The Contribution of Financial Sector Development for Economic Growth in East Africa

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Abstract

The study empirically analyses the contribution of Financial Sector Development to Economic Growth in East Africa over the period 1975-2014. A five variable dynamic panel Fully Modified Ordinary Least Squares FMOLS is employed to estimate the short-run and long-run parameters.The fluctuations of Financial Sector and Economic Growth are mainly explained by their shocks in the long run and the proportion in the variance slightly decreases over time while the accumulated response of Economic Growth to Financial Sector increases. The gain of this study, therefore, provides the Supply and Demand Leading Hypotheses; means Financial Sector accelerates and augments the economic growth and the Economic Growth enhances the Development of Financial Sector. The implications drawn from this study are the reforms in the Financial Sector; inclusiveness of Financial System and effective vigorously pursued expansionary monetary policy, which directs the economy, could be a comprehensive beneficial to the study countries.

1. Introduction

The relationship between Financial Sector Development FSD and Economic Growth has increasingly attracted a number of researchers across the globe because of institutional differences and variation in capital allocation between and within economies. Financial Sectors can be considered as factors, policies and institutions that lead to effective financial markets and access to capital and financial services (World Economic Forum, 2012). A rapid economic growth must transform into sustained and inclusive development, through on development strategies that foster economic diversification, create jobs and reduce inequality and poverty according to (UN and African Union, 2014) report. However, Africa's recent growth remains below potential and has failed to translate into meaningful job creation and its GDP growth rate slowed from 5.7 per cent in 2012 to 4.0 per cent in 2013, against developing economies' average of 4.6 per cent(United Nations Economic and Social Council Commission for Africa and African Union (2014, p.14) report.

Capital markets in the financial systems can also contribute to growth by raising long-term finance for productive investment, diversifying investors' risks and improving the allocation of funds (DFID, 2004). Nevertheless, in the East Africa economies, capital markets are underdeveloped, constrained by out dated legal frameworks, lack of capacity and regulatory framework, poor supervision and less market shares. The East Africa has a difficulty to access the banking system, which ties the biggest component of the financial sector. The financial activity in the region is by far infant and characterized by the monopolistic or oligopolistic behaviour of a few commercial banks, owned by governments. More importantly; the financial systems have remained highly exclusive and this exclusiveness is a primarily result of market failures that make the provision of financial services to lower-income groups as empirical evidences by (Thorsten and Samuel, 2013; Ali and Emerta 2012).

The contribution of financial sector development and capital market to economic growth are important tools because they promote economic growth, develop private sectors, increase liquidity to mobilize local savings, enhance bank competitions and develop a greater diversity of financial institutions (Paul, 2004). Financial sector development and its services would expect to play an essential role in improving the livelihoods. However, this is not the case in the East African region. For instance, there is an increase in the financial risk associated with growing stock of external debt and shortage of foreign exchange in Ethiopian (Haile and James, 2014), lack of export financing and long-term credit

(Wolday and David, 2010) and very low level of the financial inclusiveness and lack of physical access(Girma, 2012) and raising the paid-in capital about 566 per cent for commercial banks and 900 per cent for microfinance institutions by the National Bank of Ethiopia (Genet,2014).

Despite the fact that the Kenyan innovations in financial access undertaken in the system through Safaricom's M-Pesa, the world's leading mobile phone based microfinance institution for payments provider is a remarkable (Susan, 2014) except the financial system volatility in credit markets and macroeconomic instability. The problems mentioned above are similar to other countries in the region. For instance; undiversified, relatively high lending rates, extremely low insurance penetration and a scarcity of long term debt in Rwandan finance system; largely excessive government interference in the management of financial institutions of Tanzania and sharply curtailed and the neglect of prudential regulation leads to mismanagement in Uganda are among others, see (United Nations, 2014 report; Kessy, 2011 and Martin, 1996).

Similar empirical studies were also conducted in particular by (Athenia and Alfred, 2014) Banking sector development and economic growth: Evidence from Zimbabwe; (Montfo et al. 2013) Banking in Sub-Saharan Africa: Challenges and Opportunities; (Ndlovu, 2013) Financial Sector Development and Economic Growth: Evidence from Zimbabwe; (Nicholas,2008) Financial Development in Kenya; (Thorsten and Samuel, 2013) on Financial Sector Development in Africa; (Ali and Emerta, 2012) Financial Sector Development in the IGAD Region; (David,2012) Policy Innovations to Improve Access to Financial Services in Developing Countries: Learning Kenya; (Ali, 2012) Banking Sector Development and Economic Growth; (Paul, 2004) Capital Market and Financial Sector Development in Sub-Saharan Africa and (Easterly and Levine, 1997) Africa's Growth Tragedy, policies and Ethnic divisions have similar arguments on African wide and other developing countries in general.

This study extensively describes a number of controversial empirical studies whether the FSD has a positive impact on Economic Growth. Evidences from empirical studies show deeper, broader and better functional financial sector development can stimulate economic growth (Ugbaje and Edez, 2014; Montfort, et.al. 2013; Levine and Zervos, 1996 and Pagano, 1993). However, (Lucas, 1988 and Stern, 1989) suggest there is no relationship between financial sector development and economic growth. Therefore, looking at the mixed results and different views among the evidences of empirical studies, we explore the existing theory in organizing an analytical frame work to assess the effectiveness and importance of the FSD to the economic growth and the economic growth to the FSD, too.

East Africa is a Sub-Saharan Africa region with significant problems on the one hand and great potential for sustained economic growth on the other hand. There are a number challenges to further development. Persistent poverty, low level of human development, non-inclusive growth, lack of infrastructures and weaknesses in governance are among others.The Sub-Saharan FSD in general and the East African in particular, is very infant one because there are almost no financial markets in the region.

