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The finance-growth nexus: Evidence from Malawi

Ken Shawa

Investment Promotion and Private Sector Development Division (IPPSD), Common Market for Eastern and Southern Africa (COMESA) Secretariat, Ben Bella Road, P.O. Box 30051, Lusaka, Zambia.

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Apart from assessing the impact of financial development on economic growth, economists have also delved to understand the direction of causality between the two variables. We examine the causal relationship between the two variables in the Granger causality sense and regress economic growth on financial development and a number of control variables. The Augmented –Dickey Fuller unit root test is used to test for non-stationarity of variables and the Johansen Vector Autoregressive Cointegration test is utilised to explore the existence of a long-run equilibrium relationship among the variables. We find that all variables are integrated of order one and that they converge to a long-run equilibrium. In the light of these results, we employ an error-correction model. Causality and regression results confirm the contention of Robinson (1952) that the relationship between financial development and economic growth is *demand following* implying that *where enterprise leads, finance follows*. Additionally, results of the growth equation show that the population level, inflation, exchange rate, and openness to trade are significant in explaining economic growth in Malawi. The study suggests policies consistent with economic growth.

Key words: Non-stationarity, cointegration, financial development, economic growth.

INTRODUCTION

Financial development is defined as a process that marks improvements in quantity, quality and efficiency of financial intermediary services (Abu-Bader and Abu-Qarn, 2005). According to Levine (1997), the debate linking financial development and economic growth can be traced as far back as following Bagehot's (1873) observation that financial development played an important role in the process of industrialization in England. Bagehot claimed that financial development facilitated the necessary capital mobilization which enhanced industrialization. This basic argument was supported by Schumpeter (1912), Hicks (1969) and Miller (1998) *inter alia*.

However, for Kar and Pentecost (2000), the seminal work of Patrick (1966) helped pave the direction of the

debate. In his work Patrick argued that the causal relationship between financial development and growth is two-fold. On one hand, it is *demand following*. This implies that demand for financial services is a function of output growth and upon the transition to modernity. In general therefore this means that causation should move from growth to finance a conclusion that Robinson advanced in 1952 when he wrote “. . . *where enterprise leads finance follows*.”

On the other hand, it is *Supply leading*. This implies that it is the availability of financial services that stimulates demand. While this argument clearly contradicts Robinson's conclusion it reinforces the endogenous growth argument that financial development, precedes economic growth. Indeed Schumpeter (1912), Hicks (1969), Goldsmith

E-mail: kenshawa@yahoo.com.

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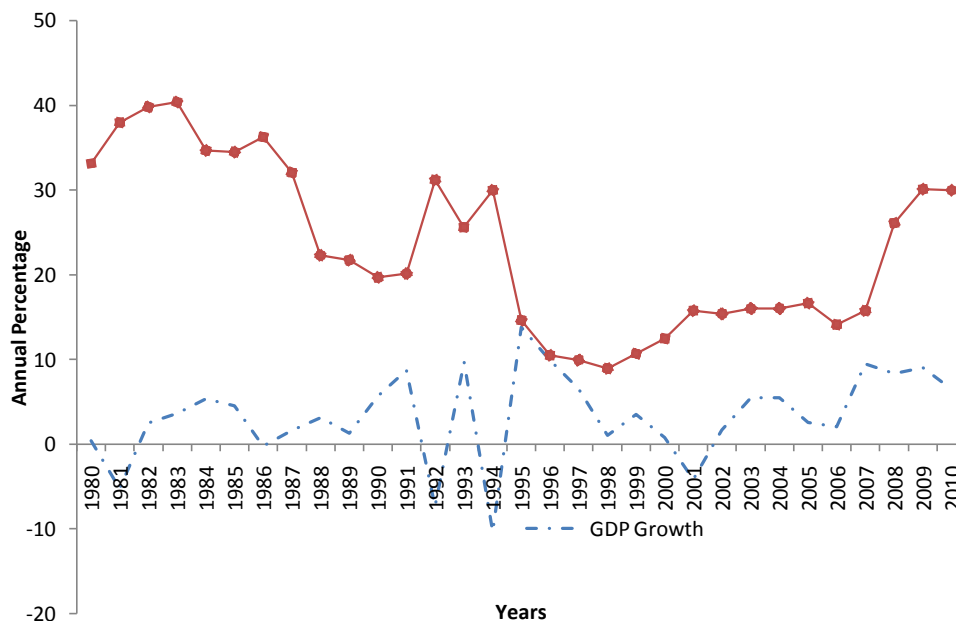


Figure 1. GDP growth and domestic credit (GDP%). Source: International Monetary Fund (IMF), World Economic Outlook Data Base (2013) and World Bank (WB), World Development Indicators (Various Issues).

