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THE DRIVERS OF REAL SECTOR GROWTH IN MALAWI: AN EMPIRICAL INVESTIGATION

Themba Gilbert Chirwa¹ and Nicholas M. Odhiambo

Abstract

The paper empirically investigates the key macroeconomic determinants of growth in Malawi, using the recently developed ARDL bounds-testing approach. The paper is motivated by the social and economic hardships that Malawi has been facing in recent years. The study reveals that the key macroeconomic determinants that were significantly associated with economic growth include investment, human capital development, population growth, real exchange rate depreciation, inflation, and international trade. We find that, in the short-run, investment, population growth, real exchange rate depreciation, and international trade are positively associated with economic growth, while inflation is negatively associated with economic growth. However, the long-run results reveal that investment, human capital development, and international trade are positively associated with economic growth, while population growth and inflation are negatively associated with economic growth. These results have significant policy implications; since the economic strategies needed to increase economic growth in Malawi should focus on promoting incentives that attract investment, improve the quality of education, reduce population growth, ensure currency and inflation stability, and promote export diversification.

Keywords: Malawi; Autoregressive Distributed Lag Models; Economic Growth

JEL Classification Code: N17, F43, O47, O55

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1. Introduction

Since attaining independence in 1964, the Malawian economy has enjoyed a brief moment of high rates of economic growth, averaging 6.0% p.a. in the 1960s. From the 1970s onwards, the economy faced numerous social, economic and political hardships – resulting in low rates of both real GDP and per capita income. In spite of undertaking numerous political and economic reforms, the consequences of such low economic performance resulted in high poverty levels, averaging 71% in 2010;, and the lowest per capita income in the Southern African region, averaging \$274 per capita in 2014 (World Bank, 2015b).

If this continues, the low growth performance that Malawi still experiences will lead to more social, economic and political hardships – if unchecked. For the economy to recover, it is important to understand the key macro-economic determinants of economic growth. This includes understanding the major factors that drive high economic growth, as well as those that have caused the economy to lag behind. In addition, it is important for Malawi to understand what policy directions the economy can adopt in order to alleviate poverty and achieve a sustainable high growth rate. This study intends to address these specific issues.

In many African economies, the economic strategies adopted are aimed at achieving high and sustainable economic growth rates, with a primary focus on achieving broader development objectives and shared prosperity. Achieving sustainable economic growth rates, either to move from low- to middle-income economies, or middle- to high-income economies, is a necessary condition; however, this is not necessarily sufficient. Easterly and Wetzel (1989) argued that the efficiency of savings and investment are equally important factors, in addition to their accumulation. Thus

policies that both attract savings and investment and make them more efficient by improving their resource allocation can further lead to a higher and more sustainable economic growth rates.

However, in order for savings and investment to be efficient, there is a need for a stable macroeconomic environment that provides incentives to reduce capital flight. This would include ensuring stable macroeconomic conditions such as low inflation, real interest rate stability, real exchange rate stability, productive or non-distortionary government spending and a productive trade policy. It would also include maintaining an efficient price mechanism and regulatory environment, and efficient and effective institutions (both public and private). These factors have been empirically investigated and they are capable of turning savings into productive investment (World Bank, 1990; Fischer, 1993).

The behaviour of these macroeconomic conditions is, however, unique to each economy and dependent on its stage of development. In order for policy makers to understand the key determinants of economic growth that are specific to their country, country-based growth studies are therefore important. As argued by Anyanwu (2014), generating sustained economic growth rates is one of the pressing challenges that Africa faces today.

The aim of this study is to identify the key macroeconomic determinants of growth in Malawi using the available annual time-series data covering the period 1970-2013. In order to study these relationships, the paper employs the recently developed Autoregressive Distributed Lag (ARDL)-bounds testing approach to cointegration, introduced by Pesaran and Shin (1999) and Pesaran *et al.* (2001).

The rest of this paper is organized as follows: Section 2 discusses the macroeconomic drivers of growth in Malawi during the study period. Section 3 discusses the empirical model specification, as well as the estimation techniques used in the study. Section 4 presents the empirical analysis results of the Malawian growth equation. Lastly, section 5 concludes the study and discuss some policy recommendations.

2. The Macroeconomic Factors of Growth in Malawi

Since attaining independence in 1964, Malawi's economic and development policy planning has been guided by the availability of natural resources and a labour-intensive agricultural system. The stage of development at independence, as well as the institutional framework, were the two most important factors defining the structure and content of future development policies. During the study period, Malawi followed a mixed economic system that was dominated by state-led development planning. The agricultural sector was the centrepiece of such development planning, with significant investments being supported by public investments and foreign aid (Chirwa and Odhiambo, 2016). During the 1971-1980 period, the level of gross domestic savings was low, averaging 14.4% p.a. of real GDP and Malawi had to rely on foreign aid averaging 21.6% p.a. of real GDP- during the same period to support its economy. The Malawian economy blossomed, growing at an average rate of 6.2% p.a. This was approximately twice the population growth rate at that time, which averaged 3.2% p.a. (World Bank, 2015b).

