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The balance-of-payments-constrained growth model for Malawi: Evidence from the bounds testing approach[1]

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Abstract

Using the autoregressive distributed lag (ARDL) bounds testing approach to cointegration, this paper tests the application of Thirlwall's law, also known as the Balance of Payments constrained growth model, on Malawi between 1980 and 2017. The results of the simplified and the extended version of Thirlwall's law show that the predicted economic growth for Malawi is 8.92% and 5.79% respectively. However, the actual average economic growth rate for Malawi during the sample period is 3.55%, which suggests that the Balance of Payments position of Malawi constrains its economic growth. The results support Thirlwall (1979) postulation that demand constraints in the balance of payments best explain growth rate differences. To relieve the Balance of Payments constraint, Malawi needs to reduce its income elasticity of demand for imports by reducing its imports on consumption goods, addressing structural demand features of its exports, and diversifying the production structure of the economy from agriculture.

1. Introduction

Thirlwall's law is a parsimonious framework that argues that in an open economy, a country's expenditure cannot outstrip the growth of its output, without creating a current account deficit on the Balance of Payments (BoP) (Nell, 2003). It also argues that a current account deficit cannot be sustained indefinitely with capital inflows without some form of adjustment. This adjustment often happens through a reduction of output growth rather than relative price adjustment in the BoP (Dixon and Thirlwall, 1975). Thirlwall's law is demand-side based, therefore Keynesian, and differs from the neo-classical framework that puts emphasis on supply-side factors. A detailed explanation of the neo-classical and Post-Keynesian approaches to economic growth can be found in Thirlwall and McCombie (1997) and Thirlwall (2019). Following the convergence hypothesis which has attempted to merge the demand - and the supply - oriented approaches to economic growth, empirical studies such as Kvedaras, Garcimartín and Astudillo (2020) have incorporated variables suggested by the convergence literature.

Thirlwall (1979) first tested the original BoP constrained growth model (Thirlwall's basic model) on developed countries in two overlapping periods from 1951 to 1973 and 1953 to 1976. The results show that the actual growth rate of countries and the predicted BoP constrained growth rate correspond. Empirically tested research of the extensions of Thirlwall's law that relax assumptions of the original model are abundant. For example, Garcimartín, Rivas and Martínez (2010) and Garcimartin, Kvedaras and Rivas (2016) argue that short run business cycles due to net capital inflows and trade shocks are important and thus investigate the implications of the BoP constrained growth model on business cycles. Vast literature has empirically tested both the original and the extended models in developed and developing countries. McCombie (2011), Setterfield (2011, Thirlwall (2011) and Thirlwall (2019) provide an excellent review of the practicability of the model and its various extensions. For a commodity dependent economy that heavily relies on exports of unprocessed raw materials, Malawi is an important case study for policymaking. Basically, because policy debate continues to take place as to which approaches, demand side or supply side, should be promoted. The need to strengthen

[1] This article is based on a master's dissertation by Chimphamba, F.N. titled "An analysis of Malawi's structural trade imbalance" submitted in 2019 at the University of Johannesburg.

the structural demand features of Malawi makes it pertinent to attempt analysis of demand side models such as Thirlwall's law.

Malawi's economic performance is affected by among other factors the composition of its exports and imports. Malawi's imports have been growing at a faster pace than exports, resulting in export to import ratio of 1:3, persistent trade, and current account deficits, which without capital inflows might have constrained economic growth. The export basket consists mainly of a varied range of unprocessed agricultural products[2]. For example, the tobacco leaf makes up over 50% of its total exports. For example, in 1980 and 2019, tobacco leaf exports accounted for 46.74% and 56.2% total exports respectively (International Trade Centre, 2020). Moreover, tobacco accounts for 70% of Malawi's foreign exchange earnings. Malawi' chronic trade deficits over time is because it is a net importer of fuel, fertilizers, machinery and equipment, vehicles, electrical and electronic products, pharmaceuticals and other consumer goods (Government of Malawi, 2012).