(1969), McKinnon (1973), Shaw (1973) all maintain that essentially a country's financial system plays a critical role in allocating resources and promoting growth (Levine, 1997; Fatima 2004).

A sound understanding of the finance-growth relationship is likely to guide effective policy making in Malawi where the economy is still heavily reliant on agriculture and the financial system is yet to grow. Incontestably for a country like Malawi an early discovery of the puzzle is likely to be beneficial to the growth process.

Figure 1 shows trends in GDP growth and domestic credit provided by the banking sector in Malawi¹. As is evident from the figure, although some years registered negative growth rates, economic growth has generally been positive but fluctuating. Between 1980 and 1990 for instance, negative growth rates of -5.2 percent and -0.215 were recorded, and while a high rate of growth was recorded in 1990 at 5.7 percent, growth in the period remained below 6 percent. Mixed results were also observed between 1991 and 2000. With negative rates obtaining in 1992 (-7.3 percent) and 1994 (-10.3 percent), the highest rate was recorded in 1995 (13 percent). The period 2001 and 2010 was not different either. Starting off with negative growth of -4.0 percent in 2001, positive results were registered in all the years with the highest value being 9.5 percent in 2007. On average

during the period 1980 to 2010, GDP growth rates averaged only 3.4 percent, an average too low for any meaningful development for a developing economy.

There was also a general decline in the provision of domestic credit by the banking sector. Between 1980 and 1990, the banking sector provided 33 percent of domestic credit (as percentage of GDP) but could only provide 19 percent by the end of 1990. While there was a temporary increase between 1991 and 1994, a sharp decline followed reaching a low value of 15 percent by the end of 2007. Nevertheless, an upward trend began to unfold again from 2008.

In terms of linking these two variables, studies on the finance-growth nexus have emphasized the one way causation coming from financial development to economic growth (Waquabaka, 2004; Allen and Ndikumana, 1998). Yet there is a possibility of a two-way causation and should this be the case then economic policy making linking the two variables has been greatly misleading. Economically a policy mismatch in one sector is likely to adversely affect other sectors and thus slow the much wanted economic growth.

Further, most studies on economic growth have been cross sectional (Hsu, Liu and Lee, 2004). Such studies hide the country specific peculiarities and therefore offer very little guidance to country-specific policy formulation. Furthermore most studies neglect the important assessment of unit roots which is a prevalent problem in most time series, the presence of which affects the application of asymptotic theory.

The present study therefore undertakes to add value to

¹ GDP growth rates are annual percentages of constant price GDP of year-on-year changes. It is expenditure based GDP which is the total expenditure at purchaser's prices. The level of financial development is depicted in the figure as the domestic credit provided by the banking sector as a percentage of GDP.

existing literature on the finance-growth nexus, by examining the two way causation of the finance and growth variables, examining the finance growth puzzle in a country specific case and testing for integration and co-integration of economic fundamentals.

The rest of the paper is organized as follows: section 2 presents an empirical survey; section 3 discusses the methodology and section 4 discusses the results. Section 5 concludes the paper.

EMPIRICAL REVIEW

A battery of econometric techniques have been used to study the finance-growth relationship. One strand has used cross-sectional or panel data while the other has used time series techniques. In this section we divide the empirical review into studies that have used panel data techniques and those which utilised times series techniques.

Panel studies

One prominent study in sub-Saharan Africa was conducted by Acaravci *et al.* (2005) who investigated the causality between financial development and economic growth for the period 1975-2005 using panel cointegration and panel GMM estimation. The study found no long run relationship between financial development and economic growth. However a bi-directional causal relationship was established between the two variables.

Rachdi and Mbarek (2011) empirically investigated the direction of causality between finance and growth using panel data cointegration and system GMM approaches. The analysis is based on a sample of 10 countries, 6 from the OECD region and 4 from the MENA region during 1990-2006. Results confirm a long term relationship between financial development and economic growth for the OECD and MENA countries. The GMM results show that financial development and economic growth are strongly linked. The error correction model shows that causality is bi-directional for the OECD countries and unidirectional for the MENA countries from growth to financial development. For European Union countries, Halko and Trigoni (2010) found that the financial system does not directly affect growth.