In the 1970s, the Government machinery created State Owned Enterprises in commerce and industry, agricultural production, transport and communications, tourism and social services. However, towards the end of the 1970s, the Malawian economy faced a number of economic challenges that affected the country's future economic growth. Some of the challenges were slow

growth and low quality of traditional exports from smallholder farmers; low terms of trade; high population growth that put pressure on the land available for agriculture; low performance of State-Owned Enterprises; increasing government budget deficits; and inadequate human capital development (Chirwa and Odhiambo, 2016). To address these challenges, the Government embarked on a series of structural adjustment reforms to realign the economy.

In 1980, a five-year Medium-Term Plan covering the fiscal years of 1981/82 to 1985/86 was formulated in consultation with the World Bank and International Monetary Fund. The objective of the Medium-Term Plan was to tackle the structural and economic shocks faced by Malawi during the period 1979-1981. This was followed by the development of a comprehensive development strategy in 1987 that focused on poverty reduction, promotion of education and health, income distribution and welfare stability for Malawians (Government of Malawi, 1987). Three structural adjustment loans funded by the World Bank in June 1981, November 1983 and November 1985 were approved to support the implementation of the Medium-Term Plan (World Bank 1981, 1983, 1985). The principal objective of these loans was to assist the Government to address its balance of payment problems. In addition, the balance of payment support came with conditions that aimed at influencing fiscal and monetary policies targeting high fiscal deficits, which were instrumental in triggering price increases (inflation) and exchange rate misalignment (World Bank, 1988).

Despite these interventions, the Malawian economy did not perform as expected during the implementation of the Medium-Term Plan of 1981-1986 and the Development Plan of 1987-1996. During the period 1981-1990, the Malawian economy grew at an average rate of 2.2% p.a. versus a target of 4.8% p.a. Gross domestic savings continued to decline, averaging 12.9% p.a. of real GDP, which meant that Malawi continued to rely on foreign aid inflow that averaged 30.7% p.a. of real

GDP during the same period (World Bank, 2015b). Although there were some improvements in Malawi's balance of payments position through cash injection from the World Bank and the IMF, the key macroeconomic drivers of economic growth deteriorated sharply. During the same period, inflation averaged 16.3% p.a., followed by a real exchange rate growth (real currency depreciation) that grew at an average rate of 3.3% p.a. At the same time, real GDP per capita in the 1980s declined at an average rate of -1.9% p.a. On the international market, Malawi's global position deteriorated, with the terms of trade index by volume averaging 0.69 p.a. and a trade deficit averaging 6.3% p.a. of real GDP (World Bank, 2015b).

Although Malawi continued to implement a number of structural reforms in the 1990s, many macroeconomic parameters remained unsatisfactory. During the period 1991-2000, the economy grew at an average growth rate of 3.7% p.a., which equalled the rate of population growth while the projected real GDP growth rate was 4.4% p.a. Gross domestic savings continued to decline sharply, averaging 2.5% p.a. of real GDP, and this meant that all investment support was through foreign aid that averaged 32.2% p.a. of real GDP. The inflation rate increased sharply, averaging 32.8% p.a. against a target of 5%. Meanwhile the trade deficit continued to deteriorate, averaging -14.3% p.a. of real GDP and leading to rising import bills, while the real currency depreciated at an average rate of 8.5% p.a. (World Bank, 2015b). A number of government development policies were formulated towards the end of the 1990s and in the 2000s, examples being the Malawi Vision 2020, the Malawi Poverty Reduction Strategy Paper of 2002-2005, the Malawi Economic Growth Strategy of 2004, and the Malawi Growth and Development Strategy of 2006-2010; however the Malawian economy continued to face economic challenges and weak performance such as crowding out of private sector investment and regulatory arbitrage (Chirwa and Odhiambo, 2016).

During the period 2001-2013, real GDP grew at an average growth rate of 4.4% p.a. against a target of 7-9% p.a. propounded by the Malawi Vision 2020 (Government of Malawi, 1998; World Bank, 2015b). Although this was a slight improvement, the level of gross domestic savings was still very low, averaging 4.3% of real GDP p.a. during the same period. This meant that the Government continued to rely on foreign aid from development partners averaging 25.5% p.a. of real GDP during the same period. The trade deficit continued to weaken, averaging -16.7% p.a. of real GDP, while the inflation rate still remained high, averaging 13.6% p.a., despite a policy of single-digit inflation rate with a target of 5% p.a. Furthermore, the local currency continued to depreciate at an annual rate of 1.5% p.a. (Government of Malawi, 1998, 2006; World Bank, 2015b).

In terms of human capital development, the Malawian authorities realized the need to address severe human capital constraints that the economy inherited in the 1960s. Since 1970, gross enrolment rates for primary education increased significantly from an average of 22.1% in 1970 to 80.1% in 2010. The Government policy on education supported the promotion of basic skills to support smallholder agriculture, and this was implemented through the promotion of basic primary education. Gross enrolment rates have significantly improved since independence. The focus has been more on primary education and less on secondary and tertiary education (Chirwa and Odhiambo, 2015).