The objective of this study is mainly an attempt to verify the effect and contribution of the FSD to the dynamic Economic Growth and vice versa using dynamic panel FMOLS under Cointegration environment. We provide a number of related empirical literature studies; description of the variables; specification and estimation of the models that inspire the study in genuine options concerning methods for the analyses.

Several studies have been trying to explain the complementarity between the financial sector and economic growth, despite the fact that the existence of the issue is quite sure known for many years. The theoretical explanations in the literature provide the FSD- led Economic Growth Hypothesis or the Growth-led FSD Hypothesis. This study adds an important unique contribution to the existing stock of knowledge about the analyses of FSD-real GDP model. Since it provides the econometric application with dynamic variance decomposition and response function of the FSD to Economic Growth and vice versa, in addition to dynamically estimates the short-run and long-run parameters and tests in a panel. As far as we know, there is no study attempts to look into this kind of dual inter-temporal causal relationship between Financial Sector Development and Economic Growth with dynamic FMOLS model.

Therefore, extensively study of the Financial Sector Development FSD contribution to Economic Growth and the debates on inter-temporal causal relationship motivate me to study whether there is a finance-led growth or a growth-led finance response for the East African Economic Growth. That is, we claim both the supply and demand sides' hypotheses for the empirical analyse to be made. Explicitly, we have made a scientific hypothesis of justification that the stronger financial sector governed by comprehensive Expansionary Monetary Policy, the greater opportunity for the economy to be everlastingly growth and the dynamic economy accelerates the FSD development.

The paper is structured as follows: the next section highlights surveys of the related literature reviews; section three describes the data and methodology used. In section four, discussion and empirical findings are provided and finally, the main findings of the study are summarized in concluding section.

2. Related Literature Reviews

Many empirical studies have indicated finance and economic growth are interrelated, for instance, (Adusei, 2013) study on Finance-Growth Nexus; (Agnieszka, 2013) Financial Liberalization, Development, Productivity and Growth; (Anthony and Tajudeen, 2010) Financial Development and Economic Growth; (Beck et al.1999) Finance and the Sources of Growth; (DFID,2004) the Importance of Financial Sector Development for Growth and Poverty Reduction; (Frank and Eric 2012) Financial Sector Deepening and Economic Growth in Ghana; (Jones,2009) Financial Development and Economic Growth: Evidence from South Africa; (Kessy,2011) the Role of Financial Sector Reforms on Development and Growth of Microfinance Sector;(Levine and Zervos, 1996) Stock Market Development and Long-run Growth; (Levine, 1997) Financial Development and Economic Growth; (Levine, 1997) Finance and Growth; (Mankiw et al., 1992) a Contribution to the Empirics of Economic Growth and (Martin, 1996) Financial Repression and Financial Reform in Uganda and (Najia, 2013) studies the Impact of Development and Efficiency of Financial Sector on Economic Growth: Empirical Evidence from Developing Countries are among others.

Empirically, studies by (Levine and Zervos, 1998 and King and Levine 1993) deeply see the role and contribution of the financial sector in economic development in cross-countries analysis, indicating stock market liquidity and banking sector development have a positive correlation with economic growth in both short run and long run period in most countries. Nevertheless, regarding an important contribution of financial sector development to economic growth, a number of controversial empirical studies have described the issue extensively. Evidences from recent empirical studies suggest that deeper, broader and better functioning of the FSD can stimulate economic growth of a given country, for example (United Nations Economic and Social Council Economic Commission for Africa and African Union (2014) overview of recent economic and social developments in Africa; World Economic Forum (2012) and World Economic Outlook (2015) point out the importance of Financial Sector Development.

From individual point of views, some scholars such as (Stern, 1989; Sofia et.al. 2011; Ugbaje and Edez, 2014; Montfort, et.al. ,2013; Najia, 2013; Adusei, 2013; Wampa,2013; Wafaa et.al., 2013;Frank and Eric,2012; Anthony and Tajudeen, 2010; Jones, 2009; Paul,2004;Ndikumana ,2001;Levine,1997; Levine and Zervos ,1996 and Pagano, 1993) try to see the importance of finance for the development. While others like Athenia and Alfred (2014), Agnieszka (2013), Ndlovu (2013), Ali (2012) and Nicholas (2008), Rym et al.(2013) argue that financial development is unidirectional causality from economic growth to financial development. On the other hand, (Hshin-Yu and Reichert, 2006) show mixed results, for example, some scholars indicate a negative relationship between the financial sector development and economic growth (see the analyses made by (Cecchetti and Kharroubi, 2015 and Rym et al.2013)). However, (Lucas, 1988 and Stern 1989) suggest that there is no relationship between financial sector development and economic growth. For Lucas (1988), finance is an 'over- stressed' determinant of economic growth.

3. Data Sources and Methodology

The methodological foundation of this study is (Baltagi, 2005) Econometric Analysis of Panel Data. The Panel Data Econometric analyses approach used by (Baltagi, 2006) on Panel Data Econometrics-Theoretical Contributions and Empirical Applications; (Hahn ,1999) how Informative is the Initial Condition in the Dynamic Panel Model with Fixed Effects; the study of (Blundell and Bond, 1998) on Initial Conditions and Moment Restrictions in Dynamic Panel Data Models; (Ahn and Schmidt, 1995) for Efficient Estimation of Models for Dynamic Panel Data; and (Islam, 1995) Growth Empirics from a Panel Data Approach ; dynamic demand for natural gas in (Baltagi and Levine, 1986); dynamic wage equation of (Arellano and Bond, 1991) and a dynamic model of company investment in (Islam, 1995) are the most top studies among others. The dynamic panel data models continue to exhibit the growth phenomenal. This means most of economic models are either implicitly or explicitly dynamic in nature (Baltagi, 2005). Within this kind of methodology, we gather the appropriate and reliable data for the effective analyses.

