic product by 0.37 % suggesting that private sector growth stimulates growth. Indeed, growth in private sector credit following accommodative monetary policy that has been pursued by the National Bank of Rwanda continues to support financing of the economy thereby fuelling economic growth.

The coefficient on bank deposit also emerged positive and significant with a unit increase in deposit leading to 24% growth in real gross domestic product. Bank deposits are also one of the indicators of financial sector development. High bank deposit implies that banks have enough funds to lend to the public which funds are used for investment thereby fuelling growth. This financial sector indicator contributes the most to economic development in Rwanda.

The results reveal that the coefficient of lending rate is (-1.370665) which is negative and significant at 5%, this means that a unit increase in lending interest rate, would lead to decrease in real gross domestic product in long run. Lending rate is also an indicator of financial sector development. Low lending rates implies that banks have enough funds to lend to the public and funds are used for investment thereby fuelling growth in short-run.

In addition, the results indicate that the coefficient of M3 is (-23.97189) which is negative and significant at 5%, this implies that an increase in M3, would lead to a decrease in real gross product in the long run in Rwanda. Therefore, retarding economic growth.

Vector error correction (VECM) model:-

Having confirmed the variables are integrated of order I (1) i.e they are stationary after differencing once and after also confirming the existence of co-integration test, then an error correction model can be formulated. The reason behind such a model is the need to regain the long-run information lost by differencing the variables by using an error correction model. This model is derived from the long-run equation based on economic theory and helps us to estimate the speed of adjustment of Gross Domestic Product, Gross fixed capital formation, credit to private sector, lending rate and broad money to its short-run equilibrium. The error correction model gives the proportion of effect accumulated in the previous period that is corrected in the current period. The results of VECM are depicted below.

Hypothesis 3:-There is no significant relationship between financial development measured by GFCF, CPRS, BD and M3 and RGDP representing economic growth.

Table 5:-Short-run dynamics: Vector error correction model coefficients on RGDP

Regressors	Coefficients	T-statistics	Standard errors	p- values
ECM	0.23729	1.23030	0.01929	0.3257
D(RGDP)	0.234267	1.23030	0.01929	0.2247
D(GFCF)	-0.043056	2.48064	0.03566	0.6777
D(CRPS)	-0.363101	1.37934	0.01358	0.1097
D(BD)	-1.414365	0.36305	0.01528	0.1074
D(LR)	0.051429	2.52873	0.11291	0.0592
D(M3))	-0.182663	-0.210883	0.866183	0.8339
R-squared = 0.75140				
Adjusted R-squared = 0.74647				
F-statistic = 1.372317				
Prob (F-statistic)= 0.208438				

Source: Authors' computation from E-Views

The results above shows that the short run causality term is positive and significant at 5% level of confidence therefore there is the short run relationship between financial sector development and economic growth. The rate of adjustment of shocks from the previous year is indicated by p-values which are significant with all variables. The R-squared is 0.75140 whereas adjusted R-squared is 0.74647 indicating that 75 percent of changes in real gross domestic product are attributable to the combined effect of all independent variables in short run.

In addition, from the table, we notice that the ratio of gross fixed capital formation (GFCF) has a t-statistic of 2.48064 with a probability value of 0.6777 that is statistically significant indicating a strong positive relationship with real gross domestic product. The Credit to private sector (CPRS) shows same relationship with real gross product and a t-statistic of 1.37934 and a probability value of 0.1097.

The results reported that the F-statistic is 1.37 with a probability value of 0.208438 showing that the combined impact of the independent variables on economic growth represented by real domestic product is statistically significant in short run. We therefore reject the null hypothesis, and conclude that in short-run there is significant relationship between financial development and economic growth in Rwanda.

Furthermore, the Error Correction Co-efficient of 0.23729 is appropriately signed, being positive and also significant at 5% level of significance. The co-efficient shows that the speed of adjustment of the model is approximately 23.7 percent quarterly due to any deviation from equilibrium.

