Determining the effect of money supply as a ratio of GDP on economic growth in Kenya from 1985-2020

Authors
Purity Wambui Gachugu[1]; Kenneth Andayi Luseno[2]
Main author email: purityne@yahoo.com

(1.2) Egerton University, Kenya.

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Abstract
The study investigated the relationship between financial deepening and economic growth using money supply as a financial deepening proxy. Data on GDP was used as proxy for economic growth. The study was based on financial intermediation theory backed up by other theories related to financial deepening. The study adopted a historical research design. A bivariate Autoregressive model (bVAR) was used in the study. Data were analysed using both descriptive and inferential statistics where. The findings reveal that a unit rise in the money supply as percentage of GDP will result in a 0.3215 unit decrease in GDP growth in the long run. This is because the money supply is harmful to the economy in the long run. There are controversies on the relationship between economic growth and financial deepening; that is, there are no universal conclusions on the nature of the relationship between financial deepening and economic growth, and only a few studies have been done on the relationship between economic growth and financial deepening in recent years. The study established that money supply has a negative effect on economic growth in the long run in Kenya. In this regard, the study recommends that the government should tighten the monetary policy, which could either be through slowing down the open market operation activities such as floating of infrastructure bonds.

Key Terms: Economic growth, Financial Deepening, Gross Domestic Product (GDP), Money Supply.

INTRODUCTION

Shaw and McKinnon (1973) define financial deepening as the increase in the pool of financial services in all levels of society. It may also be defined as the improvement in the ratio of the money supply to the Gross Domestic Product, which in turn implies that more money is available in the economy. The increased amount of liquid money in the economy gives more opportunities for investment and growth purposes. Increased opportunities for investment then lead to economic growth. It may also be defined as the process which leads to improvement in the quality, quantity and efficiency of the services offered by financial intermediaries (Sackey & Nkurumah, 2012).

Economic growth is associated with the growth in the working population, increased capital formation, technological advancement and an increase in the number of resources. Economic growth is measured in quantitative terms. Iram and Nishat (2009) argue that the health of an economy can be indicated by economic growth. They also state that capital is a prerequisite which can be used to maintain and enhance the momentum of growth.

In the last two decades, several reforms have taken place in the Kenyan banking sector, which has impacted the financial deepening in the sector (KIPPRA, 2009). The deepening has been driven by financial innovations in the sector. A good example of such innovation was the reduction of the retention ratio by the CBK from 6 to 5.25 per cent, which made loans more affordable to the citizens (KIPPRA, 2009). There was also the transformation of NBFI, like family banks and equity, into commercial banks and the new financial products and services introduced to the banking sector, all of which led to financial deepening in the banking sector. The rationale behind the reforms was to strengthen the sector, which was experiencing challenges in the 1980s. The reforms have resulted in deepening the banking sector, leading to the expansion of financial assets and techniques to meet the new demands and circumstances. The development in the sector is evident through the increase in money supply, growth of domestic credit with private sector credit dominating the sector and increase in net domestic and foreign assets.

Over the past few years, financial deepening has attracted much attention from finance and development experts. In the current years, there has been a shift from saving money in terms of real assets into financial assets. Kenya has been undergoing fluctuations in the trend of economic growth. Working on financial sector development through the changes in money supply is likely to have an influence on economic growth. The recent changes in the financial market and how it affects the real sector of the economy have not been given enough attention. Many controversies have been generated, which means that further research needs to be done on the nature of the relationship between economic growth and financial deepening using a number of variables. One controversy is that financial growth may promote economic growth by its ability to mobilise more investments, thus increasing returns to financial resources and thereby raising productivity. Another controversy is that economic growth is a response to the expansion of financial markets and their progress. The existing literature show no universal agreement on the nature of the relationship between economic growth and financial deepening. The study addresses this factor by establishing the nature of the relationship between Financial deepening and Economic growth both in the long run and short run. In addition, only a few studies have been done on the relationship between financial deepening and economic growth in recent years.

