A DYNAMIC CAUSAL LINKAGE BETWEEN FINANCIAL DEVELOPMENT, TRADE OPENNESS AND ECONOMIC GROWTH: EVIDENCE FROM MALAWI.

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Abstract
This paper investigates the dynamic causal relationship between financial development, trade openness and economic growth in Malawi in trivariate (VAR) model. The study also explores a possible indirect causal effect which finance may have on growth through trade openness. Three alternative measures of financial development: money supply, liquid liabilities, and private sector credit are employed to determine the impact of different aspects of financial development on economic growth. The Johansen Cointegration tests results indicate a long-run positive relationship between financial development, trade openness and economic growth. The Granger causality test results based on VECM shows that financial development has a unilateral causal effect on economic growth in the short-run; while financial development and trade openness have a short-run bidirectional relationship depending on financial development measure. However, the findings indicate that the indirect causal effect that financial development has on economic growth through trade openness depends on financial development measure.

Keywords: Malawi, Financial development, Economic growth, Trade openness, Granger causality, Vector Error Correction Model (VECM), Cointegration test.

1. Introduction
Economic literature provides different perspectives on the relationship that exists between financial development and economic growth. On one hand, Schumpeter (1911); McKinnon (1973); and Shaw (1973) postulate that financial development promotes economic growth through technical innovation and implementation of the innovative products. On the other hand, Robinson (1952); Kuznets (1955); and Jung (1986) illustrate that the expansion of the real economy initiates the development of modern financial institutions and their related financial services in response to an increased demand of these services. These competing views have stimulated numerous theoretical and empirical studies that investigate the causal relationship between finance and growth. Nevertheless, the studies have not reached a consensus on the direction of causality between financial development and economic growth. This study, therefore, aims to provide a more in-depth perspective regarding the finance-growth relationship in Malawi by using a Granger causality test based on trivariate (VAR) model. Furthermore, this study also explores the indirect causal effect that financial development may have on economic growth through trade openness.

The existing theoretical and empirical studies on the finance-growth nexus in Sub-Saharan Africa (SSA) do not mainly disentangle the relationship between finance and economic growth. Most of the studies just embrace the McKinnon-Shaw hypothesis and empirically demonstrate how financial development leads to economic growth (King and Levine, 1993; and Ghali, 1999). Moreover, many of the empirical studies largely focus on cross-section estimates and very few focuses on a single country. However, researchers argue that the results of cross-sectional studies are not reliable as their investigations are based on relationship of averages across countries, which may not exist in any one particular country (Kenny and Williams, 2001). In addition, majority of the studies found in SSA have used bivariate framework to examine the finance-growth causal relationship. The causality results from such bivariate framework studies are questionable, as their tests suffer from omitted variable problems and may lead to erroneous causal inferences. As such, Caporael and Pittis (1995) suggested the introduction of a third variable in the system which can not only alter the causal inferences, but also the magnitude of the estimates.

It is against this background that this study employs trivariate model by adding trade openness as an intermittent variable in the finance-growth nexus in Malawi. The model provides robust and more comprehensive causal inferences between finance and growth, because of the additional information drawn from the incorporation of trade openness as an intermittent variable in the nexus. However, the causal effect between trade openness and economic growth provides skeptical view to firmly conclude that financial development promotes economic growth indirectly through trade.

The rest of the paper is structured as follows. Section 2 highlights theoretical and empirical studies in this field. Section 3 provides the overview of the economic growth, financial sector and trade sectors in...
Malawi. Section 4 presents the data, while section 5 presents model specification and empirical results. The last section summarises and concludes this study.

2. Theory and Evidence

2.1 Finance and Economic Growth

The view that finance leads to growth (*Supply-leading hypothesis*) is traced to the work of Schumpeter (1911), who argued that well-functioning financial intermediaries are important for technical innovation and the implementation of innovative products. However, the most influential works by McKinnon (1973) and Shaw (1973) underpinned the Supply-leading hypothesis and stimulated the numerous research works that investigate how financial development can lead to economic growth. Empirical evidence supporting this supply-leading hypothesis began to appear in the 1990s, in particular, the prominent work of King and Levine (1993). Their empirical work applied a cross-section regression for 80 countries and reported a strong and robust correlation between financial development indicators and the economic growth indicator (GDP per capita) over the period of 1960 to 1989. More empirical studies followed in the late 1990s; particularly, the works of De Gregorio and Guidotti (1995), and Choe and Moosa (1999) which postulated that financial development lead to economic growth. Other empirical works that support the supply-leading hypothesis include studies by Christopoulos and Tsonias (2004); Habibullah and End (2006); and Eita and Jordan (2007).