3. Empirical Model Specification

3.1 Empirical Model Specification

Based on the preceding discussion the empirical model for this study is based on an extended growth model specified as follows:

$$Y = f(INV, HC, POPG, GC, RER, INF, TRD, AID) \quad (1)$$

The multivariate framework in equation (1) is an extension to similar models used in the empirical growth literature to investigate the impact of selected macroeconomic determinants on economic growth (see, among others, Fischer, 1993; Chen and Feng, 2000; Anyanwu, 2014). The selected key macroeconomic determinants included in equation (1) are as follows: *INV* represents investments or gross fixed capital formation as a share of real GDP; *HC* represents human capital proxied by total enrolment; *POPG* is population growth; *GC* represents government consumption share in real GDP; *RER* is the real exchange rate; *INF* is the inflation rate; *TRD* is international trade; and *AID* represents foreign aid.

In the economic growth literature, the accumulation of physical capital (investment) is one of the important key determinants of economic growth (Solow, 1956; Frankel, 1962). Investment is positively associated with the rate of growth through the savings ratio (Keynes, 1936). Regardless of the type of physical capital used, many empirical studies have found a positive relationship between investment and economic growth (Dollar, 1992; Fischer, 1992; Most and Vann de Berg, 1996; Anyanwu, 2014). In this study, the accumulation of the physical capital stock is represented by the ratio of gross fixed capital formation to real GDP; and is expected to have a positive and statistically significant impact on economic growth.

The theory on human capital development states that investment in human capital contributes towards economic growth by investing in people through education and health (Becker, 1962). However, many studies that have investigated the impact of human capital on economic growth have found mixed results. Some studies have found a positive relationship between human capital and economic growth (Easterly and Levine, 1997; Chen and Feng, 2000; Radelet *et al.*, 2001). In some cases, the relationship between human capital and economic growth has been negative (Barro, 2003). In this study, human capital development is proxied by total enrolment at all levels. We expect threshold effects to this measure and a priori expectation is, therefore, either a positive or negative association between human capital development and economic growth.

The third variable used is population growth. The relationship between population and economic growth is mixed and varies between countries (Warr, 2004). Some empirical studies on the relationship between population and economic growth have found a negative and insignificant relationship with economic growth (Levine and Renelt, 1992) In other cases a negative and significant association with economic growth was found (Mankiw *et al.*, 1992; Most and Vann de Berg, 1996); and in others there was a positive association with economic growth (Sachs and Warner, 1997; Radelet *et al.*, 2001). The population growth rate is, therefore, expected to exhibit threshold effects and either a positive or negative relationship with economic growth.

The impact of government expenditure on growth is one of the important factors studied in the empirical growth literature. The empirical work on the relationship between government expenditure and economic growth has also provided mixed results. Some empirical studies have found that fiscal policy impacts the efficiency of investment in the medium- and long-term through the crowding out of private investment, especially when government deficits finance public

consumption, subsidies or transfers. These studies found that a higher ratio of government spending to GDP is, on average, associated with a lower rate of growth for a given level of investment, thereby reducing the efficiency of investment (Easterly and Wetzel, 1989; World Bank, 1990; Barro, 2003). Other studies have found that small to moderate government sizes are positively associated with economic growth, while large government sizes impede economic growth (Anaman, 2004). A priori expectation, therefore, is that the level of government consumption will exhibit threshold effects; either a positive or negative relationship with economic growth is expected in the study countries.

The fifth macroeconomic driver of growth in Malawi is the real exchange rate as a measure of capital market stability (Rodrik, 2008). The stability of any economy's real exchange rate regime is one of the key macroeconomic policies that many developing countries in the world follow. It is argued that higher levels of real exchange rate instability can suppress economic growth especially in countries with underdeveloped capital markets. In such countries, real exchange rate variability has a negative impact on long-run economic growth (Dollar, 1992). In other cases, a stable exchange rate environment is conducive for trade and economic growth and a real exchange rate stability either by eliminating any overvaluation or undervaluation of the local currency is a necessary condition if long-run economic growth is to be sustained (Elbadawi *et al.*, 2012). In such cases, the exchange rate is positively associated with economic growth (Gluzmann *et al.*, 2014). A priori expectation on the relationship between the real exchange rate and economic growth is expected to be either positive or negative and will depend on the stability of the exchange rate (threshold effects).

The sixth factor that may have influenced economic growth in Malawi is the inflation rate. It is argued that inflation is a good macroeconomic indicator of how the government manages the economy (Fischer, 1992, 1993; Barro, 2003). It has also been argued that low inflation brings about economic efficiency as economies, through the price mechanism, are able to allocate scarce resources to their best economic use (World Bank, 1990). Though the empirical evidence has strongly supported a negative relationship between inflation and growth especially through its impact on capital intensity or the efficiency of physical capital (Fischer, 1983; Bruno and Easterly, 1998); inflation exhibits threshold effects on economic growth (Bruno and Easterly, 1998). Therefore, a priori expectations is either a positive or negative association between inflation and economic growth.