The dependence on commodity exports has contributed to Malawi's vulnerability to the deteriorating terms of trade and has affected its international competitiveness. Reinert (2007) argues that a country's production structure is critical to its competitiveness. An economy that depends on agriculture and the production of raw materials experiences deteriorating terms of trade over time, while an economy that relies on industrial products experiences improved terms of trade over time. It is not surprising that, relative to the terms of trade of the 1970s, the Malawi economy has experienced deteriorating external terms of trade (World Bank, 1982; Government of Malawi, 2012). Baxter and Kouparitsas (2000) explain that when an economy exports mainly one basket of goods (unprocessed tobacco in the case of Malawi) and imports a wide range of manufactured products, this creates unfavourable terms of trade for the country. Perraton (2003) is the only attempt to provide empirical evidence of the BoP constrained growth model in Malawi. The author tested Thirlwall's law on 51 developing countries including Malawi from 1973 to 1995. The result did not produce a matching prediction in accordance with the law. Malawi's long-run income elasticity of demand for imports was 1.14% and the predicted growth rate was 2.73%. A possible explanation is that Malawi may have been amongst the countries that suffered intense economic disturbances between 1973 and 1995 – the period under study. However, there has not been any individual country study to establish the evidence of the Thirlwall's law, in its simple or extended versions, in Malawi.

This study, therefore, tests the simple and the extended versions of Thirlwall's law for an individual country – Malawi. Unlike Perraton (2003), the study also considers a longer time period that includes the most recent years (after 1995) while taking into account country specific conditions. The results from this study are important not only for Malawi, but also for other developing countries with similar structural conditions, that is, land-locked, agriculture-based economies with little or no manufacturing capacity. Furthermore, this study adds to the knowledge on individual country studies on the balance of payments constrained growth model. The long-run relationship approach is relevant because it captures the instability of the balance of payments that may take time to adjust.

In terms of modelling, this study employs the ARDL methodology on the theoretical model suggested by Thirlwall to address the following questions: -

- Is the long-run economic growth rate in Malawi constrained by the balance of payments during the period 1980 to 2017?

The response to this question is guided by the following methodological approach: -

- Assessing the import elasticity of demand for Malawi; and
- Testing the applicability of Thirlwall's law on Malawi by using both the basic and the extended version.

This paper is organised as follows: Section 2 discusses the literature review, while section 3 presents the theoretical model and the methodology used for the study. Section 4 reports the empirical results, and section 5 concludes the paper.

2. Literature Review

Thirlwall and Hussain (1982) demonstrate that developing countries which experienced faster actual growth rates than the predicted did so because of inflows of foreign capital. Slow growth of countries is because of relative price movements, which affect negatively national income growth. The Balance of Payments constrained growth model is based on important elements of previous theories such as Harrod's foreign trade multiplier, the Hicksian 'super multiplier' and Prebisch's centre-periphery model (Thirlwall, 2011). However, the result of the basic Harrod trade multiplier differs marginally from Thirlwall's extended model. The extended model includes capital flows to finance current account deficits.

[2] See Table 1 for Malawi's main exports

Empirical evidence of Thirlwall's law for groups of countries has been further conducted by Hussain (1999) using the extended model on African and East Asian countries from the 1970s to 1990s. The results show that African countries have low growth rates because of low magnitudes of their dynamic Harrod foreign trade multiplier attributed to overreliance on exports of primary products. Other studies involving a group of countries include Perraton (2003) who examined 51 developing countries including Malawi over the period 1973 to 1995. The study finds that capital flows were not used efficiently in some of these countries in the 1970s, resulting in failures of Thirlwall's law to hold.

