# The Causal Relationship between Financial Development and Economic Performance in Tanzania

**By**

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***Abstract***

This study determines causal relationship between financial development and economic performance in Tanzania. The study employs cointegration and vector error correction model techniques. Granger causality test was applied to ascertain causation between financial development and economic performance. Overall economic performance is measured by the GDP out-turn; and proxies of financial development are: the ratio of money supply to nominal GDP; and growth of credit to private sector. The results show that there is a stable long-run relationship between financial development and economic performance in Tanzania. Granger causality test indicates that the causality runs from financial development to economic performance.

**Key words:** Growth, credit to private sector, money supply, financial development

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## 1. Introduction

The nature of the relationship between financial development and economic performance has been one of the most debated areas of development process in the recent past, yet with little consensus. Central to this debate is the question of whether strong economic development is finance-led or growth-driven. The question is germane because determination of the causal pattern between financial development and growth has important implications to policy makers' decisions about the appropriate growth and development polices to adopt. One could argue that, only in the case of supply-side led development policies should aim to enhance financial sector liberalization; whereas in the case of demand-side following development, emphasis should be placed on other growth-enhancing policies than financial development. The fact that strong correlation exists between finance and economic performance has been well documented in the development literature. However, previous empirical studies have produced mixed and conflicting results on the nature and direction of the causal relationship between financial development and economic performance.

In pursuit of transformation of economic growth process, Tanzania took an initiative which involved three generations of financial reforms. The first generation during 1991 to 2005 was focused on reformation of financial sector from state ownership and repressions to liberalized and privately-owned financial institutions. The second generation, 2006 – 2011 set the roadmap to appropriate legal, judicial and institutional reforms that would remove the main obstacles to lending, deepen financial intermediation and help develop the financial system. The current third generation is focused to streamlining financial development into the enhanced economic growth process (Bank of Tanzania, 2011).

The real sector development as measured by the economic growth rate has remained either high or modest throughout the post-reform period. The highest GDP growth rate recorded in Tanzania during the recent past was 7.8% in 2004 and decline slightly in 2009 to 6.0% but increase later to around 7.0% since 2010. Foreign direct investment (FDI) also has become important to private investment in Tanzania because of its economic significance, including contribution to tax revenue, diffusion of technology and export performance. FDI has been increasingly since 1992 when investment proportion policy was adopted and implemented in



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the country. Currently, more than half of new investment in Tanzania has been directed to industrial holding, mining, financial sector and agriculture.

The financial system exists in an economy in order to set up the settlement of payments, to mobilize the available financial resources from the surplus units of the economy and to allocate them efficiently to the deficit productive units that need financing, and also to pool and manage the financial risks. Financial system and intermediaries do organize the markets, control the process of financing and provide the public a set of instruments and means of management of investments. In view of these settings and developments, there is an obvious relationship between economic performance and financial development. Nonetheless, what is not obvious is the causal relationship between these variables in Tanzania. Unearthing their causality is relevant to policy making as it will highlight the right policy button that must be used to fine-tune the economy and expedite growth and poverty reduction.

## 2. Theoretical and Empirical Perspectives

Traditionally, the focus of the economic growth theory was on usage of labour and capital accumulation as the major cause-factors for long run growth; which means growth is exogenously determined. Nevertheless, this approach excludes any specific role of the financial sector. During the past twenty years, new theories have been developed that moved away from the view that growth is exogenously determined and therefore government cannot influence it. The new theories state that growth is endogenously determined, thus institutions and policies matter for economic growth.