LITERATURE REVIEW

Financial liberalisation is defined as the process of liberalising the financial systems of a nation aimed at creating a favourable environment in order to increase money demand in the economy. Liberalisation takes place in two ways. The first way is through increasing the financial resources of a country so as to cause supply-induced demand for money. The second way through which financial liberalisation takes place is through creating a favourable environment for investments within the economy.

This theory was pioneered by Mic Kinnon and Shaw (1973), who advocated for the liberalisation of the financial sector, thereby accelerating economic growth. According to this theory, financial sector liberalisation gives room for financial deepening. Financial deepening, in turn, reflects increased use of

financial intermediation by savers, investors and monetisation of the economy. Lowering the financial market frictions causes domestic savers to increase and also ends up attracting foreign capital. The theory by Mic Kinnon and Shaw (1973) is anchored on the assumption that a higher rate of interest results in a high degree of financial deepening, which implies that there will be high savings. These financial savings will be more efficiently allocated than if the savings were invested without the financial intermediaries (Thirlwall, 2005). This theory suggests that there is a complementary relationship between financial assets and physical capital accumulation, causing economic growth in developing countries. The theory has a limitation in that it does not offer a complete definition of financial liberalisation.

There are also studies conducted on the effects of money supply on economic growth in Kenya. Odhiamboh (2007) conducted a study on the role of financial development in South Africa. He used three proxies of financial development against economic growth proxies using the real GDP. The proxies used included the ratio of M_2 to GDP, the ratio of currency to narrow money and bank claim ratios of the private sector to GDP. Odhiamboh employed the Johansen-Juselius co-integration approach together with the vector error correction model to reveal the demand following the response between economic growth and financial development. The results rejected the supply-leading hypothesis, which states that financial growth causes economic growth. The study found that economic growth leads to financial deepening.

Safder (2014) investigated the effects of financial development on economic growth in Pakistan. The study examined the long-run relationship between financial deepening and economic growth using foreign direct investment and the level of inflation. Safder examined stationality among variables using ADF, and the results revealed that all variables are integrated of order zero. Johansen's Co-integration test showed that financial deepening, inflation, foreign direct investment and economic growth are co-integrated, which implied that there is a long-run relationship among variables in Pakistan. VECM analyses showed the existence of short-run relationships among the variables used. Error Correction Model for economic growth and foreign direct investment showed that there is an adjustment effect towards the long run. The Granger causality test showed a unidirectional relationship among variables.

Ghildiyal et al. (2015) assessed the causal impacts of financial deepening on economic growth in India. The study analysed the long-term equilibrium relationship using autoregressive distributed lag (ARDL) between financial deepening and growth. The study established that the level of financial deepening influences the level of economic growth of an economy. The study established that for development to occur in a nation, then, the financial sector of an economy must be well developed through efficient intermediation functions. Economic growth was measured using the GDP per capita, while financial deepening was measured using the ratio of M_2 to GDP. Stock market development was measured by getting the ratio of market capitalisation and GDP. The ratio of credit to the private sector to GDP was used to measure banking sector development. This study concluded that there is bidirectional causality between financial deepening and economic growth.

Ngugi et al. (2006) studied the capital market, financial deepening and economic growth in Kenya. Their study focused on the stock market and bonds market development. The study showed that there is a significant relationship between economic growth and capital and financial deepening. The study also found that non-bank financial services showed no significant relationship. The effect of financial deepening and economic growth get affected by the cost of doing business and investment.

Chogii et al. (2014) examined the change in GDP growth as a result of changes in stock market development in Kenya. The study used the data from NSE for the period between 1992 and 2011 for the Kenyan stock market. This study was conducted following controversies in the roles played by financial deepening on economic growth. This study used a correlation study design. The findings indicated that capital market deepening causes economic growth.