There is also literature on individual country studies in both developed and developing countries, most of which supports Thirlwall's law in its basic and extended forms. Among those that support the law are Atesoglu (1993) for Canada, Moreno-Brid (1999) for Mexico, Tharnpanich and McCombie (2013) for Thailand, Jeon (2009) for China, Felipe *et al.* (2010) for Pakistan and Ramzi (2005) for India. In African countries, Ozturk and Acaravci (2010) is in support of Thirlwall's law for South Africa while Onakoya (2015) finds exports to be the driver of economic growth in Nigeria. Panshak, Civcir and Ozdeser (2020) find that Nigeria's growth is constrained by the balance of payments. Most recently, Civcir, Panshak and Ozdeser (2021) consider a multi-sectoral balance of payments model and find that the model predicts Nigeria's growth path.

3. Methodology

3.1 Theoretical framework

This paper uses the extended version of Thirlwall's law, which was proposed by Thirlwall and Hussain (1982) and popularised by Hussain (1999). The starting point of the model is three equations. The first equation is the export demand function, and the second equation is the import demand function. The third equation is the balance of payments equation, with an initial current account disequilibrium financed by capital flows. The growth rates equations of the respective functions are given by:

$$x_t = \eta\left(P_{dt} - P_{ft} - e_t\right) + \varepsilon(Z_t) \tag{1}$$

$$m_t = \psi\left(P_{ft} + e_t - P_{dt}\right) + \pi(y_t) \tag{2}$$

$$P_{dt}X_t + C_t = P_{ft}M_tE_t \tag{3}$$

where X_t is the volume of exports; P_{dt} is the domestic price of exports, $P_{dt}X$ is the domestic currency value of exports, M_t is the volume of exports, P_{ft} is the average foreign price of imports, E_t is the nominal exchange rate measured as the domestic price of foreign currency. An increase in E_t indicates a depreciation in foreign currency, E converts $P_{ft}M_t$ into a domestic currency equivalent, C_t is capital flows value expressed in domestic currency.

If we take logs of equation 3 and differentiate we obtain:

$$\frac{X}{M}\left(P_{dt} + x_t\right) + \frac{C}{M}\left(C_t\right) = P_{ft} + m_t + e_t \tag{4}$$

where $\frac{X}{M}$ the ratio of exports to imports, $\frac{C}{M}$ is the ratio of capital flows to imports. Lower case letters depict growth rates.

Substituting with the export and import demand functions as outlined in (1) and (2) generates the equation that is used to estimate the BoP constraint to growth with the initial current account shortfall compensated by capital inflows: -

$$y^* = \frac{\left[\left(\frac{X}{M}\eta+\psi\right)\left(P_{dt}-e_t-P_{ft}\right)+\left(P_{dt}-P_{ft}-e_t\right)+\left(\frac{X}{M}\right)\left(\varepsilon(\mathrm{Z})\right)+\left(\frac{C}{M}\right)\left(C_t-P_{dt}\right)\right]}{\pi} \tag{5}$$

$$y^* = \left(\frac{X}{M}\right)\left(\varepsilon(\mathrm{Z})\right) + \frac{\left(\frac{C}{M}\right)\left(C_t-P_{dt}\right)}{\pi} \tag{6}$$

$$y^* = \left(\frac{X}{M}\right)x_t + \frac{\left(\frac{C}{M}\right)\left(C_t-P_{dt}\right)}{\pi} \tag{7}$$

The interpretation of equation (7) is that the equilibrium growth rate which initially has current account imbalances and a BoP constraint on economy's growth is the arithmetic sum of weighted values of exports and capital flows to the coefficient of income elasticity if imports. A higher equilibrium growth rate results when the coefficient of income elasticity of imports is low (Thirlwall and Hussain, 1982).

With no initial disequilibrium (X/M=1) and no capital flows(C/M=0), equation 7 reduces to the basic form of Thirlwall's law.

$$y^{**} = \frac{x_t}{\pi} \quad (8)$$

which implies that for a given income elasticity of demand for imports, a country's growth rate consistent with the current account equilibrium depends on exports.