Another study that employed panel cointegration was undertaken by Christopoulous and Tsionas (2004), who investigated the long run relationship between financial depth and economic growth using panel cointegration (fully modified approach) for 10 developing countries. Empirical results provide clear support for the hypothesis that there is a single equilibrium relationship between financial depth, growth and ancillary variables, and that the only cointegrating relation implies a unidirectional causality from financial depth to growth.

Using data from 286 Chinese cities over the period 2001-2006, Zhang *et al.* (2012) investigated the relationship between financial development and economic growth in China. The results from both traditional cross-sectional regressions, first-difference and system GMM suggest that traditional indicators of financial development are positively associated with economic growth. Similarly, Hassan *et al.* (2011) established a positive relationship between financial development and economic growth in developing countries and confirmed a two-way causality relationship between finance and growth for most regions and one way causality for the poorest regions.

Using a Bayesian dynamic factor model, Pan and Wang (2013) examine the relationship between financial development and economic growth across 89 countries in industrial countries, emerging market economies and other developing countries over the period 1970-2009. Estimations of the common factor, country and idiosyncratic factors driving the dynamics and co-movements of financial development and economic growth across the 89 countries indicated that the common factor plays a more significant role in explaining the variance of output growth in industrial countries and emerging market economies but not in the developing countries. In contrast financial development variability is mainly driven by country and idiosyncratic factors.

Time series

Some researchers have concentrated on country-specific studies results of which are grossly mixed. For instance, Akinlo and Egbetunde (2010) examined the long run and causal relationship between financial development and economic growth for ten countries in sub-Saharan Africa using a vector Error Correction Model. The study found that financial development is cointegrated with economic growth in the selected ten countries of sub-Saharan Africa and that financial development Granger causes economic growth in Central Africa Republic, Congo Republic, Gabon and Nigeria while economic growth Granger causes financial development in Zambia. Furthermore, bi-directional relationship between financial development and economic growth was found in Kenya, Chad, South Africa, Sierra Leone and Swaziland.

The study by Adamopoulos (2010) was also insightful. Investigating the relationship between financial development and economic growth for Ireland for the period 1965-2007 using a vector error correction model, the Granger causality tests indicated that economic growth causes credit market development while a bilateral causal relationship between stock market development and economic growth was found.

Hussain and Chakraborty (2012) demonstrated that financial development and economic growth are cointegrated and that financial development Granger-causes economic growth in Assam State of India. Ozcan

and Ari (2011) tested the relationship in Turkey for the period 1998-2009 and found a uni-directional relationship between financial development and economic growth coming from economic growth to financial development. These results for Turkey were in line with those of Kar and Pentecost (2000) who used the ratio of money to income, the ratio of banking deposit liabilities to income, the ratio of private sector credit to income, the share of private sector credit in domestic credit and the share of domestic credit to income to proxy level of financial development and their results showed that in general it is economic growth that causes financial development in Turkey and not vice versa. Similar results were established by Waquabaca (2004) in Fiji.

Using annual time series data from South Africa, Adusei (2012) tested the validity of Schumpeter's prediction that finance promotes growth. The study uses unit root tests, co-integration analysis, fully modified ordinary least squares regression, and two-stage least squares technique. Contrary to the prediction of Schumpeter that finance promotes growth, the empirical results suggest that financial development does not promote economic growth both in the short-run and long-run. However, the pairwise Granger causality test result supports the assertion that there is a uni-directional causality from financial development to economic growth in South Africa.

Hsu et al. (2004) examined the role of financial development in Taiwan, Korea and Japan using the Generalized Method of Moments (GMM) and Principal Components Analysis. The study established that finance was vital in propelling growth in Japan but had negative effects in Taiwan and Korea. Further, the study shows that unlike in Korea and Japan, stock market development had positive effects on the economic growth of Taiwan.

Fatima (2004) explored the causality between financial development and economic growth in Morocco for a period of 1970 to 2000. The study used three measures of financial development: the ratio of liquid liabilities (M3) to GDP, the ratio of domestic credit (provided by the banking sector) to GDP and the ratio of domestic credit (to private sector) to GDP. The study revealed causality running from economic growth to financial development when M3 and the ratio of domestic credit (provided by the banking sector) to GDP were used as measures of financial development. However causality runs from finance to growth when the other measure is used.