### *Exogenous Growth Model*

This was an extension to the Harrod-Domar model which included an additional term, 'productivity growth'. The most important contributor to this model, Robert Solow; in 1956 he developed a relatively simple growth model which fit the available data of US economic growth. The key assumption of the Solow's growth model is that capital is subject to diminishing returns. Given a fixed stock of labour, the impact on output of the last unit of capital accumulated will always be less than the one before. Assuming for simplicity that no technological progress or labour force growth, diminishing returns implies that at some point the amount of new capital produced is only just enough to make up for the amount of existing capital lost due to depreciation. Let us denote labour, *L*, i.e. the number of workers employed

in the production process, and capital stock, *K*, while total output is *Y*. Let *A* measure the level of technology and suppose production function is Cobb – Douglas of the form,

$$Y = Ak^{\alpha} L^{1-\alpha} \quad 0 < \alpha < 1. \tag{1}$$

Output per labour ratio is $y = Y/L$, so that

$$Y = Ak^{\alpha}. \tag{2}$$

*k* denotes K/L ratio. Capital accumulation is given by

$$\dot{k} = sy - (n + \delta)k, \; 0 < s, \delta < 1. \tag{3}$$

Where *y* represents real output, *s* is a propensity to save, $n > 0$, is exogenous population growth rate and $\delta$ is a rate of depreciation of physical capital. Equation (3) gives the goods market equilibrium, thus, saving – investment (*I*) balance, $I = sy$. Suppose *A* is constant over time and substitute (2) into (3), then divide both sides by *k* to have

$$G_k = \dot{k}/k = sAk^{\alpha-1} - (n - \delta). \tag{4}$$

From this equation, output per worker growth rate is driven as,

$$g_y = \dot{y}/y = \alpha \dot{k} \, Ak^{\alpha-1} / Ak^{\alpha} = \alpha g_k. \tag{5}$$

Generally, if technology (like population) grows at a constant rate, it can be shown that in the Solow–Swan model, the steady state values of output / labour and the capital / labour ratios are also constant and proportional to the rate of (labour – augmenting) technological change.

According to Sorensen and Jacobsen (2005), beyond some point the marginal returns to new capital will be smaller than the marginal cost of adding new capital. At this point, because of the assumptions of no technological progress of labour force, the economy ceases to grow. Thus, in the exogenous growth models financial markets have no role in promoting the long run economic performance**.** Limitations of the model include its failure to take account of entrepreneurship (which may be catalyst behind economic performance) and strength of institutions (which facilitate economic performance). In addition, it does not explain how or why technological progress occurs.

***Endogenous Growth Model***

This model is based on two broad approaches, the first sees all inputs as reproducible, and the second one is based on externalities (in the form of human capital). In both approaches, the savings rate plays a key role in the growth of capital and output per worker. The former approach consist of viewing all production inputs as some form of reproducible capital, including not only physical capital (as emphasized in the basic neoclassical framework), but

also other types as well, especially human capital (Lucas, 1988; Romer, 1986; Rebelo, 1991). This results from setting α = 1 in Equation (2), thus

$$Y = Ak \tag{6}$$

But now is interpreted as a broad measure of capital, a composite measure of the physical and human capital stock. Using the capital accumulation Equation (4), the steady state growth rate of the capital stock per worker can be shown to be equal to

$$g_k = sA - (n + d), \tag{7}$$

*with the steady state rate of per capita income growth given as*

$$g_y = sA - (n + d), \tag{8}$$

which implies that the growth rate is $sA > n + d$, and it is positive while $y$ is constant over time. The level of income per capita rises without bound. An important implication of this model is that, in contrast to the neoclassical model, an increase in the saving rate permanently raises the growth of capital and output per worker.

The second approach is based on the assumption that externalities in the production process such as increase in the output level by one firm positively affects productivity in another firm. This means that if, say, one firm doubles its inputs, the productivity of the inputs of other firms will also increase. Introducing spill over effects leads to a relaxation of the assumption of diminishing returns to capital. In most models, externalities take the form of general technological knowledge that is available to all firms, which use it to develop new methods of production. An exception to this specification is in Lucas (1988), where externalities take the form of public learning, which increase the stock of human capital and affects the productivity of all factors of production. The presence of externalities is closely associated with the existence of increasing returns to scale in the production function of all factors.