The methodology of this paper has been adapted to suit the characteristics of the Malawian economy. The steps of the empirical analysis are: first, to assess the elasticity of demand for imports, and second, to test the applicability of the basic and extended form of Thirlwall's law for Malawi.

Following the empirical literature, we estimate the import demand function using the following equation:

$$logM = loga + \psi \log(tot) + \pi \log(Y) \quad (9)$$

Annual time series data from 1980 up to 2017 is used. The data for all the variables namely imports, domestic income and terms of trade is from World Development Indicators by the World Bank (2018).

3.2 Description of variables

The use of the variables of imports, income and terms of trade are justified as per Thirlwall (1979) proposition. The variable of capital flows follows the Thirlwall and Hussain (1982) extension of the model. With reference to this paper, capital flows are defined as the sum of net foreign direct investments (FDI) and portfolio investments (World Bank, 2018).

Table 2: Variables for empirical analysis

Variable	Description
Volume of imports (logM)	The natural logarithm of imports of Malawi is in current United States dollar values.
Net terms of trade (logtot)	The natural logarithm of net terms of trade.
GDP of Malawi (logY)	The natural logarithm of GDP of Malawi in current United States dollar values.
Net capital flows	The sum of net foreign direct investment (FDI) and portfolio investments.

3.3 The ARDL approach

The autoregressive distributed lag/bounds-testing (ARDL) methodology, according to Pesaran and Shin (1999), is superior to other cointegration tests because it is easier to implement and interpret thanks to the single-equation setup and the assignment of various lag lengths to various variables entering the model. This method can also be used when the underlying regressors are mutually cointegrated, pure I(0), pure I(1), or pure I(0). After defining the model's lag order, the ARDL is preferable to the Johansen cointegration technique for determining co-integration connections because of its superior small sample qualities (Ghatak and Siddiki, 2001). Variable pre-testing is not necessary for the bounds test. Given the small sample size of the dataset employed for the investigation in this research, the selection of the ARDL is thus justified.

The use of the ARDL model requires an evaluation of the order of integration, which is achieved by testing for the unit root. If a series has a unit root or is non-stationary, regressing the series against another non-stationary variable results in a spurious regression. Although the spurious regression might have a high R^2 and significant *t*-statistics, the results may not make economic sense. The regression will have good output results, but inconsistent least-squares estimates. Additionally, the traditional tests of statistical inference, such as the t- and F-statistics, will not hold (Enders, 2015).

The testing of the null hypothesis that the variables have a unit root and are non-stationary is done using the Augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1981) and Phillips-Perron (PP) test (Phillips and Perron, 1988). The alternative hypothesis is that the respective variable is stationary with no unit root. The stationarity of a variable in

levels means that the variable is integrated of order zero [I (0)]. If a series is stationary in first difference and at second difference, then the variable is integrated of order one [I (1)] and order two [I (2)] respectively (Dickey and Fuller, 1981; Phillips and Perron, 1988). The uniqueness of the ADF test is that of adjusting the DF test to overcome any probability of serial correlation in the error terms (Pesaran and Shin, 1999). The adjustment is done by including the lagged difference terms in the regressand. Although the asymptotic distribution of both tests is the same, the PP test does syum up the lagged difference terms, but rather 'uses nonparametric statistical methods' (Gujarati and Porter, 2009:758).

According to Pesaran and Shin (1999) the ARDL methodology is advantageous over the widely used Johansen technique because of its simplicity to implement. Furthermore, the interpretation of the results is also straightforward given the single equation set up. The ARDL can be used when variables have a different order of integration [I (0)] and [I(1)] and different optimal lag lengths. The use of the ARDL is also advantageous when determining cointegration relationships because of its good small sample properties (Ghatak and Siddiki, 2001) compared to the Johansen cointegration technique.

The choice of the ARDL technique is therefore appropriate given the small sample size of the dataset used in this paper.