RESULTS AND FINDINGS
Descriptive Statistics
Summary statistics for all variables used in this study were explored before fitting in the data for

estimation. This enabled the researcher to establish the distributional characteristics of variables, which is a necessary step in data analysis. Summary statistics primarily involved measures of central tendency; in this case, the arithmetic mean of all the variables was calculated, and the standard deviation was used as a measure of distribution, minimum and maximum values were also provided. Summary Statistics results are shown in Table 1 below.

Table 1: Summary Statistics

Variables	N	Mean	Standard Deviation	Skewness	Kurtosis	Max	Min
GDP growth	35	4.1046	2.3366	-.4674	2.2884	-0.7994	8.4057
Broad money	35	36.3676	4.3225	.4573	2.7570	26.6818	43.2453
Terms of Trade	35	93.5650	10.8144	-.1227	2.3420	70.1493	114.019
Investment	35	18.6017	1.9842	.07404	2.0836	15.3879	22.8797

Table 1 displays summary results in the form of mean, standard deviation, skewness and Kurtosis coefficients. The study focused on Kenya, and time series data were collected from a period span of 34 years, ranging between 1985 and 2020. GDP growth has a mean of 4.1046%, and broad money supply as a GDP percentage has a mean of 36.3676%. The mean for terms of trade is 93.5650, while investment as a percentage of GDP has a mean of 18.6017 per cent.

The Table also contains standard deviation results. Kothari (2012) describes the standard deviation as the length at which the data has spread out from the arithmetic mean. Standard deviation is vital in detecting any form of outliers in the data. A larger standard deviation is an indication that the data has gone out further from the mean and vice-versa. GDP growth has a standard deviation of 2.3366, and broad money supply as a percentage of GDP has a standard deviation of 4.3225. The mean for terms of trade is 10.8144, while investment as a percentage of GDP has a standard deviation of 1.9842. All these variables have standard deviations that are lower than the mean. This means that there are no outliers in the dataset. Secondly, it means that none of the data is volatile.

Skewness is a measure of asymmetry. It is significant in explaining the deviation of the mean from the median and, therefore, showing the dispersion of the data. From the findings displayed in Table 1, GDP growth and terms of trade are negatively skewed with skewness coefficients of -0.4674 and -0.1227, respectively. On the other hand, broad money supply as a percentage of GDP and investment as a percentage of GDP are positively skewed with skewness coefficients of 0.4573 and 0.07404, respectively. All the variables have coefficients that are less than 1 in absolute terms, an indication that the data is symmetrical. In economic analysis, these findings denote that the results produced will be accurate, and thus, the data matches the required conditions of economic modelling (Kothari, 2012).

Kurtosis is a measure of the heaviness of the tail relative to the normality of the data involved. The measure is valuable in the detection of outliers in the data that are represented by the heavy tail (Kothari, 2012). The kurtosis coefficient for GDP growth is 2.2884; the broad money supply is 2.7570; credit to the private sector is 2.3420; the value of shares traded is 2.3375; terms of trade are 2.3420, and that for investment is 2.0836. Kurtosis coefficients with absolute values, which are higher than 3, are an indication of the presence of Kurtosis in the data, while those with lower absolute values of 3 show the absence of it. The variables in this study have absolute values that are below three, and thus, they can be termed as Platykurtic as they have less extreme values than a normal distribution. The study can, therefore,

draw the conclusion that the variables are normally distributed, satisfying the parametric requirements.

Correlation Analysis

Correlation is measured by coefficients that are scaled in a -1 to +1 range, where 0 denotes no linear or monotonic association - 1 denotes perfect negative association, and +1 denotes perfect positive association. Values that are greater than 0.5 in absolute represent a strong correlation, while those below 0.5 represent a weak association. The relationship becomes stronger and eventually approaches a straight line as the coefficient approaches an absolute value of 1. Pearson's correlation results are presented in Table 2.