However, in this approach, labour is endogenously determined and it is not just the quantity of labour which is relevant, but the quality of such labour. Households can save by investing in human capital in addition to physical capital investments. Therefore, households will produce labour with skills that will create ideas needed to handle new technologies. In this approach savings occurs in two ways: a fraction is saved for capital accumulation and a fractions is saved to increase quality of human capital. In this approach both savings rates have effects on the output growth rate. As a result, growth is no longer determined by the arbitrary technological changes, but it is endogenously determined by decision to invest in physical or

human capital. Without introducing financial market explicitly, there are grounds to believe that incentives for the population to save and to channel savings more efficiently to production process can economic affect growth positively. The growth models discussed so far do not incorporate the financial sector intermediation explicitly. The models only state that the share of aggregate output saved by the economy is available for investment. The problem inherent with this assumption is that it does not take into account the leakages and costs associated with financial intermediation process. Nevertheless, financial development contributes to growth in various ways. For instance, financial institutions are better suited than individuals to identify potentially successful projects, because these institutions are big enough to pay high costs of collecting information about individual projects and to analyze this information more efficiently. To ensure that the savers resources are used productively, the financial institutions also do supervise those projects. On the other hand, an increasing demand for financial services might induce an expansion in the financial sector as the real economy grows, implying that financial sector responds passively to economic growth.

The empirical results of the study on the causal relationship between financial development and economic growth which used data for South Africa and Kenya show that the direction of the causality between financial development and economic performance is sensitive to the choice of measurement of financial development (Odhiambo, 2007). A demand leading view was found to be stronger in South Africa and Kenya but in Tanzania the supply leading view was conversely found to be stronger. These findings are also consistent with Patrick's hypothesis which postulates that the direction of causality between financial development and economic performance changes over the course of development (Patrick, 1966).

Akinboade (2000) tested the causal relationship between financial development and economic growth in Tanzania. The results indicate that the causality between financial development and economic growth during financial liberalization has unidirectional movement running from financial development to economic growth. The purpose of this paper is to extend the discussion further by analysing the causality between financial development and economic growth of Tanzania for the extended period of 1980-2010. Thus, this paper is a follow-up and/or an extension of Akinboade's (2000) study. Although the paper builds upon Akinboade's tests, this study differs from Akinboade's since it uses longer time series and a different proxy for economic performance and financial development, respectively. Akinboade used real per capita GDP growth while this study uses overall real GDP variable. Also

Akinboade uses the ratio of bank deposit liability to nominal growth national product as the measure of financial development, while this study uses two proxies, the ratio of broad money to nominal GDP and the growth of credit extended to the private sector (PS). These financial development variables are hypothesized to have stronger relationship with output growth than the bank deposits.

Jung (1986); Kirakul, Jantarangs and Chatanahom (1992); and Rousseau and Wachtel (1998) examine the causal relationships between economic growth and financial intermediation. Specifically, Jung (1986) finds evidence for the causal relationship between financial development and economic growth. Measures of financial development include the ratio of money supply to nominal GDP. By employing Granger causality test for 56 countries, the results show that there exists a close relationship between financial and real development. The less developed countries are characterized by the causal direction running from financial to economic development. Developed countries are characterized by the reserved causal direction.

## 3. Methodology

In this study, Granger causality is used to examine the direction of causality between financial development and economic performance. The conventional Granger causality test involves the testing of the null hypothesis that financial development (FD) does not cause GDP (*Y*) and vice versa by simply running the following two regressions.

$$Y_t = \alpha_0 + \sum \alpha_{1i} \Delta Y_{t-i} + \sum \alpha_{2j} \Delta FD_{t-j} + \mu_{1t} \quad (9)$$

$$FD_t = \beta_o + \sum \beta_{1i} \Delta Y_{t-i} + \sum \beta_{2j} \Delta FD_{t-j} + \varepsilon_{2t} \quad (10)$$

Where $Y_t$ presents real GDP as economic performance, and $FD_t$ presents financial development proxies (the growth of credit to private sector and the ratio of money supply to nominal (GDP) for this case). $\mu_{1t}$ and $\varepsilon_{2t}$ are the white noise error terms for the two functions, respectively.