Equation 9 may be presented in the ARDL framework is as follows:

$$\Delta m_t = \alpha_0 + \sum_{i=1}^{k} \rho_i \Delta m_{t-1} + \sum_{i=1}^{k} \pi_i \Delta y_{t-1} + \sum_{i=1}^{k} \varepsilon_i \Delta(tot)_{t-1} + \beta_1 m_{t-1} + \beta_2 y_{t-1} + \beta_3 (tot)_{t-1} + \mu_t \quad (10)$$

where μ_t is a white noise error term, Δ is the first difference operator, *k* is the optimal lag length, and α_0 is the intercept.

The error correction model is expressed as:

$$\Delta m_t = \alpha_0 + \sum_{i=1}^{k} \rho_i \Delta m_{t-1} + \sum_{i=1}^{k} \pi_i \Delta y_{t-1} + \sum_{i=1}^{k} \varepsilon_i \Delta (tot)_{t-1} + \lambda ECT_{t-1} + \mu_t \quad (11)$$

4. Empirical results

4.1 Descriptive statistics

A summary of descriptive statistics for imports, GDP and terms of trade are presented in Table 3 in the appendix. For these variables, the skewness, which for a normally distributed variable must be 0, is 0.721, 0.766 and 0.974 respectively, whereas the kurtosis, which should ideally be 3, is a measure of the tallness or squatness of the normal distribution. The kurtosis of the respective variables is 1.922, 2.177 and 2.902, while the Jarque-Bera (JB) test is about 5.138, 4.79 and 6.017 respectively. The p-value for the JB test of normality for the joint hypothesis that S = 0 and K = 3 are 0.076, 0.049 and 0.091 respectively. Hence, using the 0.05 critical p-value, we fail to reject the null hypothesis that the variables are normally distributed, except for terms of trade. The correlation matrix for the variables is in Table 4 in the appendix and shows a correlation of 0.62 between the explanatory variables hence no multicollinearity problem is detected.

4.2 Unit root tests

The variables' properties were tested for unit root using both the ADF unit root test developed by (Dickey and Fuller, 1981) and the PP unit root test developed by (Phillips and Perron, 1988). The unit root test is necessary because most economic time series are non-stationary, which may generate spurious regressions (Granger and Newbold, 1974). The results of the unit root tests are presented in Table 5 and indicate that all variables, that is import (log of imports), income (log of GDP) and terms of trade (log of terms of trade) are integrated of order one [I(1)]. The ARDL model achieves almost efficient and unbiased estimates when each variable is in its first-difference form (Patterson, 2011).

Table 5: ADF and PP unit root tests

Test: Augmented Dickey Fuller (ADF)				Test: Phillip-Perron (PP)		
Variable	Level	1st difference	Status	Level	1st difference	Status
Log(M)	-0.208	-6.981***	I(1)	-0.176	-6.923***	I(1)
Log(Y)	-0.808	-6.472***	I(1)	-0.507	-8.100***	I(1)
log(tot)	-1.511	-4.413***	I(1)	-1.434	-5.670***	I(1)

Note: *** Denotes significance at 1% level.

4.3 The bounds test, long-run and short-run results

The bounds test results are presented in Table 6. The F-statistic is 9.97, which is far above the critical value of the upper bound of 6.36 at the 1% level, which implies that a long-run equilibrium relationship exists between imports, income and terms of trade.

Table 6: Results of the Bounds test for cointegration

Test statistic	Value[a]	Critical value for bounds			Conclusion
		Significance	I (0)	I (1)	
F-statistic	9.974	10%	3.17	4.14	There is a cointegrating relationship
		5%	3.79	4.85	
K	2	2.5%	4.41	5.52	
		1%	5.15	6.36	

[a] EViews 10 output. The source of critical values for the bounds test is Table CI (iii). Case III: unrestricted intercept and no trend (Pesaran *et al*. 2001)

Note: According to Pesaran *et al*. (2001) *k* is the number of regressors. In this study, the regressosrs are two, hence *K=2*.