Summary of empirical survey

The picture that emerges from the empirical review is that the relationship between financial development and economic growth is not uniform across countries. Within the different panels results are mixed. In some case there is no evidence that financial development propels growth, in others this evidence is apparent. Additionally

while some studies establish bi-directional causality others find one-way causality. Moreover, some studies find causality moving from economic growth to financial development while others find the reverse. It is also important to note that some studies have exposed that different financial development proxies produce different results. This means that choice of the measure is an important factor in this kind of work.

METHODOLOGY

Model specification

Several different measures have been used in literature to proxy the level of financial development. Pan and Wang (2013) used domestic credit as a percent of GDP and used the growth rate of real per capita GDP as the dependent variable. Acaravci *et al.*, (2009) used three indicators: domestic credit provided by the banking sector as a percent of GDP; domestic credit to the private sector as a percent of GDP; and liquid liabilities of the financial system-broad money (M3) as a percent of GDP. To proxy economic growth, the natural logarithm of real GDP per capita was used. Akinlo and Egbetunde (2010) used broad money (M2) as a percent of GDP while Christopoulos and Tsionas (2004) used total bank deposits liabilities to nominal GDP. Others have used stock market indices. For instance, apart from domestic bank credits to private sector, Adamopoulos (2010) uses general market stock index to investigate the relationship between financial development and economic growth for Ireland for the period 1965-2007. Other studies combine different financial variables to form composite indicators which are then used as a proxy of financial development. For example, Hussain and Chakraborty (2012) use a composite indicator of four different financial variables combined using the Principal Components Analysis. A number of control variables have been used in these studies including investment, inflation, interest rate among others.

With insights from these studies and depending on data availability we use level of domestic credit by the banking sector as a percent of GDP to proxy financial development. We control for population, inflation, exchange rate and trade openness. Thus the study employs a logarithmic model of the following form:

$$LY = \beta_0 + \beta_1 LPOP + \beta_2 LINF + \beta_3 LER + \beta_4 LOPEN + \beta_5 LFINDC + \varepsilon_t \quad (1)$$

Where: LY is logarithm of real Gross Domestic Product;

$LPOP$ is logarithm of Population;

$LINF$ is logarithm of Inflation;

LER is logarithm of Exchange Rate;

$LOPEN$ is logarithm of Trade Openness;

$LFINDC$ is logarithm of Financial Development

(proxied by level of Domestic Credit provided by the Banking Sector, % of GDP).

Data sources

The time series data set spans from 1970 to 2010 and sources included the various issues of the Reserve Bank of Malawi's Financial and Economic Review, the various issues of African Development Indicators, various issues of World Development

Indicators, various issues of World Bank Africa Data Base, and various issues of the IMF's International Financial Statistics (IFS) and the World Economic Outlook Data Base of 2013.

Unit root tests and cointegration

It has been shown in literature that in non-stationary series spurious correlation may arise despite the absence of any correlation between the underlying series. As argued by Banerjee et al. (1993), if two or more series are each growing they may be correlated even though they are increasing for entirely different reasons and by amounts that are uncorrelated. Thus a correlation between non-stationary series cannot be interpreted in the way that it could be if it arose among stationary series.

Technically, the components of an n-dimensional vector of time series $x_t, (x_{1t}, x_{2t}, \dots, x_{nt})$, are said to be co-integrated of order d,

b (denoted $x_t \sim I(d)$) if after differencing d times have stationary invertible non-deterministic Autoregressive Moving Average (ARMA) representation. Using this definition we can classify a stationary time series as being an I(0) process while a non-stationary time series will be an I(k) where k is a positive integer depending on the order of integration.

If $x_{1t}, x_{2t}, \dots, x_{nt}$ are co-integrated they will tend to track each other through time forming a long-run equilibrium relationship with any deviation from the long-run lasting only for a finite period. These variables are said to be co-integrated of order d, b (denoted $x_t \sim CI(d-b)$) if $x_t \sim I(d)$ and there exists a vector α , such that:

$$Z_t = \alpha' x_t \sim CI(d-b), \alpha \neq 0, b > 0 \tag{2}$$

The co-integration of the components of x_t vector implies the existence of a restriction on the standard vector autoregressive (VAR) model. Hence the estimates obtained by the standard VAR model will be misspecified (Engle and Granger, 1987). To circumvent this problem, a vector error correction (VEC) model has been suggested. The VEC restricts the long-run behavior of the endogenous variable to converge to their co-integrating relationship while allowing a wider range of short-run dynamics.