International trade has also been influential and a key macroeconomic driver of growth in Malawi (Chirwa and Odhiambo, 2015). Knight *et al.* (1993) argued that the inclusion of trade policies is based on the premise that the export and import sectors promote a country's openness and facilitate the transfer of technology of advanced capital goods. Furthermore, trade act as a catalyst for the diffusion of knowledge and skills. In addition, the export sector is important as it brings about foreign exchange inflows which are used to import the needed capital goods (Knight *et al.*, 1993). A priori expectation, therefore, is that trade is expected to have a positive and statistically significant impact on economic growth in the study countries. Foreign aid act as an alternative source of finance that supplements domestic investment and their inflow is seen to fill in the savings gap especially in developing economies (Chenery and Strout, 1966; Riddell, 1987).

3.2 Estimation Techniques

The Autoregressive Distributed Lag (ARDL) bounds testing approach developed by Pesaran *et al.* (2001) is employed to investigate the key macroeconomic determinants of growth in Malawi. The reasons for adopting the ARDL bounds testing procedure are fivefold. First, the ARDL model include lags of both the dependent and explanatory variables and it is a powerful tool in investigating short- and long-run cointegrating relationships between variables of interest (Pesaran and Shin, 1999; Collier and Goderis, 2012). Second, the bounds test based on the unrestricted error correction model proposed by Pesaran *et al.* (2001) can be applied regardless of whether the study variables are integrated of order zero or one (Odhiambo, 2013). Third, the two-stage ARDL approach effectively corrects for any possible endogeneity in the regressors (Pesaran and Shin, 1999; Acikgoz and Mert, 2014). Fourth, the ARDL model can take up a sufficient number of lags that captures the data generating process in a general to specific modelling framework (Hirnissa *et al.*, 2009). Lastly, given the sample size of the present study which covers the period 1970-2013 (44 observations), the ARDL approach provides robust results in studies affected by small sample sizes (Narayan, 2005).

The ARDL representation of the empirical model can be expressed as follows:

$$\begin{aligned}
\ln Y_t = & \beta_0 + \beta_1 T_t + \sum_{i=1}^n \beta_{2i} \Delta \ln Y_{t-i} + \sum_{i=0}^n \beta_{3i} \Delta \ln INV_{t-i} + \sum_{i=0}^n \beta_{4i} \Delta \ln HC_{t-i} + \sum_{i=0}^n \beta_{5i} \Delta \ln POPG_{t-i} \\
& + \sum_{i=0}^n \beta_{6i} \Delta \ln GC_{t-i} + \sum_{i=0}^n \beta_{7i} \Delta \ln RER_{t-i} + \sum_{i=0}^n \beta_{8i} \Delta \ln INF_{t-i} + \sum_{i=0}^n \beta_{9i} \Delta \ln TRD_{t-i} \\
& + \sum_{i=0}^n \beta_{10i} \Delta \ln AID_{t-i} + \alpha_1 \ln Y_{t-1} + \alpha_2 \ln INV_{t-1} + \alpha_3 \ln HC_{t-1} + \alpha_4 \ln POPG_{t-1} \\
& + \alpha_5 \ln GC_{t-1} + \alpha_6 \ln RER_{t-1} + \alpha_7 \ln INF_{t-1} + \alpha_8 \ln TRD_{t-1} + \alpha_9 \ln AID_{t-1} \\
& + \varepsilon_t \dots \dots \dots (2)
\end{aligned}$$

In equation (2) the parameters $\beta_2, \dots, \beta_{10}$ are the short-run multipliers (elasticities) and $\alpha_1, \dots, \alpha_9$ are the long-run multipliers (elasticities). The white noise residual term is assumed to be independent and identically distributed and is denoted by ε_t .

The error correction model associated with equation (2) is expressed as follows:

$$\begin{aligned}
\ln \Delta Y_t = & \beta_0 \Delta T_t + \sum_{i=1}^n \beta_{1i} \Delta \ln Y_{t-i} + \sum_{i=0}^n \beta_{2i} \Delta \ln INV_{t-i} + \sum_{i=0}^n \beta_{3i} \Delta \ln HC_{t-i} + \sum_{i=0}^n \beta_{4i} \Delta \ln POPG_{t-i} \\
& + \sum_{i=0}^n \beta_{5i} \Delta \ln GC_{t-i} + \sum_{i=0}^n \beta_{6i} \Delta \ln RER_{t-i} + \sum_{i=0}^n \beta_{7i} \Delta \ln INF_{t-i} + \sum_{i=0}^n \beta_{8i} \Delta \ln TRD_{t-i} \\
& + \sum_{i=0}^n \beta_{9i} \Delta \ln AID_{t-i} + \rho ECM_{t-1} + \varepsilon_t \dots \dots \dots (3)
\end{aligned}$$

In equation (3), the error correction term (ECM) measures the short-run speed of adjustment towards the long-run equilibrium path of the estimated growth model. In the short-run, real output responds to deviations from the long-run equilibrium path and is captured by ECM which gradually brings the economy back to its steady state level (Collier and Goderis, 2012). This implies that the coefficient of the error correction term should be negative and statistically significant and the magnitude of this coefficient should be less than one.