However, Robinson (1952) challenged the supply-side hypothesis and argued that development of the financial system follows expansion of the real sector. This second possibility termed as *demand-following hypothesis* received support from Kuznets (1955) Gurley and Shaw (1967) and Goldsmith (1969), who emphasized that the expansion of the real sector stimulates the creation of the modern financial institutions, their financial assets and liabilities and related financial services, as a result of the increased demand for these services by savers and investors in the real economy. The hypothesis was supported empirically by Jung (1986) who employed a vector autoregressive (VAR) analysis for 56 countries using two proxies for financial development. His results showed that, using the currency ratio as a proxy of financial development, economic growth leads to financial development, while the monetization proxy suggested that financial development leads to economic growth. More empirical evidence supporting demand-following hypothesis include studies by Atje and Jovanovic (1993); Demetriades and Hussein (1996) and Odhiambo (2007).

Patrick (1966) tried to reconcile the two competing hypotheses by arguing that the causal link between financial development and economic growth changes over time. This latter hypothesis postulates *bi-directional causality* between finance and growth. Calderon and Liu (2002) empirically supported Patrick’s view through their study that examined the direction of causality between finance and growth for 109 countries using the Geweke-decomposition tests for 1960 -1994 period. Their study found existence of bi-directional causality between finance and growth in the sample countries. There are many other empirical studies in literature that support the bi-directional hypothesis (see Shan and Morris, 2002; and Apergis et al. 2007).

2.2 Trade Openness and Economic Growth

Theoretical work has provided evidence on how trade openness leads to economic growth (Feder, 1983; Balassa, 1985), but as for the empirical evidence, causality between trade openness and economic growth remains inconclusive (Hassan and Islam, 2005). Jung and Marshall (1985) were among the first to question conclusions from the simple OLS regression for the trade-growth nexus. They carried out a causality test between exports and growth for the period over 1950 to 1981. Their results illustrate that the direction of causality between exports and growth is inconclusive. However, Harrison (1996) provided evidence of bi-directional causal relationship between trade openness and economic growth, but recent studies from Ahmad (2001) and Yanikkaya (2003) found weaker or no empirical support for straightforward causal relationship between trade openness and economic growth for both developing and developed countries.

2.3 Finance and Trade Openness

Finance-growth and trade-growth links are more pronounced in the literature, but the possible linkages between finance and trade openness are comparatively less documented (Hassan and Islam, 2005). This interaction between finance and openness may allow for more complex paths to economic development. Kletzer and Bardhan (1987) were first to show that countries with a relatively well-developed financial sector have a comparative advantage in industries and sectors that rely on external finance. Rajan and Zingales (1998) were, however, the first to empirically
investigate the influence of financial development on industrial growth. Their results show evidence that industries relying more heavily on external finance grow faster in countries with a better developed financial system.

Following this, Beck (2003) also empirically examined the linkages between finance and trade openness using data for 36 industries from 56 countries. His results confirmed that countries with better financial systems have higher export shares and trade balances in industries that use more external finances. However, studies by Svaleryd and Vlachos (2002); and Vazakidis and Adamopoulos (2009) show that trade openness is also an important determinant of financial development; especially in an environment where financial institutions are expected to provide services such as adequate insurance and risk diversification to industries.

2.4 Finance, Trade Openness and Economic Growth

Linkages between finance and trade openness are important as they may allow for complex path to economic growth where there is no direct relationship between finance and economic growth. The empirical work of Chang (2002) for Mainland China reveals some of such complex path to growth. His study employs a multivariate framework model using quarterly data over the 1987-1999 period. The Granger causality results based on multivariate error-correction model found that, in Mainland China, neither the supply-leading nor demand-following hypothesis is empirically supported during the sample period. However, the results found financial development Granger causing trade openness which in turn Granger causes economic growth. The findings indicate that financial development indirectly affects economic growth through trade openness. However, Gries et al. (2009) and Uddin and Chakraborty (2009) studies provide a skeptical view on the indirect influence financial development may have on economic growth through trade openness or vice versa.