In this study, the order of integration of a time series will be found by applying a unit root test while the order of co-integration of a vector of time series will be obtained by applying a co-integration test.

The Augmented Dickey Fuller Test (Time Series Properties)

To test for the order of integration the study employed the Dickey Fuller Augmented Test. The test uses the following AR(1) process:

$$y_t = \mu_t + \rho y_{t-1} + \varepsilon_t \tag{3}$$

where μ_t and ρ are parameters and ε_t is assumed to be white noise. y_t is a stationary series if $-1 < \rho < 1$. If $\rho = 1$, y_t is a nonstationary series. The hypothesis of a stationary series can be evaluated by testing whether the absolute value of ρ is strictly less than 1. The Dickey Fuller Test therefore takes the unit root as the

Null hypothesis $H_0 : \rho = 1$ against a one sided alternative $H_1 : \rho < 1$. However the actual test is carried out by estimating an equation with y_{t-1} subtracted from both sides of the equation:

$$\Delta y_t = \mu_t + (\rho - 1)y_{t-1} + \varepsilon_t \tag{4}$$

where $\Upsilon = \rho - 1$ and the null and alternative hypotheses are:

$H_0 : \Upsilon = 0$ and $H_1 : \Upsilon < 0$. More generally the ADF approach controls for higher order correlation by adding lagged difference terms of the dependent variable y_t to the right hand side of the regression:

$$\Delta y_t = \mu_t + \Upsilon y_{t-1} + \delta_1 \Delta y_{t-1} + \delta_2 \Delta y_{t-2} + \dots + \delta_{p-1} \Delta y_{t-p+1} + \varepsilon_t \tag{5}$$

This augmented specification is then used to test:

$H_0 : \Upsilon = 0$, $H_1 : \Upsilon < 0$ in this regression.

The Johansen Co-integration Test (Long-Run Equilibrium)

Given that we had a group of non-stationary series we were interested in determining whether the series are cointegrated and if they are, in identifying the cointegrating (long-run) relationships. We use a VAR-based cointegration tests using the methodology developed by Johansen (1991, 1995).

The Johansen's Cointegration Test considers a VAR of order p:

$$y_t = A_1 y_{t-1} + \dots + A_p y_{t-p} + Bx_t + \varepsilon_t \tag{6}$$

where y_t is a k - vector of non-stationary I(1) variables, x_t is a vector of deterministic variables, and ε_t is a vector of innovations. The VAR can be re-written as:

$$\Delta y_t = \Pi y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + Bx_t + \varepsilon_t \tag{7}$$

where $\Pi = \sum_{i=1}^p A_i - I$ and $\Gamma_i = - \sum_{j=i+1}^p A_j$

Granger's representation theorem asserts that if the coefficient matrix Π has reduced rank $r < k$, then there exists $k \times r$ matrices α and β each with rank r such that $\Pi = \alpha\beta'$ and $\beta'y_t$ is stationary. r is the number of cointegrating relations (the cointegrating rank) and each column of β is the cointegrating vector. The elements of α are known as the adjustment parameters in the Vector Error Correction Model. Johansen's method is to estimate the Π matrix in an unrestricted form, then test whether we can reject the restrictions implied by the reduced rank of Π .

Table 1. Unit root tests in levels and associated critical values.

Variable	ADF Test Statistic
LY	1.524556
LPOP	-1.873115
LINF	-2.522843
LER	1.073024
LOPEN	-0.826733
LFINDC	-1.718393

Critical values: -3.6496(1%); -2.9558(5%) and -2.6164 (10%).

Table 2. Unit root tests in first difference and associated critical values.

Variable	ADF Test Statistic
Δ LY	-3.044010
Δ LPOP	-3.162857
Δ LINF	-6.716030
Δ LER	-3.284222
Δ LOPEN	-6.843875
Δ LFINDC	-2.883559

Critical values: -3.6576 (1%); 2.95.91 (5%) and -2.6181 (10%).