Although the ARDL bounds testing approach does not require pre-testing of variables for stationarity, variables that are integrated of order two or higher make the bounds testing approach irrelevant (Odhiambo, 2013). It is therefore important to determine whether the variables of interest are integrated of order not more than one. The study investigates the order of integration of each variable of interest by using three unit root tests. The first is the Augmented Dickey-Fuller (1979) unit root test that takes into account the presence of serial correlation in the time series data. The second unit root test used is the Elliott, Rothenberg and Stock (1996) Dickey Fuller Generalized Least Squares (DF-GLS) unit root test that detrends the time series data. The third test investigates the presence of a structural break in the time series data using the Perron (1990) innovation outlier model.

3.3 Data Sources

The study uses annual time series data covering the period 1970-2013 and has a sample size of 44 observations. This data is obtained from the World Bank Development Indicators (World Bank, 2015b) and UNESCO Institute of Statistics (UNESCO, 2015). The variables included are real GDP per capita (expressed in 2005 constant USD prices); investment (gross fixed capital formation as a share of real GDP in 2005 constant prices); human capital (proxied by total enrolment – primary, secondary and tertiary); population growth; government consumption share in real GDP; the real exchange rate (ratio of the nominal exchange rate and PPP conversion factor for GDP); inflation rate (growth of consumer price index); foreign aid (net official development assistance and official aid received as a share of real GDP expressed in 2005 constant USD prices); and international trade (proxied by the ratio of exports and imports as a share of real GDP expressed in 2005 constant USD

prices). The ARDL model estimation results are computed using Microfit 5.0, while unit root tests are reported based on Eviews 9 software.

4. Empirical Estimation Results

4.1 Stationarity Tests

Table 1 reports the stationarity test results for the time series used in this study based on the Augmented Dickey-Fuller (1979); Elliot, Rothenberg and Stock (1996) Dickey Fuller Generalized Least Squares (DF-GLS); and Perron (1990) structural break unit root tests. In order to determine which unit root test to conduct, it is important to know whether the data generating process of the time series is autoregressive or trended.

A preliminary graphical analysis of the time-series analysis showed that when testing for unit roots, the test equations for real GDP per capita, human capital and real exchange rate are trend stationary and should include both an intercept and a trend, while population growth, government consumption, inflation, investment, foreign aid and trade should include an intercept only. The stationarity results for Malawi conclusively showed that real GDP per capita, human capital (proxied by total enrolment), the real exchange rate and foreign aid are integrated of order one, while inflation and trade ratio variables are integrated of order zero in all three test equations. The investment and government consumption variables become integrated of order zero when the ADF and DFGLS test equations are used, and integrated of order one when a structural break is considered. Population growth and the real interest rate variables are integrated of order one when the ADF test is considered and integrated of order zero when the DFGLS and structural break test equations are used. The unit test results showed that all variables are integrated of order one or zero.

Table 1: Stationarity Tests for all Variables

Variable	Stationarity of all Variables in Levels						Stationarity of all Variables in 1 st Difference					
	ADF		DFGLS		Perron		ADF		DFGLS		Perron	
	Without Trend	With Trend	Without Trend	With Trend	Without Trend	With Trend	Without Trend	With Trend	Without Trend	With Trend	Without Trend	With Trend
Log(GDPPC)		-2.02		-1.85		-3.78		-7.42***		-2.91*		-8.00***
Log(INV)	-3.32**		-3.08***		-4.55						-9.18***	
Log(HC)		-1.34		-1.38		-2.39		-6.32***		-5.99***		-6.43***
Log(POPG)	-2.67*		-2.71***		-7.32***		-4.82***					
Log(GC)	-3.57***		-3.60***		-4.36*						-9.75***	
Log(RER)		-3.08		-3.17*		-4.35*		-6.19***		-6.32***		-6.69***
Log(INF)	-4.19***		-4.20***		-5.73***							
Log(TRD)	-4.13***		-4.05***		-4.96***							
Log(AID)	-1.69		-1.66*		-3.59		-11.28***		-1.75*		-12.44***	

Note: for all p-values: *** 1% significance level; ** 5% significance level; * 10% significance level.

Therefore, the Bounds testing procedure for cointegrating relationships suggested by Pesaran *et al.* (2001) can be employed.

4.2 ARDL Bounds Test for Cointegration

In this section, the Akaike Information Criteria is employed to determine the appropriate lag-length for the estimated ARDL equation. This method is chosen as it tends to over-fit the model of interest, given that the optimal lag length for the growth model is up to 2 lags. The optimal lag length is chosen based on the number of regressors included in the growth model. The optimal lag-length selection criteria are based on the lowest AIC obtained. For the Malawi growth equation, the optimal ARDL model selected was a $ARDL(1, 2, 2, 2, 1, 2, 2, 2, 0)$ model with a restricted intercept and no trend. Table 2 reports the Pesaran *et al.* (2001) bounds test for level relationships for the selected equation.