3. Financial Development, Trade Openness and Growth in Malawi.

Malawi’s financial system is heavily dominated by banks, despite the presence of other non-banking financial institutions in the sector. According to Reserve Bank of Malawi financial report (2010), the banking sector still accounts for more than 70% of the total assets and liabilities of the financial sector.

This trend of financial development is attributed to the pre and post liberalization financial conditions. The sector was heavily characterized by government determination of interest rate, direction of credit allocation and ceilings and strict entry of other financial institutions among others in its pre-liberalization period (i.e. before 1987 liberalization programme). Limited financial products and innovation, wide interest spreads, weak legal systems and pronounced market fragmentation have been main characteristics of the post liberalization period (Mlachila and Chirwa, 2002). It is, therefore, not surprising that financial reforms did not result into immediate financial deepening in Malawi as shown by Figure 1 (see the appendix).

On the part of trade, Malawi has, in the recent years, diversified foreign trade patterns with South Africa as the major trading partner for other countries within and outside the SADC (Tussie and Aggio, 2006). The country has also gradually reduced tariff rates and other non tariff barriers on imports under multilateral and bilateral trade agreements such as SADC, COMESA, AGOA, EBA and the EU-ACP Cotonou Agreement. According to Tussie and Aggio (2006), Malawi stands out as one of the most liberalized economies in the SADC region, after meticulously implemented trade liberalization policies.

Economic growth has, in contrast, taken a mixed trend since getting independence in 1964. The country began with commendable economic achievements during the early years after independence by growing at an average rate of 6.79% between 1964 and 1969, with the highest growth rate record of 13.62% in 1965. However, the economic growth declined between 1970 and 1987 and the situation worsened between 1990s and early 2000s when the economy grew at average rate of about 1.7%. This poor economic performance is mainly attributed to country’s heavily dependence on thin and low quality agricultural products for exports, fall in the terms of trade in the late 1980 due to the disruption of trade routes, because of the war in Mozambique in the 1970s through the late 1980s, droughts in 1992 and 2001, the drying out of foreign aid inflows in around 1992-1993 and political events of 1993 and 1994 (change to multiparty politics). Nevertheless, the economy started to recover in 2003 and the growth rate averaged 6.84% between 2003 and 2009. The recovery is attributed to structural reforms in trade agreements at both bilateral and multilateral level, prudent fiscal and monetary policies and timely debt cancellation in 2006 by multilateral lenders. This economic performance has had a corresponding effect on the growth of per capita income over the years and rose from US$64.31 in 1970 to US$248.34 in 2009. However, the country has failed to be placed into the middle income group as such it is still ranked as one of the poorest countries in the world (UNCTAD, 2009).
4. Data and Sources

The annual series data of real GDP per capita (GDPC), broad money (M2) supply, bank deposit liabilities and private sector credit covering the period from 1970-2009 is used in this study. The time span is sufficient and long enough to capture the long-run relationship among the variables and to ensure the quality of the analysis, as argued by Hakkio and Rush (1991). All data are expressed in natural logarithms in order to include the proliferate effect of time series and to reduce the problem of heteroskedasticity (Gujarati, 2009). The main sources of data of most variables were International Monetary Fund’s International Financial Statistics CD-ROM (2010) and Reserve Bank of Malawi (RBM) Annual Financial and Economic Review Reports.

The study uses three alternative financial development measures, as applied by Eita and Jordaan (2007), in Botswana. The three alternative measures are employed to determine different aspects of financial development on economic growth, since all measures do not capture the same information on the role of the financial intermediaries on economic growth. The first measure is the ratio of broad money (M2) to nominal GDP (M2/GDP). The measure consists of the currency held outside the banking systems plus deposits of the banks and non-bank financial institutions. The rising ratio of broad money reflects the extent to which transactions are monetized in the economy. The second measure is the ratio of bank deposit liabilities to total nominal GDP (DEPLIAB). The measure equals demand deposits plus time and saving deposits. The indicator provides an alternative measure to a broad money ratio, especially for developing countries, where a large component of the broad money stock is held outside the banking system (Kar and Pentecost, 2000). Liquid liabilities exclude currency in circulation from broad money stock; therefore, higher ratio reflects the depth of the financial intermediation. The third measure is the ratio of private sector credit to nominal GDP (PRIVGDP). The ratio stresses the importance of the financial intermediaries in financing investments in the private sector. The important assumption is that credit provided to the private sector increases investments and productivity to a much larger extent than do credits to the public sector (Kar and Pentecost, 2000). Therefore, a higher ratio indicates a greater financial intermediary development. Economic growth is estimated using real GDP per capita (GDPC) and trade openness (TOPEN) is estimated by the ratio of the sum of exports and imports to GDP.