### *Testing stationarity*

Time series data is said to be stationary if the mean and variance are constant through time and the value of the covariance between the two time periods depends only on the distance or lag between the two time periods and not the actual time at which the covariance is computed (Gujarati, 2003). However, if the mean and variance change in samples for different time

spans, then this type of variable is known as non-stationary variable. Regression equations with non-stationary variables have serious limitations. Among other problems, their *t*-ratio and the adjusted *R*-squared will be overestimated by a large magnitude. Therefore, all tests become invalid. In order to avoid spurious regression problem, trended data is differenced to generate a stationary series. The most popular test of stationarity over the past several years is the unit root test. This test was first developed by Dickey and Fuller in 1970 and is named after them. The Dickey-Fuller (DF) test is applied to the regression analysis in the following forms,

$$\Delta X_t = \delta X_{t-1} + \varepsilon_t, \tag{11}$$

$$\Delta X_t = \alpha_i + \delta X_{t-1} + \varepsilon_t, \tag{12}$$

$$\Delta X_t = \alpha_1 + \alpha_2^t + \delta X_{t-1} + \varepsilon_t, \tag{13}$$

where *X* denotes the variable to be tested. This study uses an Augmented Dickey-Fuller (ADF) test that takes into account any autocorrelation by adding the lagged values of the dependent variable, $\Delta X_t$.

$$\Delta X_t = \alpha_1 + \alpha_2^t + \delta X_{t-1} + \sum_{i-1}^{m} B_1 \Delta X_{t-1} + \varepsilon_t \tag{14}$$

Where $X_t$ represents the variables whose time series properties are being investigated, $\Delta$ is the difference operator, and *m* is the number of lagged variables. The appropriate model for ADF unit root test is,

$$\begin{aligned} Y_t - Y_{t-1} &= \rho Y_{t-1} - Y_{t-1} + \mu_t \\ &= (\rho - 1) Y_{t-1} + \mu_t. \end{aligned} \tag{15}$$

This is also written as,

$$\Delta Y_t = \delta Y_{t-1} + \mu_t. \tag{16}$$

Where $\delta = (\rho - 1)$ and $\Delta$ is the first difference operator.

Ho = $\delta = 0$ (Unit root)

$H_1 = \delta < 1$ (No unit root)

If $\delta = 0$ then $\rho = 1$, which means there is a unit root, i.e. the time series under consideration is non-stationary. This means, $H_0$ presents the null hypothesis which suggest the presence of unit root, and $H_{1\ presents}$ the alternative hypothesis which suggest the absence of unit root.

***Testing cointegration***

Cointegration explores the possibility that the variables in the long run wander together and so restoring equilibrium relationship when the individual series themselves are non-stationary

in their levels but stationary when differenced. Thus, it can be stated that cointegration highlights the existence of a long run equilibrium to which the system converges overtime. This study uses the Johansen procedure which is based on a vector auto regression (VAR) framework to test for cointegration. The Johansen approach (Johansen, 1990) is most preferable to test for cointegration for more than two series compared to Engle Granger method. The procedure is based on likelihood ratio (*LR*) test to determine the number of cointegration vectors in the regression. It enables to test for the existence of non-unique cointegration relationships.

***Vector Error Correction Mechanism***

The short run adjustments are corrected using the vector error correction mechanism (VECM). The major advantage of VECM is that it avoids problems of a spurious correlation between dependent and explanatory variables, and it makes use of short run and long run information in the data. Also, VECM identifies the existence of granger causality between economic perfomance and financial development, Equations (17) and (18).