The long-run coefficients of the ARDL (3, 0, 0) model are captured in Table 7. The lag length for the model was chosen using Akaike Information Criterion, Schwarz Criterion and Hannan-Quinn Criterion, which suggested the same lag length.

Table 7: Estimated long-run coefficients

Variable	Coefficient	Standard error	t-statistic	Probability
LogY	0.969	0.079	12.223	0.000
Logtot	-0.530	0.224	-2.368	0.024

The coefficient of income is 0.97 is positive as expected and highly significant. *Ceteris paribus,* 1% increase in domestic income raises imports by 0.97%. The coefficient for the terms of trade (*logtot*) is also significant and negatively related with imports as expected. *Ceteris paribus*, a 1% increase in terms of trade reduces imports by 0.53%. Therefore, we can conclude that both national income and terms of trade have a statistically significant long run relationship with Malawi's imports, which is in line with economic theory.

Table 8: Error correction model results

Dependent variable: Imports (ΔlogM)				
Variable	Coefficient	Standard error	t-statistic	Probability
C	0.970	0.162	5.957	0.000
$\Delta logm_{t-1}$	-0.274	0.118	-2.304	0.028
$\Delta logm_{t-2}$	0.173	0.113	1.525	0.138
ECT_{t-1}*	-0.438	0.077	-5.655	0.000
R-squared		0.559		
F-statistic		13.151		

*p-value is incompatible with t-bounds distribution

The results in Table 8 show that the coefficient of the ECM is negative as expected from theory for equilibrium to be restored and is statistically significant at 1% level. This result means that any deviations from the long run equilibrium import demand takes 44% per cent of each time period (that is, a year) to be corrected, that is approximately 5 months.

4.4 Discussion of the empirical results

Based on the results of the long run model, the import demand function of Malawi for the period 1980 to 2017 can be expressed as follows:

$$m_t = 0.97y_t - 0.53ToT_t$$

$$(-2.37) \quad (12.223)$$

Theoretically, the import demand function shows that an increase in the terms of trade leads to a reduction in import demand, and an increase in the growth rate of domestic income leads to an increase in the demand for exports. The estimated coefficients of the long-run relationship are statistically significant and bear the theoretically expected sign of the import demand function. The results imply that import demand is almost unit elastic (0.97) with respect to income and less elastic (-0.53) with respect to terms of trade. The income elasticity of demand for imports is positive and significant, as hypothesized by Thirlwall's law, and the results show that a 1% increase in GDP will generate a positive proportional import increase of 0.97% holding other variables constant. In other words, an increase in Malawi's economic growth leads to a rise in imports demand in the long run. The terms-of-trade coefficient is also in line with Thirlwall's law. Following the law of demand, terms of trade have a negative effect on imports.

The calculation of the basic form of Thirlwall's law is done by dividing exports growth of 8.92 %[3] by the estimated income elasticity of demand for imports of 0.97% (Thirlwall, 2011) as shown in Table 9. The model predicts an annual growth rate of 9.2 %. The actual average GDP growth rate for Malawi for the period is 3.55%. This result indicates that the predicted growth rate far exceeds the actual growth rate with a margin of 6.36 percentage points. However, the basic form of Thirlwall's law ignores the importance of the capital flows in the BoP equilibrium. This omission leads to disparities between Malawi's predicted growth and the actual growth because Malawi mainly exports unprocessed agricultural products mostly raw tobacco, which have limited linkages/multipliers to generate growth.