3.1 Data Sources

The panel data of nine East African countries over the period 1975-2014 are used and analysed. The annual data are obtained from the United Nations Aggregates Databases and World Development Indicators WDI of the World Bank. These data are the primary databases for data development from officially recognized international sources.

3.2 Measuring Financial Sector

A good measurement of financial development is crucial in evaluating the progress of financial sector development and understanding the corresponding impact on economic growth (DFID, 2004). The financial sector is the set of institutions, instruments, and the regulatory framework that permit transactions to be made by incurring and settling debts; that is, by extending credit. However, in practice, it is difficult to measure financial development given the complexity and dimensions it encompasses. Since the financial sector of a country comprises a variety of financial institutions, markets and products, this measure only serve as a rough estimate and does not fully capture all aspects of financial development.

It is a very tough task for setting suitable indicators for measuring the financial sector development. However, many alternative indicators have been suggested in various studies related to the financial development and economic growth. Three indicators are recommended. The first indicator is the Ratio of M2 minus currency in circulation to Nominal GDP used as an indicator of banking sector development (Levine, 1997 and Sofia et al. 2011). The second one is the ratio of domestic credit to private sector to nominal GDP. This indicator measures the quality and quantity of the investment financed by the banking sector. Many researchers use this indicator as a proxy for financial sector development (see: King and Levine, 1993). Third indicator is the assets with the central bank to GDP ratio. Average market capitalization to GDP ratio is used as the indicator of development of stock exchange market. Thus, the ratio of total value of stock market over the nominal GDP shows the financial and investment policy behaviour (Beck et al. 1999).

Unlike all indicators mentioned above, we use the ratio of total Domestic Credit to real Gross Domestic Product as a proxy for the financial Sector Development FSD in this study. This is because; the nominal GDP is subject to inflation, M2 minus Currency in economic circulation results in extensive use of liquid currency outside the banking system, further this also subject to inflation as a large amount of money is not controlled under monetary authority. We don't also consider the ratio of domestic credit to private sector to nominal GDP due to the fact that, its limit in coverage. Credit provided to government and to other sectors would be incorporated. Finally, we also do not consider the ratio of total value of stock market over the nominal GDP as an indicator since there is almost no Stock Market in developing economies in general and in the East African in particular.

A solid and well-functional financial intermediation is an engine powerful behind economic growth. Therefore, the real GDP at 2005 constant price US $ is determined by the ratio of total Domestic Credit to real Gross Domestic Product as a proxy for Financial Sector Development FSD, Gross Capital Formation, net Official Development Assistance and Aid Received from abroad and Official Exchange for a panel of nine East Africa countries including Burundi, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Rwanda, Uganda and Zambia.

3.3 Specifications of Dynamic Panel Econometric Model

The dynamic panel estimators based on the use of lagged observations of the explanatory variables are designed to address the problem of unobserved country specific effects and joint endogeneity of the explanatory variables. In the dynamic panel estimators, we apply the differenced equation to remove any bias created by unobserved country-specific effects and potential parameters inconsistency arising from simultaneity bias, see the studies in (Easterly, 1997; Arellano and Bond, 1991). In the case where the cross sectional dimension are relatively small and the time dimension is large, standard time series techniques is applied to systems of equations and the panel aspect of the data should not pose new technical difficulties (Breitung and Pesaram, 2005).

In terms of applications as (Baltagi, 2005) points out, panel data has an advantageous over pure time series or cross-section data in such a way it controls for individual heterogeneities or differences; it gives more informative, variability, degrees of freedom and efficiency with less collinearity among the variables and it is better able to study the dynamics of adjustment. In addition, panel data is better able to identify and measure effects that are simply not detectable in pure cross-section or pure time-series data. It allows us to construct and test more complicated behavioural models than purely cross-section or time-series data.

Most empirical growth models estimated using panel data are based on the hypothesis of conditional convergence, containing some dynamics lagged variables in the regressors (Islam, 1995).The long-run estimation of dynamic panel econometric models explain macroeconomic events by specifying preferences, technology and institutions and predicts what is actually produced, traded and consumed and how these variables respond to various shocks (William, 2010).

Consider linear dynamic panel data involving lagged dependent variable specification is given by

$$Y_{it} = \sum_{j=1}^{p} p_j Y_{i,t-j} + X'_{it} \beta + \delta_{it} + \varepsilon_{it} \tag{1}$$

The dynamic panel described in eq. (1) is characterized by two sources of persistence over time. These are autocorrelation due to the presence of a lagged dependent variable among the regressors and the individual effects characterizing the heterogeneity among the individuals. Thus, we cannot apply the ordinary least squares OLS, generalized least squares GLS, Fixed and Random effects methods because Y_{it-1} is correlated with δ_{it} and samples mean of Y_{it-1} is correlated with that of ε_{it} so that the results will be inconsistent (Baltagi, 2005).