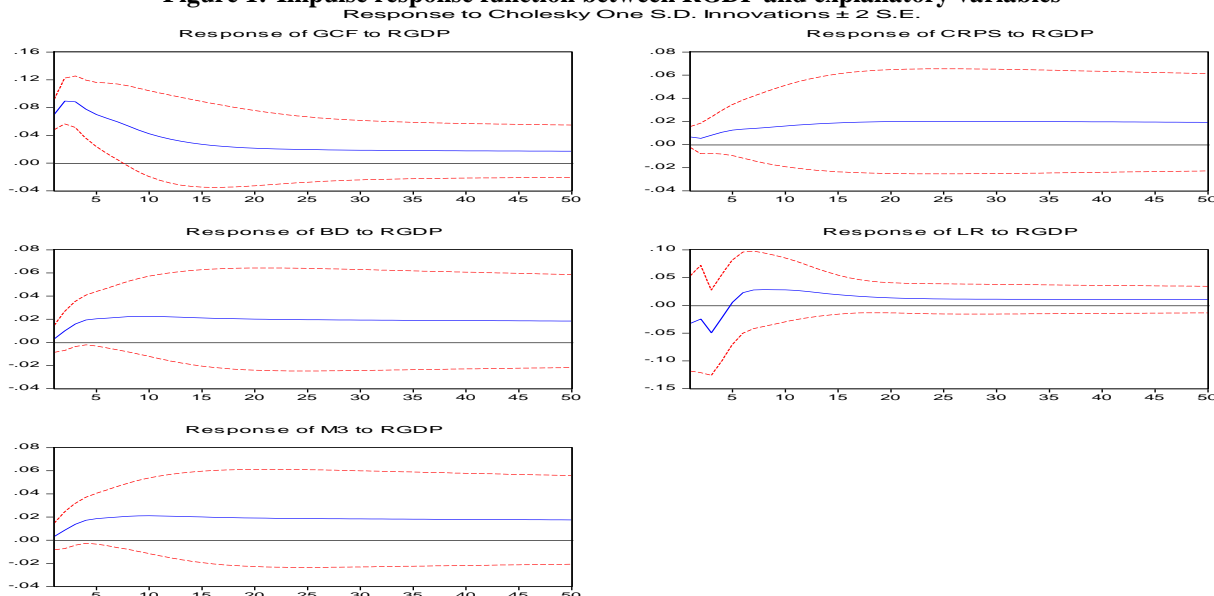
Impulse response functions:-

Impulse response function reflects the response of the dependent variables to unit shock of the independent variables. The vertical axis shows the deviation from the baseline level of the target variable in response to change in the shock variables of one standard deviation and the horizontal axis presents the number of quarters elapsed after the shock (Kigabo et al. 2008).

Impulse response function (IRF) depicts the dynamic property of the model. It helps to test for response of the dependent variables to unit shock of the independent variables. The results for the IRF show how each measure of financial sector performance respond to the shocks against economic growth in Rwanda.

To sum up, the response of real gross domestic product to shocks in independent variables there is uniformity in that there is a positive relationship between real gross domestic product in all cases as supported by Salas and Saurina (2002) study.

Nevertheless almost of financial sector indicators provide a significant impact to the shocks in economic growth measures in short run shown by blue lines as the best interpreter of impulse responses using vector error correction estimates (VEC).

Figure 1:-Impulse response function between RGDP and explanatory variables

Source: Authors' computation from E-views 8

Overall, the results from impulse response function indicate that all variables namely credit to private sector; bank deposits, broad money, gross fixed capital formation and lending rate have a long run positive effect on real Gross Domestic product. BD and M3 affect the RGDP in quarter 5 and GFC affect the RGDP in quarter 15. CRPS will affect RGDP in long run from 50th quarters while effect of LR continued to be closer to RGDP from quarter 5 to 50 quarters.

The results from impulse response function confirm the results from Johansen cointegration test, grange causality and variance decomposition which revealed the existence of the impact of financial development on economic growth in Rwanda.

Conclusion and Recommendations:-

In this study, the direction of causality between financial sector development and economic growth it was examined by using cointegration and error-correction models. Five proxies of financial development were included and one control variable in the study against real GDP, a proxy for economic growth. The five proxies of financial sector development are credit to private sector(CPRS), bank deposits(BD), broad money(M3) and lending rate(LR) plus one control variable which is gross fixed capital formation(GFCF).

The study finds a supply-leading hypothesis. This means that, for Rwanda, it is the financial development, which Granger causes economic growth. Put yet in other words, it is the expansion of the financial system which stimulates financial services to the public that spur growth.

The study attained its general and specific objectives and null hypothesis have been rejected meaning that all variables have unidirectional Granger cause to economic growth in Rwanda.

Based on the findings, the study recommends that the government to put in place policies and provide incentives for the continuation of the financial sector development for growth of the economy. Likewise, growth of the economy will make demand for financial services leading to financial sector development; economic growth and financial development are inter-reliant.

The findings from this study have some policy implications which will reinforce the observed benefits derivable from financial sector development especially in the form of economic growth arising from the established positive link between the variables. On the basis of the empirical evidence, policies that improve access to afford-able credit by the private sector, including small and medium enterprises (SMEs), would spur the needed innovation, expansion

in all sectors of the economy to generate desired employment levels, household incomes and overall growth of the economy.

Enhancing integration with the external financial market should be at the core of the financial sector development strategies. This will impact on the overall financial sector development thereby increasing economic growth. Since Rwanda financial sector is dominated by the banking sector, the financial sector has to deepen by strengthening the banking sector so as to maintain a sustainable economic growth. It can be strengthened by having a strong regulatory system that strengthens the private sector as it is the engine of economic growth.

However, the further research can be carried out to establish the relationship between financial sector development and economic growth using other various variables such as liquid liabilities, stock market capitalization, consumer price index, trade openness and per capita income as measure of growth.

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