Table 9: Results for the simple version of the BoP constrained growth model (Equation 8)

Growth Period	Income elasticity of demand for imports (π)	Average growth of exports (%)	Predicted growth (%) ($y^{**} = \frac{x_t}{\pi}$)	Difference between actual and predicted growth rate
1980 – 2017	0.97	8.92	9.2	6.36

The extended version of Thirlwall's law predicts that the domestic income growth rate is 5.79 % for the sample period. The value is calculated by dividing the weighted sum of the growth of exports and of capital flows by the income elasticity of demand for imports (Hussain, 1999). According to Thirlwall (1979) there are two situations which indicate that a country's economic growth is BoP constrained. The first scenario is when the actual growth rate is less than the predicted growth rate. The second case is when there is statistical similarity between predicted growth rate and the actual growth rate. Since our findings reveal that the actual growth rate is lower than the predicted growth rate, the interpretation using first scenario is that Malawi's growth is BoP constrained, hence the country cannot grow beyond the BoP constraint.

Table 9: Results for the extended version of the BoP growth constrained model (equation 7)

Growth Period	Income elasticity of demand for imports (π)	Average Growth of Exports	Average Growth of Capital Flows	Predicted Growth $y^* = \left(\frac{X}{M}\right)\left(\varepsilon(\mathrm{Z})\right) + \frac{\left(\frac{C}{M}\right)(C_t - P_{dt})}{\pi}$	Difference between actual and predicted growth rate
1980-2017	0.97	8.92	-3.30	5.79	2.24

[3] The mean value over the 1980-2017 period

4.5 Diagnostic tests of the ARDL model results

Table 10: Diagnostic tests

Test	F-statistic	P-value
Heteroscedasticity	1.437	0.240
LM serial correlation	0.296	0.745
Normality	0.428	0.861
Ramsey RESET	0.230	0.634

As shown in Table 10, the Breusch-Pagan-Godfrey test for heteroscedasticity failed to reject the null hypothesis of homoscedasticity. The Langrage Multiplier (LM) test reveals that there is no first-order serial correlation and the Jarque-Bera test for normality indicates that the residuals are normally distributed.

CUSUM and CUSUMSQ are used to check the stability of the ARDL model. Figures 1 and 2 present the results graphically. In both figures, the solid lines lie inside the critical bounds (dashed lines) of the significance level which is 5%, signifying model stability.