First- differencing eq.(1) specification eliminates the individual effects and produces an equation in the form of

$$\Delta Y_{it} = \sum_{j=1}^{p} p_j \, \Delta Y_{i,t-j} + \Delta X'_{it} \, \beta + \Delta \varepsilon_{it} \tag{2}$$

Phillips and Hansen (1990) propose a fully modified ordinary least squares FMOLS and Pedroni(2000) and Mark and Sul(2003) improve and apply for estimator which employs a semi-parametric to eliminate the problem caused by the long-run correlation between the cointegrating equation and the stochastic regressor innovations. It is asymptotically unbiased which directly comes from the differenced regressions given as

$$\Delta X'_{it} = \hat{\Gamma}'_{21} \Delta D_{1t} + \hat{\Gamma}'_{22} \Delta D_{2t} + \Delta \hat{u}_{it} \tag{3}$$

According to the study by Phillips and Hansen (1990), fully modified ordinary lest squares FMOLS estimator is given by

$$\hat{\beta}_{FMOLS} = \left(\sum_{t=1}^{T} Z_{it} \, Z'_{it} \right)^{-1} \left(\sum_{t=1}^{T} Z_{it} \, Y^*_{it} - T \begin{bmatrix} \hat{\lambda}^*_{12} \\ 0 \end{bmatrix} \right) \tag{4}$$

Where $Z_{it} = (X'_{it}, D'_{it})'$, the modified data $Y^*_{it} = \hat{Y}_{it} - \hat{\omega}_{12} \hat{\Omega}_{22} \hat{u}_2$ and estimated biased correction term $\hat{\lambda}^*_{12} = \hat{\lambda}_{12} - \hat{\omega}_{12} \hat{\Omega}_{22} \hat{\Lambda}_{22}$. Assume that $\hat{\Omega}_{22}$ and $\hat{\Lambda}_{22}$ be the construction of long-run covariance matrix estimators using $\hat{u}_{it} = (\hat{u}_{1i,t}, \hat{u}_{2i,t})$. D_{1t} and D_{2t} are deterministic trend regressors.

The most widely-used and efficient methods of estimation for differenced equation are the Generalized Method of Moments GMM of (Arellano and Bover, 1995) and Fully Modified Ordinary Least Squares FMOLS in (Pedroni, 2000). The GMM system of the form developed and studied by (Arellano and Bover, 1995) and discussed in (Ahn and Schmidt, 1995) and (Hahn, 1999) are not only lagged levels used as instruments for first differences, but lagged first differences are used as instruments for levels, which corresponds to an extra set of moment conditions. This method, requires large number of time variable sets, but loses a time-series observation (Hansen, 2013 and 1991). In this study, therefore, we employ FMOLS to estimate a panel cointegrating vector that characterizes the short run and long-run relationship among the variables.

4. Discussions and Empirical Findings

The lag-length determination is the key point in the process of testing and estimation variables. The kaike information and other criteria are often used to choose the optimal lag length distributed-lag models. To estimate the lag length, we compute the log-likelihood function and various information criteria for each choice are used (Johansen, 1988, 1991and 1995).

There are three distinct situations that automatically lag length parameters can be computed. The first situation occurs when we select the lag length parameter for the kernel- based estimators of using (Newey and West, 1994) data-based automatic methods. The other two situations are when the unit root test requires estimation of a regression with a parametric correction for serial correlation as in the augmented Dickey –Fuller ADF and Dickey-Fuller generalized least squares DFGLS test equation regressions and the autoregressive AR spectral estimator. The log-likelihood cannot decrease when additional regressors are included.

Table 4.1 Lag Order Selection using different types of Criteria

Lag	LogL	LR	FPE	AIC
0	-380.441	NA	7.95e-06	2.4472
1	1701.27	4084.12	1.70e-11	-10.611
2	1734.75	64.620*	1.61e-11*	-10.665*
3	1745.816	21.008	1.76e-11	-10.576

*indicates by lag selection order criteria of LR: sequential modified LR test statistic, Final prediction error FPE and AIC: Akaike information criterion, the optimal lag length is two at 5% level.

The result from the test for the lag length, based on the five-variable vector error correction VEC system with the optimum lag length of two, which   is reported in Table 4.1. The lag orders chosen by the sequential modified test, Final prediction error, and the Akaike information criteria have shown the optimal lag length is two at 5% level of significance. The optimum lag length determination is the lowest value of each criterion assumes the most appropriate model. Thus, this lag length two will be used for the rest of analyses throughout the paper. Based on the optimal lag length now can test for Unit Roots.

Recent literature suggests that panel-based unit root tests have higher power than unit root tests based on individual time series (Baltagi, 2005). A number of panel unit root tests that allow for cross-section dependence use orthogonalization type of procedures to asymptotically eliminate the cross-dependence of the series before standard panel unit root tests are applied. There are two natural assumptions one can assume the persistence parameters are common unit root process that is identical across cross-sections, which includes Levin, Lin, and Chu and Breitung tests whereas the alternative one is to vary freely across cross-sections. The Im, Pesaran, and Shin, Fisher-ADF and Fisher-PP tests allow for individual unit root processes. One major source of cross-section correlation in macroeconomic data is common shocks, such as oil price shocks and international financial crises (Baltagi, 2005). The cross-sectional dependence is a direct descendant of the cross-country on growth according to the study by (King and Levine, 1993; Levine and Zervos, 1998 and Hurlin and Mignon, 2007).

The null hypothesis is a non-stationary behaviour of the time series, admitting the possibility that error terms are serially correlated with different serial correlation coefficients in cross-sectional units (Pesaran, 2007). We determine each variable has a unit root in the presence of cross-sectional dependence across the panel and we report the results in Table 4.2.