Table 2: Pearson's Correlation Matrix

	GDP growth	Broad Money	Credit to the private sector	Shares traded	Terms of trade	Investment
GDP growth	1					
Broad money	0.0415	1				
Terms of Trade	-0.0662	0.5925**	0.3989*	0.4656**	1	
Investment	0.5479**	0.1552	0.2897	-0.2416	-0.3166	1

* Significant at 5 per cent (2-tailed)

** Significant at 1 per cent (2-tailed)

Table 2 displays a matrix of Pearson's correlation results. It is shown that there is a strong positive and significant (at 1%) correlation (0.5479) between investment as a percentage of GDP and GDP growth. This implies that an increase in investment will lead to a rise in GDP growth. There is a moderate positive (0.5925) correlation between terms of trade and broad money supply as a percentage of GDP which means that terms of trade increase broad money supply will also rise as a percentage of GDP. These findings reveal that most variables are not significantly associated with each other, and those that have very weak correlation, which suggests that there is no multicollinearity among the variables in the dataset. The study shows that the variables are positive but insignificantly correlated. The data can thus be used as it is.

Unit Root Test

Time-series data are always prone to problems of the unit root, which refers to a state where the mean and variance of the variable are not consistent over time rendering the data non-stationary. If ignored and the researcher goes ahead with estimation, it is likely to result in spurious approximations (Gujarati, 1995). The study used Augmented Dickey-Fuller and Phillips Perron tests to diagnose unit roots. Results are displayed in Table 4.3

Table 3: Unit Root Test

Variables	ADF Test Z(t)		PP test Z(t)		Order of Integration
	At level	First Difference	At level	First Difference	
GDP growth	-3.204*	-	-3.194*	-	I (0)
Broad money	-2.555	-6.464**	-2.563	-6.411**	I (1)
Terms of Trade	-2.055	-5.691**	-2.176	-5.696**	I (1)
Investment	-2.819	-5.855**	-2.810	-6.287**	I (1)

* Significant at 5 per cent (2-tailed)
** Significant at 1 per cent (2-tailed)

Table 3 presents Unit root results using Phillips Perron and Augmented Dickey-Fuller Approaches. GDP growth is found to be stationary in levels. On the other hand, the Broad money supply, terms of trade and investment are found to be non-stationary in levels and had to be differenced once to become stationary. According to Harris and Sollis (2003), the ARDL model requires the variables to be either integrated of order zero or integrated of order one, even though the data is estimated in levels. It can, therefore, be concluded that all the variables in the dataset have met this condition.

Lag Selection

Before estimation, it is vital to determine the optimal length of lags in an ARDL model due to their sensitivity to length. The study used Akaike Information Criteria (AIC) due to its suitability for smaller samples, that is, with less than 60 data points. Results are displayed in Table 4.

Table 4: Selection-order Criteria

Lag	LL	LR	df	P	FPE	AIC	HQIC	SBIC
0	-413.995				58252.1	27.9997	28.0893	28.2799
1	-338.702	150.59	36	0.000	4471.08	25.3801	26.0077	27.3418
2	-303.077	71.248	36	0.000	6284.34	25.4052	26.5706	29.0483
3	-242.178	121.8	36	0.000	3233.99	23.7452	25.4486	29.0697
4	418.936	1322.2*	36	0.000	5.3e-14*	-17.929*	-15.688*	-10.921*

From Table 4, it can be inferred that the model should have a maximum lag length of 4 going by the Akaike Information Criterion (-17.929*). The same is suggested by other tests; Final Predicted Error (5.3e-14*), Hannan-Quinn Information Criterion (-15.688*) and Schwarz Bayesian Information Criterion (-10.921*).

Cointegration Test

They conducted cointegration tests in a bid to determine whether there was a long-run relationship that existed among the variables. In this quest, Pesaran et al. (2001) Bounds Cointegration test was carried out. The test is based on a null hypothesis that postulates no long-run relationship in the model and an alternative of the existence of a relationship among the variables. The decision is determined by evaluating how far or near the F and t values are from zero compared to the critical values. Cointegration is displayed in Table 5.