Causality

To establish the direction of causality between economic growth and financial development in Malawi, the *Granger Causality Test* was employed. The Granger (1969) approach to the question of whether x causes y is to see how much of the current y can be explained by past values of y and then to see whether adding lagged values of x can improve the explanation. Y is said to be Granger-caused by x if x helps in the prediction of y or equivalently if the coefficients on the lagged x's are statistically significant. This method measures precedence and information content. The test runs bivariate regressions of the form:

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \dots + \alpha_i y_{t-i} + \beta_1 x_{t-1} + \dots + \beta_i x_{t-i}$$

$$x_t = \alpha_0 + \alpha_1 x_{t-1} + \dots + \alpha_i x_{t-i} + \beta_1 y_{t-1} + \dots + \beta_i y_{t-i} \quad (8)$$

For all possible pairs. The reported F-statistics are the Wald Statistics for the joint hypothesis,

$\beta_1 = \dots = \beta_i = 0$ for each equation. The null hypothesis is therefore that x *does not Granger-cause* y in the first regression and that y *does not Granger-cause* x in the second regression.

Diagnostic checks

In order to check whether the model we developed is correct and is without error several tests were carried out. These included the Breusch-Godfrey Serial LM test which tested for the presence of

autocorrelation in the residuals, the Histogram-Normality Test which tested for normality of residuals, the White Heteroscedasticity Test which tested for homogeneity of variance of residuals, and the Ramsey RESET test which tested for the well specification of the model.

RESULTS AND DISCUSSION

Unit root results (Time Series Properties)

In order to establish the order of integration the study used the ADF test under the null hypothesis of nonstationarity. The first step involved applying the test on level variables the results of which are reported in Table 1. It is clear from the table that the hypothesis of nonstationarity cannot be rejected at any conventional levels and therefore it was necessary to expose the variables to the ADF test in first difference results of which are captured in the Table 2 shows that Δ LY achieves stationarity at 5%, Δ LPOP at 5%, Δ LINF at 1%, Δ LER at 5%, Δ LOPEN at 1% and Δ LFINDC at 10%. Since the variables achieve stationarity after first difference, we conclude that all the variables in the study are integrated of order One.

Cointegration results

Granger and Newbold warned that regressing one I(1) variable on another leads to spurious regression (Griffiths *et al.*,1993). Granger however identified a situation when the regression of an I(1) process on an I(1) process was not spurious. This is a situation when the variables are cointegrated. In such a case the least squares estimator works better, in that it converges to the true parameter value faster than usual. The present study tested for Cointegration by the Johansen Vector Autoregressive Test, the results of which are given in Table 3. The results of the Johansen procedure indicate 2 cointegration vectors thereby confirming Cointegration (the variables have a long run equilibrium to which they converge). In this case, these results justify a short-run error correction model.

Causality results

The results of the Pairwise Granger Causality Test are given in Table 4. With a p-value of 0.62763, the null hypothesis that the LFINDC does not Granger Cause LY is upheld but with a p-value of 0.04225 which is less than 0.05, the hypothesis that LY does not Granger Cause LFINDC is rejected. The results therefore indicate that for Malawi, the causal relationship between financial development and economic growth is demand following. Causality runs from growth to financial development. This means that financial services are a function of output

Table 3. Johansen cointegration procedure.

Eigen Value	Likelihood ratio	5% critical value	1% critical value	Hypothesised NO. of CE(s)
0.738984	111.6764	94.15	103.18	None**
0.558956	68.69477	68.52	76.07	At most 1*
0.419999	42.49921	47.21	54.46	At most 2
0.318063	25.06801	29.68	35.65	At most 3
0.312097	12.81784	15.41	20.04	At most 4
0.026103	0.846405	3.76	6.65	At most 5

*(**) denotes rejection of the hypothesis at 5%(1%). Series: LY LPOP LINF LER LOPEN LFINDC.

Table 4. Pairwise Granger Causality Tests.

Pairwise Granger Causality Tests	F-Stat	Prob
Null hypothesis		
LFINDC does not Granger Cause LY	0.4739	30.62763
LY does not Granger Cause LFINDC	3.5657	40.04225

growth and as argued by Kar and Pentocost(2000). The results are also in line with studies by Akinlo and Egbetunde (2010), Fatima (2004) and Ozcan and Ari (2011).