Table 4.2 Test for Unit Root in the Presence of Cross-section Dependence

Variable	Im- Pesaran &Shin		Fisher χ^2		Fisher ADF PP	
	Level	1st Diff.	Level	1st Diff.	Level	1st Diff.
$\ln GDP_{it}$	2.19706	-4.16781	18.4764	56.6891	15.2088	104.023
	(0.9860)	(0.0000)*	(0.4247)	(0.0000)*	(0.6476)	(0.0000)*
FS_{it}	1.54441	-9.00403	11.6111	107.489	11.1096	193.959
	(0.9388)	(0.0000)*	(0.8666)	(0.0000)*	(0.8896)	(0.0000)*
$\ln GCF_{it}$	0.83003	-8.96295	12.4165	105.245	18.6104	223.307
	(0.7967)	(0.0000)*	(0.8250)	(0.0000)*	(0.4162)	(0.0000)*
$\ln DA_{it}$	0.02876	-7.69269	20.9716	101.035	24.9586	254.686
	(0.5115)	(0.0000)*	(0.2808)	(0.0000)*	(0.1261)	(0.0000)*
OER_{it}	1.11016	-6.85127	12.3629	78.8925	6.67812	100.603
	(0.8665)	(0.0000)*	(0.8279)	(0.0000)*	(0.9926)	(0.0000)*

The test includes Individual Intercept & Trend. User-specified lags: 1. The null hypothesis assumes individual unit root process and * denotes rejection of the hypothesis at 1% level of significance.

However, we have to make our data become cross-sectional independence before estimation. Since estimation in the presences of cross-sectional dependence causes bias and inconsistency as Andrew (2005) argues. A standard augmented Dickey–Fuller ADF regression is considered with the cross-section averages of lagged levels and first-differences of the individual series Pesaran(2007) is used for cross sectional dependence test. The limiting distribution of this test is different from the Dickey–Fuller distribution due to the presence of the cross-sectional of the lagged level in which Pesaran(2007) uses a truncated version of the Im,Pesaran Shin test, avoiding the problem of moment calculation Baltagi(2005). Therefore, we conduct the tests for both t-statistic and Pesaran Cross–section Dependence and confirm there is no Cross-sectional Dependence in each series after transformation of the original data through demeaned method (the method is available in Walter (2004)., i.e., the difference between the individual observation and the common average of the series in which the tests outputs are reported in Table 4.3.

Table 4.3 Test for cross-sectional Independence for Demeaned Data series

Test for cross-sectional dependence for transformed Individual data series				
Variable	Coefficient	Std. Error	t-Statistic	P. Value
$FSD_{i.t-1}$	-0.0642	0.0234	-2.7492	0.0063 *
$\ln GDP_{i.t-1}$	0.9989	0.0046	219.43	0.0000*
$\ln GCF_{i.t-1}$	0.9784	0.0118	83.131	0.0000*
$\ln DA_{i.t-1}$	0.9854	0.0126	78.479	0.0000*
$OER_{i.t-1}$	0.9963	0.0046	215.17	0.0000*
Test for Panel Equation:				
Pearson CD Normal			0.8330	0.4048

* refer to the rejection of the null hypothesis of Cross-sectional Independence at 1% level of significance using t-statistic for the test, while of the null hypothesis of Cross-sectional independence for a panel equation is not rejected. $\ln GDP_{i,t}$ denotes GDP in log form.

Regression of the dependent variable, $DGDP_{i,t} = lnGDP_{i,t} - lnGDP_{it-1}$, depends on $lnGDP_{it-1}$ and then the calculated t-value is considered for the hypothesis of cross-sectional dependence of individual transformed data series.

We take into account about panel cointegration methodology developed by (Johansen, 1988); later on applied by (Saikonen, 1992) for estimation and testing of Cointegrating Systems in Autoregressive Approximation and (Stock-Watson, 1993) use for a Simple Estimator of Cointegrating Vectors in Higher Order Integrated Systems and (Johansen 1995) highlight about solving the problem of eigenvalues and finally, inferences that can be conducted the test hypothesis for long-run relationship. Like panel unit root tests, panel cointegration tests can be motivated for its more powerful tests than individual time series cointegration tests. In the case of purchasing power parity and convergence in growth, economists use pool data on similar countries, in the hopes of adding cross-sectional variation to the data will increase the power of panel cointegration tests (Baltagi, 2005).

In order to test the long run relationship among a five panel series in multivariate analyses, we use the Johansen approach. Table 4.4 shows the Johansen Test for Unrestricted Rank and number of Cointegration equation when Financial Sector Development is a dependent variable. Both the Trace and the Maximum eigenvalue tests in the first column of the table indicate number of cointegrating vectors, which are the hypotheses of the variables not cointegrated(r= 0) against the alternative of one or more cointegrating vectors(r > 0). Since the values of Trace Statistic (0) and Maximum Eigen Statistic(0) exceed their respective the critical values at the 5 % significance level, we reject the null hypothesis of zero cointegrating vectors (r=0) and accept the alternative hypothesis of more than zero cointegrating vectors (r>0). On the other hand, the values of Trace Statistic (1) and Maximum Eigen Statistic (1) are less than their respective the critical values at the 5 % significance level, we don't reject the null hypothesis of r ≤ 1 cointegrating vectors (r=1) and reject the alternative hypothesis of more than one cointegrating vectors (r>0).This suggests the Johansen test gives number of cointegration vector is one within five series. More explicitly, we don't reject the null hypothesis at 5% level of significance that there is one cointegrating equation since the critical values in Trace statistic and Maximum eigenvalue less than the their respective critical values. Hence, the variables are integrated of the same order and they move together towards the long run equilibrium or have a long run relationship. When real GDP is considered as dependent, the test output also displays the same number of cointegrating equation, which has been accessed from the author.