5. Model Specification and Empirical Results

5.1 Model Specification

In this study, multivariate vector autoregressive (VAR) model is used to examine the causal relationship between financial development, trade openness and economic growth in Malawi. The approach was chosen over other alternative techniques because of the fact that macroeconomic variables are often affected not only by exogenous variables but also their own past values. Therefore, finance-growth relationship should be viewed as an autoregressive process. In addition, the method has favourable response to both large and small samples (Odhiambo, 2008). The multivariate model for estimating causal relationship among financial development (FINA), trade openness (TOPEN) and economic growth (GDPC) in Malawi is specified as:

\[ GDPC = f \left( FINA, TOPEN \right) \]  

The function can be estimated by log-linear form as

\[ \log GDPC_t = \alpha_0 + \alpha_1 \log FINA_t + \alpha_2 \log TOPEN_t + \varepsilon_t \]  

Where: \( \alpha_0 \) is a constant term, \( t \) is a time trend and \( \varepsilon \) is a random error term.

5.2 Unit Root Test

In modern time series econometrics, most economic variables have mean and variance that are not stationary and the situation results into a spurious regression, with a high R² and t-statistics that appear to be significant, but the results have no economic meaning (Granger and Newbold, 1974). However, valid estimates and inferences are possible if the non-stationary variables have a long–run linear relationship between them and in this case, the set of variables are said to be cointegrated. In an attempt to establish whether the variables of our interest are stationary, that is I(0), or first difference stationary, that is I(1), the study uses most popular tests Augmented Dickey-Fuller (ADF) due to Dickey and Fuller (1979, 1981) and Phillips-Perron (PP) due to Phillips and Perron (1988).
5.3 Co-integration Analysis

Economic literature provides different methods for examining the existence of the long-run relationship between the two or more time series variables. The most widely used methods are Engle-Granger procedure due to Engle and Granger (1991) and full information maximum likelihood approach due to Johansen (1988, 1995) and Johansen and Juselius (1990). This study employs Johansen approach as it handles multivariate systems in a better way than Engle-Granger procedure (Banerjee et al. 1993; and Harris 1995). The vector autoregressive (VAR) based cointegration test methodology developed by Johansen and Juselius (1990) with up to k-lags of $X_t$ is expressed as follows:

$$X_t = A_1X_{t-1} + ... + A_kX_{t-k} + \mu + \varepsilon_t$$

(3)

Where: $X$ is an $n \times 1$ vector of the I(1) variables of interest, $t = 1, \ldots, T$, $\mu$ is a vector of constants $\varepsilon_1, \ldots, \varepsilon_t$ and IN(0, $\Pi$) error terms.

Using $\Delta = 1 - L$, where $L$ is the lag operator, the above vector autoregressive model with Gaussian errors can be expressed by its first differenced error correction form:

$$\Delta X_t = \Pi X_{t-k} + \Gamma_1 \Delta X_{t-1} + \ldots + \Gamma_{k-1} \Delta X_{t-k+1} + \mu + \varepsilon_t$$

(4)

Where: $\Gamma_i = -(I - A_1 - \ldots - A_k)$, ($i = 1, \ldots, k-1$) and $\Pi = -(I - A_1 - \ldots - A_k)$, $I$ is the unit matrix and $A_i$ ($i = 1, \ldots, k$) are the coefficients of the vectors and $k$ is the number of lags included in the system.

Equation 4 is a traditional first difference VAR model, except for the term $\Pi X_{t-k}$. The $\Pi$ matrix conveys information about the long-run relationship between variables and the rank of $\Pi$ is the number of linearly independent and stationary variables. The information on the coefficient matrix $\Pi$ is decomposed as $\Pi = \alpha \beta^T$, where the elements of the $\alpha$ matrix are error correction coefficients, which indicates the speed of adjustment from disequilibrium. $\beta$ is a matrix of long-run coefficients which ensure that $X_t$ converges to their long-run steady state solutions. Thus, the Johansen cointegration test is based on an examination of matrix $\Pi$, which contains an error correction term (ECT) that has information about a long-run relationship. If this matrix has a full rank, the vector process $X_t$ is stationary. If the rank equals zero, the matrix is a null matrix and the equation remains a traditional VAR, where the variables are not cointegrated, and hence, have no long-run relationship. Johansen (1995) and Johansen and Juselius (1990) provides two likelihood ratio statistics to test for the number of cointegrating vectors. The first is the trace statistic, which tests the null hypothesis that the number of distinct cointegrating vectors is less than, or equal to, $r$ against a general alternative. The second is the maximum eigenvalue (L-max) statistic, which tests the null hypothesis of exactly $r$ cointegrating vectors against the alternative of $r+1$ cointegrating vectors.