Table 5: Bounds Cointegration Test

Test	10 per cent		5 per cent		1 per cent		P-value	
	1(0)	1(1)	1(0)	1(1)	1(0)	1(1)	1(0)	1(1)
F statistic	2.571	4.016	3.177	4.861	4.720	6.997	0.000	0.004

t- statistic	-2.477	-3.789	-2.873	-4.274	-3.703	-5.296	0.000	0.004
F =	8.403							
t =	-5.817							

The F- statistic 8.403 is higher than the critical values of I (1) regressors, while the t-statistics -5.817 is less than the critical values of I (1) regressors. The null of no cointegration is rejected and concludes the model containing GDP growth, terms of trade, broad money supply and investment exhibits a long-run relationship.

Regression Results

The model estimated an ARDL (2,0,2,2,1,0) regression using the AIC procedures. The data was regressed in levels as suggested by (Pesaran et al., 2001) because all the variables were either integrated of order one or zero. The long-run regression results are presented in Table 6, while the short-run regression results are presented in Table 7.

Table 6: Estimated Long-run Coefficients Using the ARDL Approach

	D.gdp	Coefficient	Std. Err.	t	P>t
ADJ					
	GDP				
	L1.	-1.3481	0.23176	-5.82	0.000
LR					
	Money supply	-0.3215	0.11283	-2.85	0.011
	Terms of Trade	0.08511	0.0322	2.64	0.017
	Investment	0.65102	0.13764	4.73	0.000

Table 6 displays ARDL regression results. The speed of adjustment coefficient is -1.3481 and significant at 1 per cent (P-value=0.000). This confirms the presence of long-run association that had been previously established by Pesaran et al. (2001) Bounds cointegration test. Specifically, the results illustrate that any deviation, in the long run, will be stabilised at a 13.48% adjustment rate per year. These findings imply that instead of monotonically converging to the equilibrium path directly, the error correction process fluctuates around the long-run value in a dampening manner. Nevertheless, once this process is complete, convergence to the equilibrium path is rapid (Narayan & Smyth, 2006). Individual results are discussed in the following subsections.

The estimated long-run coefficient for the money supply as a percentage of GDP is -0.3215 and statistically significant at the 5 per cent level. The findings reveal that a unit rise in the money supply as percentage of GDP will result in a 0.3215 unit decrease in GDP growth in the long run. This is because the money supply is harmful to the economy in the long run. The results are consistent with the findings of a study conducted by Kipkirui (2014). The study found that an increase in money supply as a percentage of GDP has a negative effect on GDP in Kenya for the period 1970 to 2012. The study explains that one cause of such phenomena is a rise in domestic credit which raises the money supply and, in turn, affects GDP negatively. The results are also consistent with a study by Kiganda (2014) which found that money supply is a significant determinant of inflation in the long –run. Inflation, on the other hand, affects GDP negatively.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions: This study concluded that money supply as the ratio to GDP has no significant effect on economic growth in Kenya. From the findings, a negative and significant coefficient was obtained for the money supply. Thus, the null hypothesis is rejected and hence, in the long run, the money supply has a

negative effect on economic growth in Kenya. These findings mean that money supply has the ability to misallocate the prices, inflating the prices of long-term assets such as the stock and housing markets. This factor is likely to lead to an economic downturn in the long run, as consumers would not be able to afford some of these assets.

Recommendations: The study established that money supply has a negative effect on economic growth in the long run in Kenya. In this regard, the study recommends that the government should tighten the

monetary policy as far as the money supply is concerned. This could either be through slowing down the open market operation activities such as floating infrastructure bonds. These activities lead to a reduction in economic growth in the long run as they are likely to crowd out private investment. An increase in money supply leads to an increase in prices and has a negative effect on production. This, in turn, has a negative effect on inflation.

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