Table 4.4 Johansen Test for Unrestricted Rank(r) and No. of Cointegration Equation

Hypothes	Trace test				Maximum Eigenvalue test		
No of CE	Eigen value	Trace St	5% Critic	P. Value	Max. Eigen Statistic	5%Critical	P. Value
None	0.1212	80.408	69.819	0.0056*	40.703	33.877	0.0066*
At most 1	0.0606	39.706	47.856	0.2332	19.706	27.584	0.3618
At most 2	0.0445	19.999	29.797	0.4229	14.347	21.132	0.3372
At most 3	0.0163	5.6522	15.495	0.7362	5.1633	14.265	0.7211
At most 4	0.0016	0.4889	3.8415	0.4844	0.4889	3.8415	0.4844

Both Trace and Max-eigenvalue tests indicate there is one cointegrating equation. * denotes rejection of the hypothesis at the 5% level of significance. The trend assumption is linear deterministic with lag interval (in the first differences) is 1 to 2.

Since the number of cointegration within the five series is confirmed, we continue to the next step of estimation of the short-run and long-run parameters. The analysis of long-run cointegrating relationships has received a considerable attention by a number of researchers such as (Pablo, 2010) in Dynamic OLS Estimation; (Pedroni, 2000; Mark and Sul, 2003) about Fully Modified OLS estimators and (Barro, 1998) focuses on determinants of Economic Growth a case where a cross-country empirical results are in asymptotically unbiased. However, we encounter with the endogeneity problem due to simultaneous equations of the real GDP-FSD model. In the presence of endogeneity, estimations become bias and inconsistent. Therefore, we have to provide a solution with the help of instrumental variables IVs and two stages least squares 2SLS (see detailed: Wooldridge, 2002, 1997a) for the endogeneity.

Consider the following simultaneous equations of GDP-FSD model where lnGDP and FSD are endogenous variables whereas lnGCF, lnDA and OER are predetermined.

$$lnGDP = \beta_0 + \beta_1 FSD + \beta_2 lnGCF + \beta_3 \ln DA + u \qquad (4a)$$

$$FSD = \beta_{10} + \beta_{11} lnGDP + \beta_{12} OER + v \qquad (4b)$$

Here, we apply the methods of instrumental variables IVs and two stages least squares 2SLS for endogeneity arises from simultaneous equations model, before estimating the dynamic panel of long-run coefficients using FMOLS.

Where $lnGCF$ and $lnDA$ are not correlated with u, $Cov(lnGCF, u) = 0$ $Cov(lnDA, u) = 0$ and $Cov(FS, u) \neq 0$, $Cov(FS, OXR) \neq 0$ and $Cov(OXR, u) = 0$. Thus, OER can be used as instrumental variable IV for FS in eq(4a). Similarly, in eq(4b), lnGCF and lnDA are IVs for lnGDP, however, the solution is not unique, which depends on whether lnGCF or lnDA since the FS function is over-identified whereas lnGDP is exact – identified.

Under instrumental variables, we have to run FSD on lnGCF, lnDA and OXR using OLS and obtain the estimated value of FSD-OSL. Then we estimate the real GDP using dynamic panel FMOLS by taking lnGDP as a dependent and the estimated FSD-OSL, lnGCF and lnDA as explanatory variables. Lastly, we regress lnGDP on lnGCF and OER as lnGCF is an IV-one for lnGDP or lnGDP on lnDA and OER as lnDA is another IV for lnGDP. However, these lead us to a non-unique solution, which depends on whether lnGCF or lnDA is considered as an IV for lnGDP. To estimate the FSD equation by FMOLS method, we consider the larger value of coefficient of determination between these two regressions.

The two stages least squares 2SLS is also applied for solving the problem of endogeneity arises from simultaneous equations model as eq(4a) is exact-identification and eq(4b) is over-identification. We first estimate the reduced form equations by OLS; that is, regress FS on lnGCF, lnDA and OER by OLS and obtain the estimated FSD-OSL, then we estimate lnGDP as a function of estimated FSD, lnGCF and lnDA by FMOLS in eq.(4a). Likewise, for eq.(4b), we regress lnGDP on lnGCF, lnDA and OXR using OLS and obtain the estimated lnGDP, then replace lnGDP by the estimated lnGDP and estimate FSD as a function of the estimated lnGDP and OER by FMOLS. The main difference between IVs and 2SLS is that in the former case the estimated value of the variables are used as instruments, while in the latter case they are used as regressors, in the case where there is exactly-identification, the results of IVs and 2SLS are the same.

Note that $\widehat{FSD}$-OLS, $\widehat{FSD}$-2SLS, $ln\widehat{GDP}$-2SLS, $\widehat{lnGDP}$-2SLS denote the estimated Financial Sector Development FSD and real lnGDP by -OLS and -2SLS methods, respectively.

Table 4.5 Dynamic Panel FMOLS Estimation of Long-run Coefficients 1975 2014

	Dependent Variable is real lnGDP				Dependent Variable is FSD			
	Var.	Coeff.	t-stat.	P. Value	Variable	Coeff.	t-stat.	P. Value
Applied IV	$\widehat{FSD}$-OLS	0.1132	3.2432	0.0013**	$ln\widehat{GDP}$-OLS	0.0630	1.8672	0.0628*
	LNGCF	0.1105	3.4631	0.0006**	OER	-0.1199	-7.9221	0.0000**
	LNDA	-0.1291	-3.7154	0.0002**				
Applied 2SLS	$\widehat{FSD}$2SLS	0.1132	3.2432	0.0013**	$ln\widehat{GDP}$-2SLS	0.0681	2.0095	0.0453**
	LNGCF	0.1105	3.4632	0.0006**	OER	-0.0675	-4.5426	0.0000**
	LNDA	-0.1291	-3.7154	0.0002**				

** and * denote the level of significance at 5% and 10% with the optimal lag length is two. Cointegration equation deterministic includes constant and trend. Regressor equations estimated using differences in the method of Weighed Panel Estimation first –stage residuals heterogeneous long-run coefficients.