Table 2: ARDL Bounds Test Results

Dependent Variable	Function	Value (F-statistic)	Cointegration Status		
Real GDP per capita	(<i>GDPPC</i> INV, HC, POPG, GC, RER, INF, TRD, AID)	5.99***	Cointegrated		
Null Hypothesis: No long-run relationships exist					
Asymptotic Critical Values for $k = 8$ (Pesaran <i>et al.</i>, 2001; Case II, p. 300)					
1%		5%		10%	
$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$
2.62	3.77	2.11	3.15	1.85	2.85

Note: *** 1% significance level; ** 5% significance level; * 10% significance level.

As illustrated in table 2, the computed F – statistic is 5.99 and is statistically significant at the 1% upper critical bound. In summary, the bounds test to cointegrating relationships using the Pesaran *et al.* (2001) approach confirms the existence of long-run level relationships between the dependent variable, real GDP per capita, and the set of covariates.

4.3 Empirical Analysis of ARDL-Based Error Correction Model

Table 3 below presents the short- and long-run multipliers for the Malawi growth equation.

Table 3: Estimated Results (Short- and Long-run Coefficients)

Malawi: Panel 1 – Estimated Long-Run Coefficients (Elasticities) [Dependent Variable: Log of Real GDP per capita $\log(GDPPC)_t$]				
Regressor	Coefficient	Standard Error	t-statistic	Probability
$\log(INV)_t$	0.2972***	0.07	3.99	0.001
$\log(HC)_t$	0.1371**	0.05	2.68	0.015
$\log(POPG)_t$	-0.1216**	0.05	-2.61	0.017
$\log(GC)_t$	0.0771	0.09	0.78	0.445
$\log(RER)_t$	-0.0607	0.15	-0.39	0.698
$\log(INF)_t$	-0.0569**	0.02	-2.29	0.033
$\log(TRD)_t$	0.4278**	0.15	2.79	0.012
$\log(AID)_t$	-0.0867	0.05	-1.69	0.107
C_t	3.5947***	0.78	4.59	0.000
Malawi: Panel 2 – Estimated Short-Run Coefficients (Elasticities) [Dependent Variable: change in log of Real GDP per capita $\Delta\log(GDPPC)_t$]				
Regressor	Coefficient	Standard Error	t-statistic	Probability
$\Delta\log(INV)_t$	0.0892**	0.04	2.33	0.028
$\Delta\log(INV)_{t-1}$	-0.0479	0.04	-1.26	0.220
$\Delta\log(HC)_t$	-0.0683	0.15	-0.46	0.649
$\Delta\log(HC)_{t-1}$	-0.1511	0.11	-1.43	0.165
$\Delta\log(POPG)_t$	-0.1355*	0.08	-1.79	0.086
$\Delta\log(POPG)_{t-1}$	0.1979***	0.07	2.98	0.006
$\Delta\log(GC)_t$	-0.0045	0.06	-0.08	0.939
$\Delta\log(RER)_t$	0.0268	0.09	0.29	0.771
$\Delta\log(RER)_{t-1}$	0.1149*	0.06	1.91	0.068
$\Delta\log(INF)_t$	-0.0195**	0.01	-2.36	0.026
$\Delta\log(INF)_{t-1}$	0.0123	0.01	1.61	0.120
$\Delta\log(TRD)_t$	0.1432**	0.06	2.42	0.023
$\Delta\log(TRD)_{t-1}$	-0.1113*	0.06	-2.00	0.056
$\Delta\log(AID)_t$	-0.0564	0.04	-1.48	0.152
ECM_{t-1}	-0.6504***	0.15	-4.24	0.000
R-Squared	0.8564	R-Bar Squared	0.6900	
S.E. of Regression	0.0267	F-Stat (15,26)	7.55[0.000]	
Residual Sum of Squares	0.0136	DW-statistic	2.3211	
Akaike Info. Criterion	-86.195	Schwarz-Bayesian Criterion	-66.212	

Note: *** 1% significance level; ** 5% significance level; * 10% significance level.

Panel 1 reports the estimated long-run coefficients; while Panel 2 report the estimated short-run coefficients. As shown in panel 2, the short-run dynamics and the adjustment towards the long-run equilibrium path is measured by the error correction term (ECM). The result shows that a 1% deviation from the equilibrium path is corrected in the next period at a rate of -0.65% and is statistically significant at the 1% significance level. This confirms the presence of a long-run level equilibrium path between real GDP and the selected regressors (investment, human capital, population growth, government consumption, the real exchange rate, inflation, international trade, and foreign aid). The regression results for the ARDL model reveals a good fit represented by an estimated R –squared value of 0.86 and an adjusted R –squared value of 0.69.

Panel 1 of Table 3 presents the long-run coefficient estimates. The results reveal that the key macroeconomic determinants that are significantly associated with long-run economic growth in Malawi include the accumulation of physical capital (investment), human capital development, population growth, inflation and international trade. The relationship between investment and the long-run level of real GDP per capita is positive and statistically significant at the 1% significance level. The results reveal that the accumulation of physical capital is positive and significantly associated with the level of real GDP per capita in the long-run. The results show that a 1% increase in the level of investment results in a 0.30% increase in the level of real GDP per capita and they are statistically significant at the 1% significance level. These results are supported by similar studies that found a positive relationship between investment and economic growth in the long-run (Anyanwu, 2014).