The cointegration equations are stated as Equations (15) and (16) while the vector error correction model equations are (17) and (18).

$$Y_t = \delta + \varphi FD_t + EC_{1t} \quad (15)$$

$$FD_t = \alpha + \vartheta Y_t + EC_t \quad (16)$$

$$\Delta Y_t = \alpha_o + \sum \alpha_{1i} \Delta Y_{t-1} + \sum \alpha_{2j} \Delta FD_{t-1} + \alpha_3 EC_{t-1} + \mu_t \quad (17)$$

$$\Delta FD_t = \beta_o + \sum \beta_{1i} \Delta Y_{t-1} + \sum \beta_{2j} \Delta FD_{t-j} + \beta_3 EC_{2t-1} + \varepsilon_t \quad (18)$$

Where $EC_{t-1}$ represents one period lagged error correction term, which is captured from the cointegration regression; and the causal inference is obtained through the significance of $\alpha_3$ and $\beta_3$.

***Granger Causality***

Evidence of a cointegrating relationship between financial development and economic performance is crucial for the correct specification of a model to test for Granger causality. Using Equations (9) and (10), long run and short run Granger causality can be tested. Granger causality in the long run is tested by checking the significance of the parameter estimates of the error correction term ($\alpha_3 EC_{t-1}$), where the null hypothesis to test is stated as $H_0$: = 0 (saying, financial development does not Granger-cause economic performance in the long-

run) in Equation (17), and $H_0$: = 0 in Equation (18), (saying economic performance does not Granger cause financial development in the long run). Granger causality in the short term is tested via restrictions (joint insignificance) of the parameters $\alpha_{2j}$ and $\beta_{2j}$ in Equations (17) and (18), respectively. This is performed using the Wald parameter restrictions test, in which the null hypothesis is $H_0$:$\alpha_{2j}$ = 0 (i.e. financial development does not Granger-cause economic performance in the short-run) and H0:$\beta_{2j}$ = 0 (i.e. economic performance does not Granger-cause financial development in the short run).

## 4.0 Estimation and Interpretation of Results

Estimations employ Tanzania's annual data (1980–2010) of GDP, money supply and credit to private sector. After transformation of Money supply (M2), and GDP into logarithms, these variables were normally distributed with skewness that is close to zero. According to Jarque-Bera statistic, the data follow normal distribution, i.e. they are symmetrically around the mean. Regarding the humpness, the variables are slightly flatter than a normal distribution (*platykurtic*). Moreover, the standard deviation results are nonzero indicating variability of observations over time.

**Table 1: Summary of Descriptive Statistics of the Variables**

| | ***gGDP*** | ***gM2*** | ***gPS*** | ***LogGDP*** | ***LogM2*** | ***M2/GDP*** |
|---|---|---|---|---|---|---|
| Mean | 4.190 | 24.726 | 8.674 | 6.274 | 5.620 | 0.233 |
| Median | 4.400 | 23.800 | 9.240 | 6.480 | 5.836 | 0.214 |
| Maximum | 7.800 | 54.900 | 16.210 | 7.509 | 6.905 | 0.418 |
| Minimum | -2.400 | -9.600 | 1.58 | 4.646 | 4.244 | 0.134 |
| Std. Dev. | 2.624 | 13.068 | 4.452 | 0.931 | 0.820 | 0.084 |
| Skewness | -0.543 | 0.063 | 0.148 | -0.431 | -0.233 | 0.688 |
| Kurtosis | 2.666 | 3.819 | 1.854 | 1.835 | 1.830 | 2.432 |
| Jarque-Bera | 1.665 | 0.886 | 1.811 | 2.710 | 2.048 | 2.861 |
| Probability | 0.435 | 0.642 | 0.404 | 0.258 | 0.359 | 0.239 |

**Notes:** gDGP = growth rate of GDP, gM2 = growth rate of broad money supply, gPS = growth rate of growth of credit to private sector, LogGDP = logarithm of GDP, LogM2 = logarithm of broad money supply, and M2/GDP = ratio of broad money supply to GDP.