After model diagnostic testing for the residual normality distribution and non-serial correlation (the tests outputs have been accessed from the author), the long-run estimations are reported in Table 4.5. The estimated FSD (by the IVs and 2SLS) and Gross Capital Formation GCF have positively significant contribution to the Economic Growth lnGDP. This means, a one percentage point increases in the estimated FSD increases the realGDP(in log form) by 11.32 percentage and a unit increases in GFC that increases the real GDP by 11.05. While the net Official Development Assistance and Aid received from abroad lnDA has negatively significant impact on the East African Economic Growth over the period 1975- 2014. The negative effect of lnDA on the real lnGDP may be people become dependent on the assistance and reluctant to work, hence productivity decline eventually falling in real lnGDP. On the other hand, the estimated real lnGDP by the IVs and the 2SLS has a positive significant role for the development of Financial Sector FSD; however, the Official Exchange Rate OER has significantly negative effect.

Negative impact of OER may be due to that fact, high currency depreciation in a sample countries study. Evidences confirm concerning about negative effect of the official exchange rate OER on the FSD performance are (Gerardo and Felipe, 2002) describes the G-3 exchange rate volatility and evaluates its impact on developing countries, empirically shows a robust and significantly negative impact on developing countries' exports and (Hua, 2011) estimates the 29 Chinese provinces panel data over the period from 1987 to 2008, using the GMM system estimation and the results shows the real exchange rate appreciation had a negative effect on the economic growth and employment. Furthermore,

(Kandil, 2004) examines the effects of exchange rate fluctuations on real output growth and price inflation in a sample of twenty-two developing countries and concludes the exchange rate depreciation, decreases real output growth. Likewise, a negative relationship of lnDA with real GDP is confirmed in studies by (Ekanayake and Chatrna 2008) in which findings indicate, foreign aid has mixed effects on economic growth analyse of 85 developing countries for the period 1980-2007 and (Vanarith, 2009) shows aid has no positive effect on economic growth. However, it is positively related to corruption in 67 developing countries from 1986-2005 using panel data. Though, the United Nations Millennium Development Goals Declaration explicitly recognized the role of Official Development Assistance in the development process, committed industrialized countries to "grant more generous development assistance" (UN, 2000).

Table 4.6 VEC Granger Causality/Block Exogeneity Wald Tests

Dependent variable	Independent Variable	χ^2	P. Value
Estimated FSD $-$2SLS	Estimated lnGDP $-$2SLS	5.2215	0.0735*
Estimated lnGDP $-$2SLS	Estimated FSD $-$2SLS	8.9627	0.0379**

** and * denote   the level of significance at 5% and 10% with   the optimal lag length of two.

We also conduct a vector error correction VEC Granger Causality tests between estimated FSD and estimated real GDP to show a directional causation for a panel countries study. There is a bi-directional cause from the GDP to the FSD, and vice versa (see Table 4.6). However, this test doesn't explicitly indicate the change in magnitude. Thus, we have to look for the Variance-Response function analyses under the Panel Cointegration.

Table 4.7 Variance Decomposition and Impulse Response of Estimated FSD and GDP

period	Variance Decomposition of t Estimated FSD to that of		Variance Decomposition of the Estimated lnGDP to that of	
	FSD	GDP	FSD	GDP
1974	100.00	0.0000	0.6275	99.372
1984	99.971	0.0289	5.3739	94.626
1994	99.963	0.0372	10.341	89.659
2004	99.956	0.0436	13.783	86.217
2014	99.951	0.0489	16.066	83.934
period	Impulse Response of the Estimated FSD to that of		Impulse Response of the Estimated lnGDP to that of	
	FSD	GDP	FSD	GDP
1974	0.0213	0.0000	0.0045	0.0570
1984	0.1617	-0.0026	0.1398	0.6257
1994	0.2324	-0.0047	0.4001	1.2522
2004	0.2626	-0.0063	0.7105	1.8727
2014	0.2753	-0.0076	1.0411	2.4876

Cholesky Ordering: DCPGDP, lnGDP and Standard Errors is Monte Carlo (1000000 repetitions). DCPGDP and lnGDP represents financial sector FS and GDP, respectively. Here in the cointegration environment, it is possible to find out the Variance Decomposition and Impulse Response Functions using (1,000,000 times of Monte Carlo Repletion).

Table 4.7 shows impulse innovation to the estimated Financial Sector FSD and the estimated GDP. The fluctuations of FSD and GDP are mainly explained by GDP shocks and FSD shocks in the long run. The FSD shock accounts for 0.03% fluctuates in GDP while the real GDP shock accounts for 5.37% fluctuates in FSD in the year 1984. The proportion in the variance of GDP and FSD slightly decreases over time and reaches 83.93% and 99.95% in the year 2014, respectively. For these shocks, the accumulated response of GDP to FSD increases. We can also show graphically the accumulated response of real GDP to the FSD and vice versa in Fig.1, (in Appendix C) on the upper to the right side and bottom to the left side.

These empirical results are related to the previous studies by (David, 2012 and Susan, 2014). The gain of this study, therefore, provides the supply and demand leading hypotheses by dynamic panel FMOLS, means FSD accelerates and augments the Economic Growth and vice versa.