The study results reveal that human capital development is positively and significantly associated with the long-run level of real GDP per capita and the results are statistically significant at the

5% significance level. They show that a 1% increase in total enrolment leads to a 0.13% increase in the level of real GDP per capita in the long-run. These results are supported by similar studies that have found that an educated society is good for economic growth in developing economies (Mankiw *et al.*, 1992; Fischer, 1992; Chen and Feng, 2000; Radelet *et al.*, 2001).

The study results also show a negative relationship between population growth and long-run level of real GDP per capita. The results show that a 1% increase in population growth results in a -0.12% decline in the level of real GDP per capita and they are statistically significant at the 5% significance level. These results are similar to other empirical growth studies that found a negative relationship between population and economic growth in developing countries (Anyanwu, 2014).

The relationship between inflation and the long-run level of real GDP per capita is revealed to be negative and significantly associated at the 5% significance level. The results reveal that a 1% increase in inflation in the long-run leads to a -0.06% decline in the level of real GDP per capita. These results conform to similar studies that found a negative relationship between inflation and economic growth in developing countries (Fischer, 1992; Burnside and Dollar, 2000; Chen and Feng, 2000; Bayraktar, 2006; Bhaskara-Rao and Hassan, 2011).

The study results also reveal that international trade is positively and significantly associated with the long-run level of real GDP per capita at the 5% significance level. They show that a 1% increase in international trade leads to a 0.43% increase in the level of long-run real GDP per capita. These results are supported by similar studies that found a significant association between international trade and economic growth in developing countries (see, among others, Chen and

Feng, 2000; Burnside and Dollar, 2000; Radelet *et al.*, 2001; Barro, 1999, 2003; Chang and Mendy, 2012; Anyanwu, 2014). The study results did not find a significant association between government consumption, real exchange rate depreciation, foreign aid and the long-run level of real GDP per capita.

The short-run results are presented in panel 2 of table 3. The results reveal that the key macroeconomic determinants that are significantly associated with the growth of real GDP per capita in the short-run include growth of investment, population growth, depreciation of the real exchange rate, inflation and international trade. The results show that the growth of investment in the current period is positively and significantly associated with the growth of real GDP per capita and is statistically significant at the 5% significance level. A 1% change in the growth of investment in the current period led to a 0.09% increase in the growth rate of real GDP per capita. The positive relationship between investment and economic growth is supported by similar studies in the empirical growth literature (Mankiw *et al.*, 1992; Acikgoz and Mert, 2014).

The results reveal a mixed association between population and economic growth in the short-run, revealing a significant negative association in the current period and a significant positive association in the previous period. The results also show that while a 1% increase in the growth of population in the current period led to a -0.14% decline in the growth of real GDP per capita, a 1% increase in population growth in the previous period led to a 0.20% increase in the growth of per capita real GDP. Overall, the relationship between population and economic growth is positive and statistically significant at the 10% and 1% significance levels respectively. The study results are supported by empirical evidence where population growth is found to be

positively associated with economic growth (see, among others, Sachs and Warner, 1997; Radelet *et al.*, 2001).

The empirical results show a positive association between the depreciation of the real exchange rate in the previous period and real GDP per capita growth in Malawi and are statistically significant at the 10% significance level. They also show that a 1% depreciation of the real exchange rate in the previous period led to a 0.11% increase in the growth rate of real GDP per capita in the short-run. These results support the importance of having a stable exchange rate regime with moderate volatility and have been confirmed by similar studies (see, among others, Vieira *et al.*, 2013).

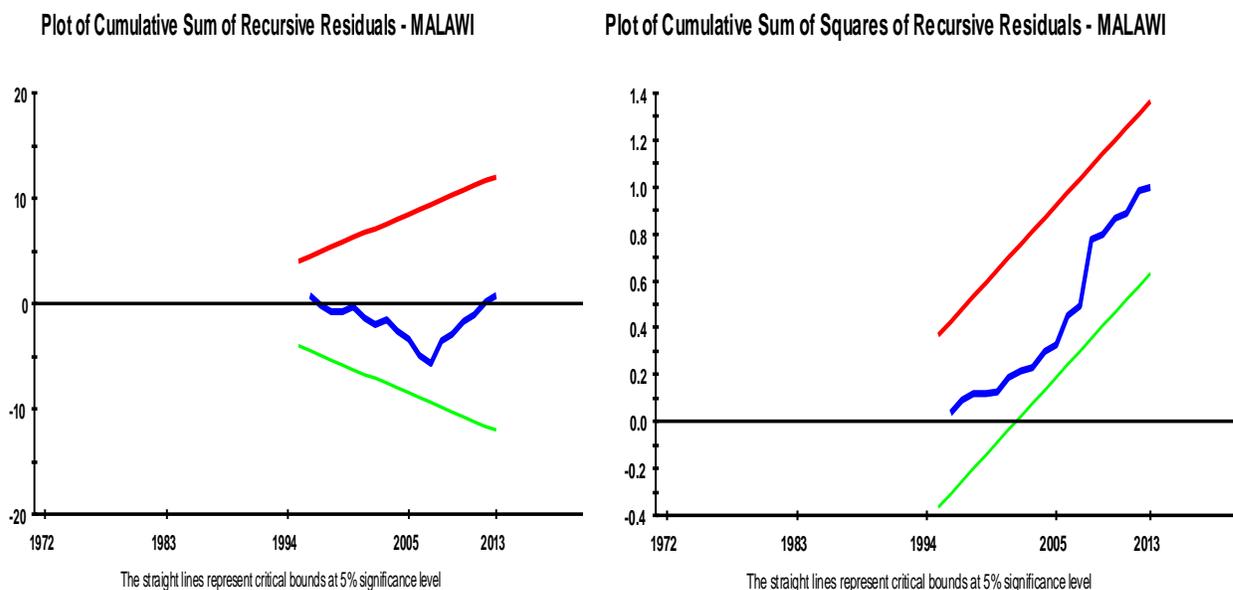
The relationship between inflation and real GDP per capita growth is found to be negative and statistically significant at the 5% significance level. The results reveal that a 1% increase in the growth of inflation in the current period led to a -0.02% decline in the growth rate of real GDP per capita in the short-run. This result is supported by a number of empirical growth studies that also found a negative association between inflation and economic growth in developing countries (see, among others, Fischer, 1992, 1993; Burnside and Dollar, 2000; Barro, 1999, 2003; Bayraktar, 2006; Bhaskara-Rao and Hassan, 2011).