5.4 Granger Causality Test

The existence of cointegration among the three variables suggests that there must be Granger causality in at least one direction, but it does not indicate the direction. Engle and Granger (1991) proved that if the variables are integrated of order I(1) and co-integrated, the standard Granger causality test is not appropriate, as it does not consider the error correction term, which corrects the dis-equilibrium in the short-term. The authors, therefore, recommends the use of the error correction model (ECM), which incorporates the error correction term (ECT) in order to obtain proper statistical inferences when analyzing the causality relationship. Our Granger causality is, therefore, tested based on the vector error correction model (VECM), which is expressed as:

$$\Delta FINA_t = \phi_0 + \sum_{j=1}^p \phi_j \Delta FINA_{t-j} + \sum_{j=1}^p \phi_j \Delta GDPC_{t-j} + \sum_{j=1}^p \phi_j \Delta TOPEN_{t-j} + \phi_3 ECT_{t-1} + \varepsilon_t$$

(5)

$$\Delta GDPC_t = \lambda_0 + \sum_{j=1}^p \lambda_j \Delta FINA_{t-j} + \sum_{j=1}^p \lambda_j \Delta GDPC_{t-j} + \sum_{j=1}^p \lambda_j \Delta TOPEN_{t-j} + \lambda_3 ECT_{2t-1} + \varepsilon_t$$

(6)

$$\Delta TOPEN_t = \gamma_0 + \sum_{j=1}^p \gamma_j \Delta FINA_{t-j} + \sum_{j=1}^p \gamma_j \Delta GDPC_{t-j} + \sum_{j=1}^p \gamma_j \Delta TOPEN_{t-j} + \gamma_3 ECT_{3t-1} + \varepsilon_t$$

(7)
Where: \( \Delta \) is the first difference operator; \( p \) is optimal lag length determined by Schwarz information criterion (SIC). \( ECT_{t-4} \), \( ECT_{2t-1} \) and \( ECT_{3t-1} \) are mutually uncorrected error correction terms lagged one period and \( \epsilon_{1t} \), \( \epsilon_{2t} \), \( \epsilon_{3t} \) are white noise errors.

In the above equations, Wald F-statistic is used to test the joint statistical significance of the coefficients of each of the other lagged endogenous variables for the short-run causal effect; while significance of the \( t \)-statistic of the coefficient of the lagged error correction term (ECT) indicates long-run causal effect. In Equation (5), testing that \( GDPC_j \) and \( TOPEN_i \) do not cause \( FINA_i \) in the short-run; imply testing the null hypothesis \( H_0 \): all \( \phi_{2j} = 0 \) and \( \phi_{3j} = 0 \) using the Wald F-test. Failure to reject the null hypothesis economic growth and trade openness do not Granger cause finance in the short-run. Similar logic applies to equation 6 and 7 for GDPC, and TOPEN.

5.5 Empirical Results

5.5.1 Unit Root Results

The results of the ADF and PP unit root test for each variable are presented in Table 1. The results show that both tests failed to reject the existence of a unit root for the data in levels, indicating that all variables are non-stationary. The variables were then differenced once and the first difference results reveal stationarity of the variables. It is, therefore, safe to conclude that the examined time series data is integrated of order one or I(1) in levels and order zero or I(0) in the first difference.

5.5.2 Co-integration Results

The test results of the Trace statistic test and Maximum eigenvalue statistic test indicate rejection of the null hypothesis of no cointegration (i.e., \( r = 0 \)) at the 5% significance level (see Table 2). The cointegration results provide evidence of at least one cointegrating vector between economic growth, trade openness and each of the three measures of financial development. The results, therefore, suggest that the three variables would not move too far away from each other through time. The estimated long-run relationship illustrates that in Malawi, financial development and trade openness have a positive effect on economic growth.