The Error- Correction Model

Prior to developing this error correction model we developed a long run equation from which residuals or innovations were obtained. These residuals formed the Error Correction Mechanism represented as $LY - L\hat{Y}$. The error-correction model we develop here contains differenced variables and the error correction mechanism as follows,

$$\Delta LY = \beta_0 + \beta_1 \Delta LPOP + \beta_2 \Delta LINF + \beta_3 \Delta LER + \beta_4 \Delta LOPEN + \beta_5 \Delta LFINDC + \beta_6 (LY - L\hat{Y})_{-1} + \varepsilon_t \quad (9)$$

Where ΔLY is the differenced logarithm of Gross Domestic Product;

$\Delta LPOP$ is the differenced logarithm of Population;

$\Delta LINF$ is the differenced logarithm of Inflation;

ΔLER is the differenced logarithm of Exchange Rate;

$\Delta LOPEN$ is the differenced logarithm of the Sum of Exports and Imports as a ratio of GDP which is a proxy for openness;

$\Delta LFINDC$ is the differenced logarithm of the ratio of domestic credit by the banking sector to GDP which is a proxy for Financial Development and $(LY - L\hat{Y})_{-1}$ is the One-

Period Lagged Error Correction Mechanism.

Δ is the difference operator.

The results of this formulation are given in Table 5.

Interpretation of the Error-Correction Regression Results

We start interpreting the results by considering the model's explanatory power. Generally high explanatory ability is a hallmark of a good model. The Adjusted R-squared of 0.822958 implies that the independent variables are explaining about 82 percent of the variation in the dependent variable. This means that the stochastic component only accounts for 18 percent. This may imply that the independent variables that were chosen for this model are vital in explaining the behaviour of the dependent variable.

Related to the R-Squared is the F-Statistic. The results indicate a relatively high F-Statistic which has an associated p-value of 0.000000. This shows that the variables are jointly significant in affecting or influencing the dependent variable. Such a high F-Statistic also indicates that generally the model is well specified. The well specification of the model may imply that the right mathematical form was used and that theoretically important variables have not been omitted.

Of vital consideration are the diagnostic checks for model. The results show no presence of both first order and second order autocorrelation (*Durbin-Watson Stat*; *BGSLM Test*); no presence of heteroscedasticity (*WH F-*

Table 5. Error-correction regression results.

Variable	Coefficient	Std.Error	t-Statistic	Prob (P-value)
C	0.116383	0.047434	2.453586	0.0221*
$\Delta LPOP$	1.093128	0.391231	2.794077	0.0103*
$\Delta LINF$	-0.019739	0.005134	-3.844483	0.0008**
ΔLER	0.421755	0.120905	3.488319	0.0020**
$\Delta LOPEN$	-0.373695	0.064646	-5.780648	0.0000**
$\Delta LFINDC$	-0.078821	0.059543	-1.323767	0.1986
$(LY - \hat{LY})_{-1}$	-0.703260	0.210357	1.962609	0.0028**
AR(1)	0.477135	0.243112	1.962609	0.0619
MA(1)	0.949792	0.033295	28.52633	0.0000**

*(**) denotes significance at 5% (1%). R-Squared: 0.868647; Adjusted R-Squared: 0.822958; Durbin-Watson Stat: 1.59450; F-Statistic:19.01252; Prob(F-Statistic), 0.000000; BGSLM Test Obs* R-Squared, 0.637962;p-value, 0.726889; Hist-Norm Jarque-Bera, 0.493732; p-value, 0.781245; WH F-Stat, 0.247509; P-value, 0.989241; Ramsey RESET Log likelihood Ratio, 1.054871; p-value, 0.568974.

Stat), that the model is well-specified (*Ramsey RESET*) and that the residuals are normally distributed (*Hist-Norm*).

The main variable in this model is financial development since the aim of the paper is to examine the finance-growth nexus. As has already been mentioned to proxy financial development the study used the ratio of domestic credit by the banking sector to GDP. Many studies have used this formulation before, arguing that availability and access of loanable funds from the banking sector indicate that banks are able to play their intermediation role. This is undoubtedly a characteristic of a growing financial system. It is therefore expected that a viable financial system should lead to positive economic growth. The expected sign therefore is positive. However, the results in the present study show contrary results. The coefficient of financial development is negative and insignificant statistically. Insignificant results were also obtained by Halko and Trigoni (2010), Adusei (2012) and like in the present case Hsu et al. (2004) found negative coefficients for Taiwan and Korea. The negative sign and the statistical insignificance of the variable is not surprising considering that the granger causality result have indicated a uni-directional causality coming from growth to financial development.