5. Concluding Remarks and Implication

This paper explores the effect and contribution of Financial Sector Development FSD to the East African economic Growth over the period 1975-2014. Regarding an important contribution of FSD to Economic Growth, a number of controversial empirical studies have been described and extensively studied whether the FSD has a positive impact on economic growth, or not. Specifically, the debates on the inter-temporal causal relationship have been targeted to study whether there is a finance-led growth or a growth-led finance response for the East African economy.

Empirically, the contributions of the FSD and the Gross Capital Formation GCF have positively significant to the Economic Growth. While the net Official Development Assistance and Aid received from abroad lnDA has negatively significant impact on the East African economic Growth over the period 1975 2014. The negative effect of DA on the real GDP may be people become dependent on the assistance and reluctant to work, hence productivity decline eventually falling in real GDP. On the other hand, the estimated real GDP by has a positive significant role for the development of Financial Sector FSD; however, the Official Exchange Rate OER has significantly negative effect. This negative result may be due to that fact high currency depreciation against in a sample of countries study.

A vector error correction VEC Granger Causality test between estimated financial sector and estimated real GDP show that there are two way-directional causes from the GDP to the FSD and the FSD to real GDP. In addition, the proportion in the variance of GDP and FSD slightly decreases over time and reaches 83.93% and 99.95% in the year 2014, respectively. For these shocks, the accumulated response of GDP to FS increases.

The gain of this study, therefore, provides the Supply and Demand Leading Hypotheses, means FSD accelerates and augments the Economic Growth and vice versa. The implications drawn from this study are the reforms in the FS; inclusiveness of Financial System and effective vigorously pursued expansionary monetary policy, which directs the economy, could be a comprehensive beneficial to the study countries.

Acknowledgement

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Appendix

Appendix A- Equation and Its Explanations

For an AR(ρ) error specification, the relevant individual cross sectionally CADF statistics are computed from the ρth order cross- section/ time series augmented regression is given in Appendix I.

$$\Delta y_{i,t} = \alpha_i + \rho_i y_{i,t-1} + c_i \bar{y}_{t-1} + \sum_{j=1}^{p} d_i \, \Delta \bar{y}_{t-j}$$

$$+ \sum_{j=1}^{p} \beta_{i,j} \, \Delta y_{i,t-1} + \varepsilon_{i,t},$$

Where $\varepsilon_{i,t}$ *is the idiosyncratic error term,* $\bar{y}_{t-1} = \frac{\sum_{i=1}^{N} y_{i,t-1}}{N}$ and $\Delta \bar{y}_{i,t} = \frac{\sum_{i=1}^{N} y_{i,t}}{N}$.

With the transformed data, now we can test for the cross-sectional independence of individual data series (Pesatran, 2004) by constructing a test of null hypothesis $H_0 : \rho_i$ for all i, or the alternative one is $H_a : \rho_i < 0$.

Appendix B- Table

Table 5.8 Serial Correlation and Normality Tests

VAR Residual Serial Correlation LM Tests			VAR Residual Normality Tests using Cholesky Orthogonalization		
			Distribution	χ^2	P. value
Lags	LM-Stat	P. Value	Skewness	249.68	0.0000*
1	20.26458	0.7328	Kutrosis	55843.5	0.0000*
2	23.32022	0.5589	Jarque-Bera	56093.2	0.0000*

* Indicate rejection of the null hypotheses of Serial Correlation at lag order of two and multivariate normality distribution of the residuals in the model.
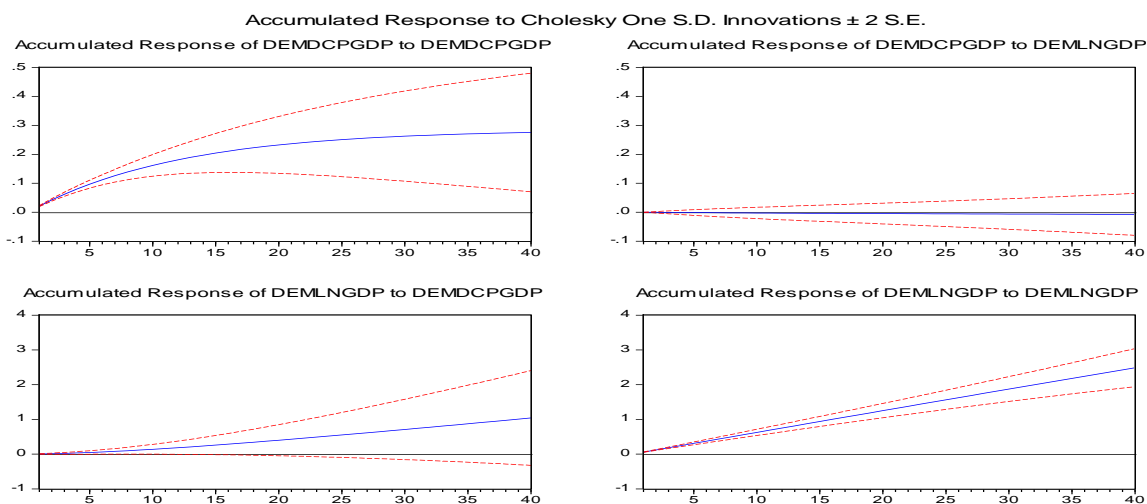
Appendix C-Graph

Fig.1. Accumulated Response of FS and real GDP

Note: DEMDCPGDP $\equiv FS$ and DEMLNGDP $\equiv real\ GDP$ in log form and DEMDCPGDP and DEMLNGDP represents demeaned data of FS and that of GDP, respectively.