### *Unit Root test*

A test of ADF Equation (16) for unit root gives the results indicated in Table 2. The null hypothesis is that the series are non-stationary and the critical values at 1%, 5% and 10% are -3.723, -2.989 and -2.625, respectively. The asterisks (***), (**) and (*) indicate rejection of the null hypothesis of non-stationary at 1%, 5% and 10% levels of significance at all levels of significance, respectively. The numbers in brackets are the probability values.

**Table 2: ADF Unit Root Test Results in Levels and First Difference**

| *At level* | | *At first difference* | | |
|---|---|---|---|---|
| | **t-statistic** | **OI** | **t-statistic** | |
| Log GDP | -2.396(0.1427) | I(1) | -3.008**(0.0007) | I(0) |
| M2/GDP | -1.903(0.3309) | I(1) | -4.168***(0.0007) | I(0) |
| gPS | -3.362(0.0123) | I(1) | -8.857***(0.000) | I(0) |

After differencing once, all variables became stationary, implying that the variables were integrated of order one I(1). The critical value for each of the variables turned out to be less than the computed *t*-value, thus concluding the time series data are stationary after the first difference.

***Cointegration test***

According to Engel and Granger (1987), if two or more time series variables are integrated of order one, I(1), there could be a linear combination between them, which is integrated of order zero, I(0). This necessitating the test for the presence of cointegration among the variables; which include GDP, the ratio of money supply to GDP and growth of credit to private sector.

**Table 3: Johansen Cointegration Test Result**

| *No. of CE(s)* | *Eigenvalue* | *Statistic* | *Critical Value* | *Prob.*** |
|---|---|---|---|---|
| None | 0.388487 | 25.54727 | 29.79707 | 0.1428 |
| At most 1 | 0.199914 | 11.28453 | 15.49471 | 0.1946 |
| At most 2 * | 0.153026 | 4.816482 | 3.841466 | 0.0282 |

Trace test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Trace test and maximum Eigen values statistics indicate 2 cointegrating equations at the 0.05 level, and denotes rejection of the null hypothesis at the 5% level. This means there is cointegrating vectors between GDP, the ratio of broad money supply to GDP and growth of credit to private sector. In other words, in the long run there is equilibrium relationship between these variables, they do wander together.

***Vector Error Correction Mechanism***

The existence of a long run relationship also has its implications for the short run behaviour of the I(1) variables. There has to be some mechanism that drives the variables to their long run

equilibrium relationship (Verbeek, 2008), thus the application of vector error correction mechanism (VECM) derives the short run dynamics of the series. When a long run relationship exists, there must be some forces that will pull the equilibrium error back towards zero; the vector error correction term does this. The following results were generated from the vector error correction mechanism specified in equations (17) and (18).

The result bellow show that equation one (financial development) is significant at 5 percent and coefficient of Error Correction Term (ECT) is negative as required, indicating the existence of dynamic stability. Its magnitude reports the speed for adjustment of around 20.3 and 30.1 percent respectively. This implies that, about 20.4 and 30.1 percent of the deviations from the long run equilibrium are corrected in one period. Equation (economic performance) is insignificant at 5 percent level and the coefficient of ECT is positive. Negative and statistically significant values of the coefficients of the vector error correction terms indicate that the measure of financial development and economic performance are adjusting to their long run equilibrium relationship.