The results also reveal mixed results between trade and economic growth, both in the current and previous period. They are statistically significant at the 5% and 10% significance levels, respectively. They show that a 1% increase in the growth of trade in the current period led to a 0.14% increase in real per capita GDP growth, while a 1% increase in the previous period led to a -0.11% decline in the growth rate of real GDP per capita. Overall the results reveal a positive

association between trade and growth in Malawi and are supported by similar empirical growth studies that also found a positive association between trade and economic growth (see, among others, Fischer, 1993; Barro, 1999, 2003). The study did not, however, find a significant relationship between the growth of human capital development, government consumption, foreign aid and real GDP per capita.

Finally, the following post-diagnostic tests are reported: CUSUM and CUSUMSQ test; Breusch-Godfrey serial correlation test; Breusch-Pagan-Godfrey test for heteroskedasticity; Ramsey RESET test; Normality test; and ARCH test. Figure 1 illustrates the CUSUM and CUSUMSQ results for the estimated growth equation.

Figure 1: CUSUM and CUSUMQ Tests



As illustrated in figure 1, the CUSUM test reveals parameter instability, while the results of the CUSUMQ test reveal variance stability. The cumulative sum of recursive residuals as well as the

squares of the recursive residuals are within the 5% critical lines and the results are suggestive of coefficient stability in the country studied. Table 4 reports post-estimation diagnostic results.

Table 4: ARDL-VECM Post-Estimation Diagnostic Tests

Test Statistic	Results
Breusch-Godfrey Test: No Serial Correlation F(1,18)	1.18 [0.291]
Breusch-Pagan-Godfrey Test: No Heteroskedasticity F(1,40)	0.92 [0.344]
Ramsey RESET Test: Functional Form F(1,18)	2.85 [0.251]
Normality: CHSQ (2)	2.33 [0.312]
ARCH Test: Heteroskedasticity (no ARCH terms) F(1,18)	0.32 [0.580]

*Note: for all p-values: *** 1% significance level; ** 5% significance level; * 10% significance level.*

The results reveal that the null hypotheses cannot be rejected for all post-diagnostic tests at the 5% significance level. This implies that the final ARDL model for the estimated Malawi growth equation is well-specified and the parameter estimates are not biased.

5. Conclusion

In this paper, we have empirically investigated the key macroeconomic determinants of economic growth in Malawi during the period 1970-2013. The main macroeconomic determinants investigated include the accumulation of physical capital, human capital development, population growth, government consumption, real exchange rate, inflation rate, foreign aid and international trade. The study has employed an augmented economic growth model; and it has used the Autoregressive Distributed Lag (ARDL) modelling approach to estimate both the short- and long-run elasticities of the selected macro-economic determinants. Using the ARDL bounds testing approach to cointegration, the study found that the key macroeconomic determinants that are positively associated with real GDP per capita growth in the short-run are investment, population growth, depreciation in the real exchange rate and international trade. On the other hand, inflation was negatively associated with the growth of real

GDP per capita. In the long run the study revealed that investment, human capital development and international trade, are positively and significantly associated with the growth of real GDP per capita, while population growth and inflation have a significant negative relationship with long-run real GDP per capita. These results have significant policy implications for Malawi, both in the short- and the long-run. They imply that the economic strategies that need to be pursued by the authorities in Malawi in the short-run should focus on creating incentives that will attract more investment into the country; technologies that improve the productivity of labour; stabilization of the real exchange rate; control of inflation; and an increase in exports. The long-term strategies that are crucial for Malawi's future include providing incentives that attract more long-term investment; improving the quality of human capital stock; reducing the rate of population growth; inflation stability; and increasing the production and productivity of exports.

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