5.5.3 Granger Causality Results

The Granger causality results based on error correction model are reported in Table 3. The Granger causality results of the GDPC, M2/GDP and TOPEN equations suggest that there is a short-run causal flow from financial development and trade openness to economic growth without feedback effect. However, the results show that financial development and trade openness have a short-run bi-directional causal relationship. In the long-run the three series share a bi-directional causality as evidenced by the significance of the coefficients of the error correction term.

The Granger causality tests of the GDPC, DEPLIAB and TOPEN equations illustrate that, in the short-run, the direction of causality runs from financial development to economic growth and trade openness without a reverse causation. On the contrary, the analysis found that economic growth and trade openness do not share any short-run causal relationship. In the long-run, the three variables share a bidirectional causal relationship, as indicated by the significance of the coefficients of the lagged error-correction terms.

The Granger causality results reported on the GDPC, PRIVGDP and TOPEN equations reveal only prima-facie causal effect running from financial development to economic growth and trade openness. In the long-run the results indicate unidirectional causality from economic growth to financial development and trade openness. In contrast, financial development and trade openness share a long-run bi-directional causal relationship.

5.6 Discussion

The foregoing causality results show that, in Malawi, the supply-leading hypothesis dominates the demand-following hypothesis. In other words, the development of the financial sector precedes and induces the growth of the real sector. The findings confirm Patrick’s (1966) view, that in the early stages of the economic development of a country, the supply-leading pattern dominates and, at the later stages, it gradually becomes less and less important and a demand-following pattern becomes dominant. The results also indicate that, in Malawi, financial development and trade openness have a short-run bidirectional causal effect, however, causal effect from trade openness to financial development depends on the financial development measure. This finding implies that, in Malawi,
financial development plays a more important role in increasing trade and its structures in the short-run, compared to the corresponding impact that trade openness has on financial development.

The short-run causal interactions between finance and trade openness on one hand and trade openness and economic growth on the other do not provide strong evidence to say that, in Malawi, financial development indirectly promotes economic growth through trade openness or that trade openness enhances economic performance through its impact on financial development. This could be explained by the poor domestic entrepreneurial capacity, the internal institutional settings of the financial intermediaries and heavy dependence on primarily agricultural products for exports which are less likely to allow for more dynamic benefits from trade, to enhance sustainable economic growth.

6. Conclusion

This study investigated the causal relationship between financial development, trade openness and economic growth in Malawi in a trivariate time series framework. Three alternative financial development measures: money supply (M2), deposit liabilities and private sector credit were used to determine the impact of different aspects of financial development on economic growth.

The VECM empirical approach was used to investigate the direction of causality between the variables. The VECM analysis was conducted after confirming the presence of stochastic trend and cointegration relationship among the variables. Our empirical findings have revealed existence of long-run relationship between financial development, trade openness and economic growth and provide support that financial development and trade openness drive economic growth in developing countries. The causality findings have suggested that financial development is an important factor in explaining growth and trade openness in the short-run, while in the long-run, the series have feedback causal effects. The results have confirmed the supply-leading hypothesis between finance and growth for Malawi. Although we have found a causal effect from trade openness to economic growth when the money supply is used as financial development measure, the results (in the cases of deposit liabilities and private sector credit) have concurred with the empirical findings of Chang (2002) and Hassam and Islam (2005), who found no causal relationship between trade openness and economic growth.

Our short-run causal effect results from trade openness to economic growth provide evidence that, in Malawi, an indirect causal effect from financial development to economic growth through the channels of trade openness depends on the measure of financial development. In other words, our study has established evidence of the existence of the dynamic linkages between financial development and trade openness; however, these linkages are not strong enough to draw a firm conclusion that financial development further promotes economic growth indirectly through its influence on trade openness.