**Table 4(a): VECM results for GDP and ratio of broad money supply to GDP**

| ***Independent variables*** | ***Dependent variables*** | |
|---|---|---|
| ***Error correction*** | ***D (Log GDP)*** | ***D (M2/GDP)*** |
| ECT | -0.203430<br>(0.00872)<br>[-2.33384] | 0.016443<br>(0.012207)<br>[1.36256] |
| D (Log GDP(-1)) | 0.314350<br>(0.29066)<br>[1.08151] | 0.051656<br>(0.40241)<br>[0.12837] |
| D (Log GDP(-2)) | O.120014<br>(0.25966)<br>[0.46219] | 0.004150<br>(0.35949)<br>[0.01154] |
| D (M2/GDP(-1)) | -0.046265<br>(0.22012)<br>[-0.21018] | 0.271979<br>(0.30475)<br>[0.89245] |
| D (M2/GDP(-2)) | 0.160833<br>(0.19699)<br>[0.81644] | -0.037400<br>(0.27273)<br>[-0.13713] |
| C | 0.128665<br>(0.06392)<br>[2.01294] | -0.020906<br>(0.08849)<br>[-0.23624] |
| R squared | 0.412414 | 0.142053 |
| Adj R-squared | 0.278871 | -052936 |
| Sum squared Residuals | 0.293173 | 19370.56 |

| | | |
|---|---|---|
| F-statistic | 3.088263 | 0.728519 |
| Long likehood | 24.09848 | 14.98971 |
| Akaike information criterior | -1.292749 | -0.642122 |
| Schwarz criterion | -0.007276 | -0356650 |

Standard errors are in ( ); t-statistics in [ ]

**Table 4(b): VECM results for GDP and growth of credit to private sector**

| ***Independent variables*** | ***Dependent variables*** | |
|---|---|---|
| ***Error corrections*** | ***D (Log GDP)*** | ***D (gPS)*** |
| ECT | -0.301042<br>(0.01287)<br>[-2.41170] | 0.013870<br>(0.03951)<br>[0.3510103] |
| D (Log GDP(-1)) | 0.299253<br>(0.20514)<br>[1.45874] | -3.355281<br>(0.62976)<br>[-5.32784] |
| D (Log GDP(-2)) | 0.003287<br>(0.22328)<br>[0.01472] | 3.190263<br>(0.68543)<br>[4.65437] |
| D (gPS(-1)) | -043211<br>(0.0547)<br>[-0.80806] | -0.273710<br>(0.16416)<br>[-1.66734] |
| D (gPS(-2)) | -0.027210<br>(0.04428)<br>[-0.61457] | 0.049920<br>(0.13592)<br>[0.36728] |
| C | 0.160043<br>(0.06250)<br>[2.56079] | 0.067118<br>(0.19186)<br>[0.34983] |
| R squared | 0.412920 | 0.728215 |
| Adj-R-squared | 0.279493 | 0.666445 |
| Sum squared residuals | 0.292920 | 2.760477 |
| F-statistic | 3.094721 | 11.78924 |
| Akaike AIC | -1.293611 | 0.949647 |
| Schwarz | 0.463059 | |

Standard errors are in ( ); t-statistics in [ ]

### *Causality Test*

The cointegration test reveals that a long run relationship exists between the variables under the study (GDP and financial development indicators). The cointegration test findings necessitate doing Granger causality to ascertain the direction of influence between economic performance and financial development. The inclusion of the error terms in the Granger causality test equations enables us to distinguish between short run and long run causality of financial development and economic performance.

***Long run Causality***

Long run causality is performed by testing whether the coefficient of the Error Correction Term (ECT) in each equation is statistically different from zero (by a *t*-test) and that it has a negative sign (Kirchgässner and Wolters, 2007), which means the process restores equilibrium over time. The analysis shows (Table 5(a)) that the coefficient of the ECT in the GDP equation is negative and statistically significant at 5%; but in the M2/GDP equation, the coefficient of the ECT is not significant and is positive. This implies that there is unidirectional causality, which runs from financial development to economic performance in the long run.