Due to the requirements of regression analysis, it was impossible to estimate an equation with only one independent variable. This prompted the researcher to include acceptable control variables in the model. These included population, inflation, exchange rate, and openness of the economy. As can be observed from the regression results the coefficient of population has the expected positive

sign and it is significant at 5% level. This shows that the labour force is an important variable in the growth process in Malawi. It is important to note that the production system in Malawi is more labour intensive and therefore the growth of a labour force should indeed show a positive influence.

In terms of inflationary effects on growth the results exhibit an expected negative sign. The coefficient is also significant at 1% level. The present results are in concomitant with the findings of Rousseau and Wachtel (2002) in the United States. The negative impact of inflation on growth can be due to direct and indirect effects through the financial sector. Direct effects include the higher transactions and information costs in an inflationary environment that inhibit economic growth. For example economic agents will find planning difficult when inflation makes nominal values uncertain. Firms and individuals will be reluctant to enter contracts when inflation is imperfectly predicted and judgements about absolute and relative prices are uncertain. The reluctance to enter contracts over time will inhibit investment and entrepreneurship. Thus inflation will have a direct effect on resource allocation and economic growth.

The indirect channel for the negative effects of inflation on growth is through its effects on financial sector development. High inflation will inhibit any long term financial contracting and financial intermediaries will tend to maintain very liquid portfolios. Thus in an inflationary environment intermediaries will be less eager to provide long-term financing for capital formation and growth.

The coefficient of nominal exchange rate is positive and significant at the 1% level. This points to the fact that a depreciated exchange rate is amenable to the growth

process, though care must be taken on the rate and extent of depreciation. This result highlights efficient exchange rate management in Malawi. Theoretically a depreciated exchange rate should trigger domestic production and accelerate exports while reducing imports.

With globalisation, most countries have now fully opened up their economic boundaries. Contrary to other empirical studies such as that of Ndebbio (2004) which established a positive link with growth, trade openness has registered a negative sign in our study. The coefficient is significant at the 1% level perhaps to emphasise the fact that trade restrictions are still important for small economies like Malawi. When a country is too open production is hampered and the economy becomes *distributive* rather than *productive*.

The one-period lagged error term is negative and statistically significant at 1% level. Its coefficient which is approximately -0.70 implies that about 70% of the discrepancy between actual and equilibrium income is corrected each period. Thus there are economic forces in the economy which operate to restore the long-run equilibrium path of the income level following short-run disturbances.

SUMMARY, CONCLUSION AND POLICY RECOMMENDATIONS

The study uses data from Malawi to examine the link between financial development and economic growth. The study set out to examine this link by carrying out unit root tests of all variables. The results of these tests confirmed that the variables are integrated of order one - $I(1)$. The study then carried out the Johansen VAR Cointegration Test and established two cointegrating vectors thereby confirming cointegration. This justified the development of an error correction model. In its examination of the causal link between financial development and economic growth the study established that the relationship is *demand following*. To achieve this the Pairwise Granger Causality Test was used.

The study also carried out several diagnostic checks to be in conformity of the requirements of least squares regression. The results showed that the residuals were not correlated, the residuals had variance homogeneity, the residuals were normally distributed, that the model was well specified.

The results showed that population inflation, exchange rate were significant in influencing income in Malawi. The Financial Development variable had a pervasive sign and was insignificant at conventional levels.

The results of this empirical work have vital policy implications. The variable representing financial development has a negative coefficient and it is statistically insignificant. This, along with the Granger Causality results which show causality running from growth to financial development, it is evident that the finance-growth

relationship in Malawi is *demand following*. Therefore, for Malawi, "*where enterprise leads finance follows*." Thus policies consistent with economic growth should be encouraged. To this end, economic theory enlightens us that policies for growth are broadly divided into two: demand-side policies and supply-side policies. For example, government can use fiscal policy in a demand-side framework, such as cutting taxes which will increase disposable income, encourage consumer spending and contribute to the growth of the economy, or use supply-side policies that attempt to increase productivity and efficiency of the economy. For instance, privatisation and deregulation may increase efficiency as private firms have a greater profit incentives to cut costs and boost productivity.

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