These results have policy implications for countries with low level of financial development and domestic entrepreneurial capacity. We therefore, advocate for the policies that will help in strengthening financial deepening and domestic industrial development so that the countries will gain from the improved services in the future.
References


Appendix

Figure 1: Graph for Financial Development and Economic Growth in Malawi 1970-2009

Table 1: Unit Root tests

<table>
<thead>
<tr>
<th>Variable</th>
<th>Augmented Dickey-Fuller (ADF)</th>
<th>Phillips-Perron (PP)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Levels</td>
<td>First Difference</td>
</tr>
<tr>
<td></td>
<td>Intercept and trend</td>
<td>Intercept and trend</td>
</tr>
<tr>
<td>GDPC</td>
<td>-0.020</td>
<td>-5.292***</td>
</tr>
<tr>
<td>DEPLIAB</td>
<td>-1.580</td>
<td>-5.916***</td>
</tr>
<tr>
<td>PRIVGDP</td>
<td>-1.698</td>
<td>-5.480***</td>
</tr>
<tr>
<td>TOPEN</td>
<td>-0.537</td>
<td>-7.952***</td>
</tr>
</tbody>
</table>

Notes: *, ** and *** denote stationary at 10%, 5% and 1% levels.
Table 2: Cointegration Test Results

<table>
<thead>
<tr>
<th>Null hypothesis</th>
<th>Trace statistic</th>
<th>Maximum Eigenvalue statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Alternative hypothesis</td>
<td>Statistic</td>
</tr>
<tr>
<td>Co-integration test results between GDPC, M2/GDP and TOPEN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>r = 0</td>
<td>r ≤ 1</td>
<td>36.629**</td>
</tr>
<tr>
<td>r ≥ 1</td>
<td>r ≤ 2</td>
<td>14.617</td>
</tr>
<tr>
<td>r ≥ 2</td>
<td>r ≤ 3</td>
<td>0.0280</td>
</tr>
<tr>
<td>Co-integration test results between GDPC, DEPLIAB and TOPEN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>r = 0</td>
<td>r ≤ 1</td>
<td>35.038**</td>
</tr>
<tr>
<td>r ≥ 1</td>
<td>r ≤ 2</td>
<td>10.488</td>
</tr>
<tr>
<td>r ≥ 2</td>
<td>r ≤ 3</td>
<td>1.6538</td>
</tr>
<tr>
<td>Co-integration test results between GDPC, PRIVGDP and TOPEN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>r = 0</td>
<td>r ≤ 1</td>
<td>46.880*</td>
</tr>
<tr>
<td>r ≥ 1</td>
<td>r ≤ 2</td>
<td>7.4880</td>
</tr>
<tr>
<td>r ≥ 2</td>
<td>r ≤ 3</td>
<td>1.3878</td>
</tr>
</tbody>
</table>

** Denotes rejection of the null hypothesis at the 0.05 critical value.

r Denotes the number of co-integration vectors.
Table 3: Granger causality results based on the Vector Error Correction Models

<table>
<thead>
<tr>
<th>Explanatory Variables</th>
<th>Equations</th>
<th>( \Delta GDPC )</th>
<th>( \Delta M2/GDP )</th>
<th>( \Delta TOPEN )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-run: F-statistic</td>
<td>( \Delta GDPC )</td>
<td>16.11***</td>
<td>0.001</td>
<td>2.70</td>
</tr>
<tr>
<td></td>
<td>( \Delta M2/GDP )</td>
<td>5.19**</td>
<td>4.55**</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>( \Delta TOPEN )</td>
<td>-0.248**</td>
<td>-0.495**</td>
<td>-0.881***</td>
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<tr>
<td>Long-run (ECT): t-statistic</td>
<td>( \Delta GDPC )</td>
<td>-</td>
<td>0.001</td>
<td>2.70</td>
</tr>
<tr>
<td></td>
<td>( \Delta DEPLIAB )</td>
<td>1.08</td>
<td>2.84</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>( \Delta TOPEN )</td>
<td>-0.246**</td>
<td>-0.308**</td>
<td>-1.125***</td>
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<table>
<thead>
<tr>
<th>Explanatory Variables</th>
<th>Equations</th>
<th>( \Delta GDPC )</th>
<th>( \Delta PRIVGDP )</th>
<th>( \Delta TOPEN )</th>
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</thead>
<tbody>
<tr>
<td>Short-run: F-statistic</td>
<td>( \Delta GDPC )</td>
<td>8.15**</td>
<td>1.89</td>
<td>1.19</td>
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<td></td>
<td>( \Delta PRIVGDP )</td>
<td>0.23</td>
<td>2.56</td>
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<td>( \Delta TOPEN )</td>
<td>-0.185</td>
<td>-0.340*</td>
<td>-1.232***</td>
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</tbody>
</table>

Notes: *, ** and *** denote 10%, 5% and 1% level of significance, respectively.