**Table 5(a): Long run Granger Causality Test for the Model**

| ***Null Hypothesis*** | ***ECT*** | ***Observation*** | ***t-statistic*** | ***Prob*** |
|---|---|---|---|---|
| LogGDP does not granger cause M2/GDP | 0.016443 | 28 | 1.362559 | 0.1868 |
| M2/GDP does not granger cause LogGDP | -0.20343 | 28 | -2.333842 | 0.0291 |

ECT is coefficient of error correction term

Table 5(b) shows results of the test of long run causality between GDP and growth of credit to the private sector. This intends to establish the variable that drives the other in this case of Tanzania.

**Table 5(b): Long run Granger Causality Test for the Model**

| ***Null Hypothesis*** | ***ECT*** | ***Observation*** | ***t-statistic*** | ***Prob*** |
|---|---|---|---|---|
| LogGDP does not granger cause gPS | 0.013780 | 28 | 0.351029 | 0.7289 |
| gPS does not granger cause logGDP | -0.031042 | 28 | -2.411698 | 0.0247 |

The above null hypothesis of GDP does not Granger cause growth of credit to private sector is not rejected at the 5%, but the null hypothesis of financial development indicator (growth of credit does not Granger cause GDP is rejected at the 5%. Implying that, there is unidirectional Granger causality that runs from financial development to economic performance, which supports the supply leading hypothesis.

***Short run Causality***

The short-run Granger causality test is based on a likelihood ratio test, which follows the chi-square distribution; it tests jointly the significance of the coefficients of the explanatory

variables in their first differences. It is applies on the estimated VECM, where cross-equation restrictions are imposed on the lag differences in each of the equations of the VECM. Table 6 bellow reports the results of short-run Granger causality. This study fails to reject the null hypothesis that growth of credit to private sector does not Granger cause GDP; but rejects the null hypotheses that GDP does not Granger cause growth of credit to private sector at 1% level of significance. This implies that there is unidirectional short run movement running from GPD to the growth of credit to private sector as one the adopted indicators of financial development in this study.

**Table 6: Short Run Granger Causality Tests for the Bi-variate Model**

| ***Dependent variable: LogGDP*** | | | |
|---|---|---|---|
| ***Excluded*** | ***Ch-sq*** | ***df*** | ***Probability*** |
| D(gPS) | 0.661264 | 2 | 0.7185 |
| All | 0.661264 | | 0.7185 |
| ***Dependent variable gPS*** | | | |
| | ***Chi-sq*** | ***df*** | ***Probability*** |
| D(LogGDP) | 37.09274 | 2 | 0.0000 |
| All | 37.09274 | 2 | 0.0000 |
| ***Dependent variables LogGDP*** | | | |
| ***Excluded*** | ***Chi-sq*** | ***df*** | ***Probability*** |
| D(M2/GDP) | 0.666687 | 2 | 0.7165 |
| All | 0.666687 | 2 | 0.7165 |
| ***Dependent variable: D(M2/GDP)*** | | | |
| ***Excluded*** | ***Chi-sq*** | ***df*** | ***probability*** |
| D(LogGDP) | 0.23794 | 2 | 0.9882 |
| | 0.23794 | 2 | 0.9882 |

The null hypothesis that GDP does not Granger the ratio of broad money supply to GDP as another indicator of financial development adopted is not rejected, and the null hypothesis that the reverse is true is also rejected. This means for the case of Tanzania that, in the short run the relationship between GDP and the ratio of the broad money supply to GDP is not strong.

## 5. Conclusion

The findings of this study show evidence that financial development that is being experienced in Tanzania spurs economic performance. Therefore the policy implication is that the government has to devise strategies that will further enhance the functioning of the financial system as a way to accelerate growth. Creating enabling environment for effective participation of private sector in delivering financial services will thus be instrumental to growth enhancement. Enhancing competition and development of financial markets through

domestic and foreign capital is vital to promotion of economic performance of Tanzania. The challenges remains to continue creating a more conducive environment for development of the financial sector to grow the economy, and this is in tandem with the Tanzania's vision to substantially reduce poverty and transform the economy to a middle income status by 2025.

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