Figure 1: Plot of CUSUM statistics for coefficient stability test

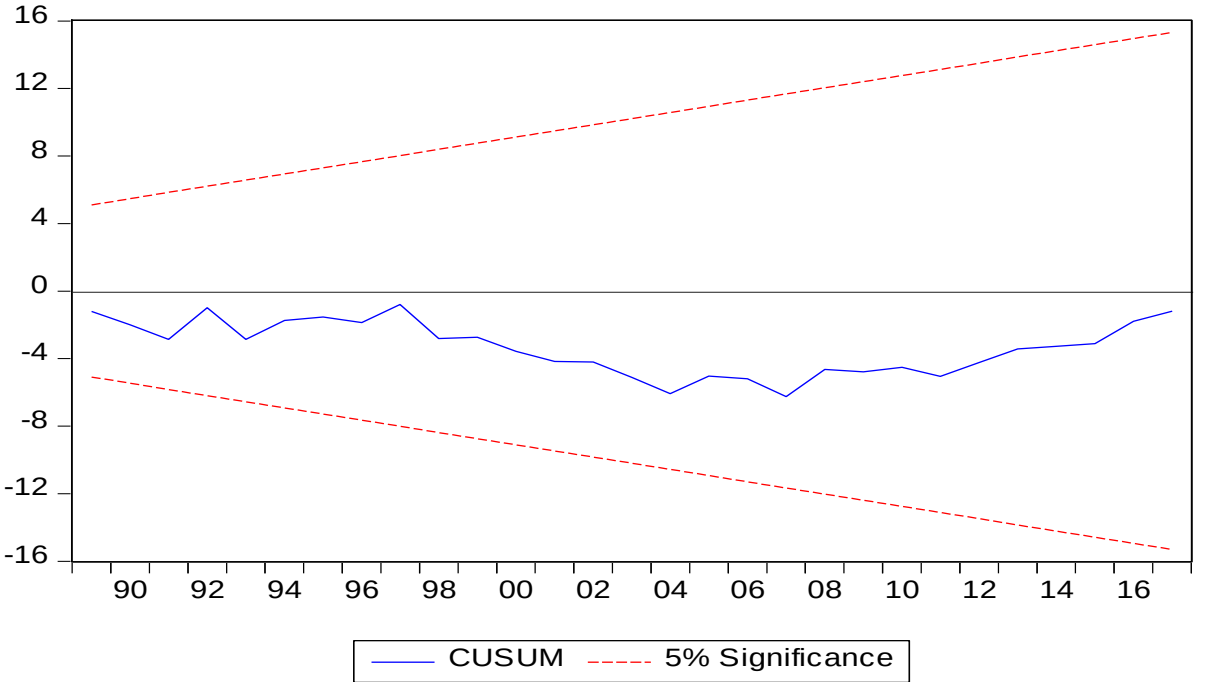
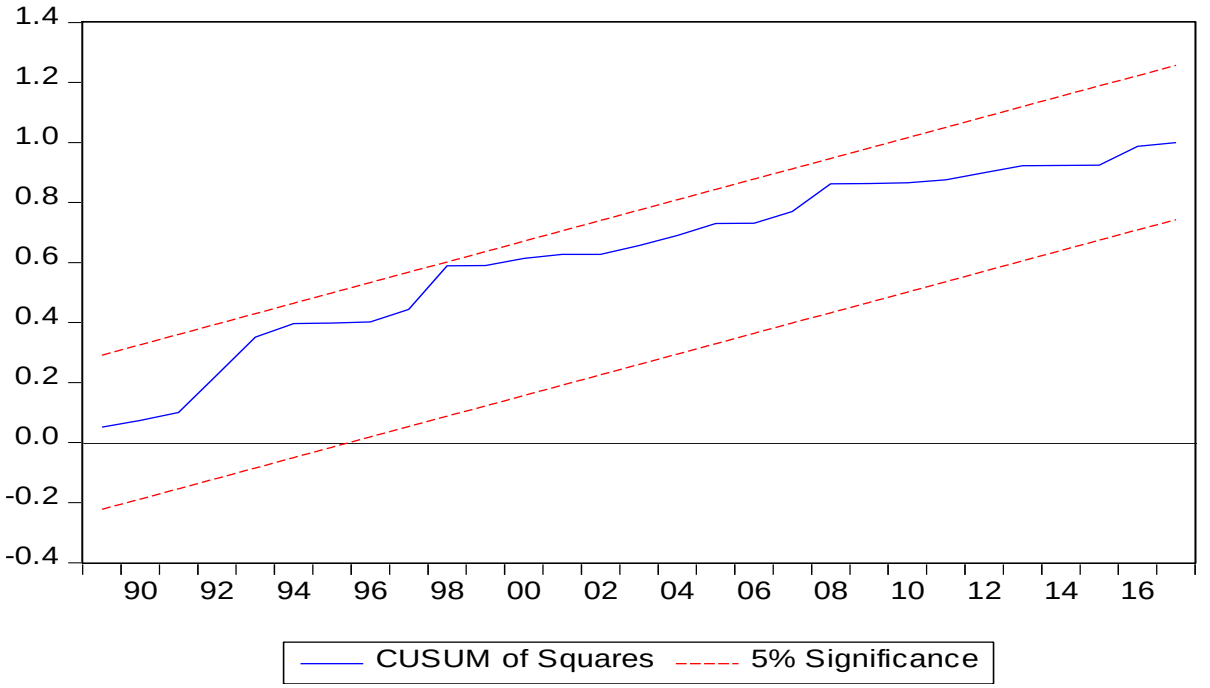


Figure 2: Plot of CUSUMSQ statistics for coefficient stability test



Further research can take advantage of other extensions of Thirlwall's law, such as Moreno-Brid and Pérez's (1999) model, which captures interest payment on external debt. This is because the extended version, which incorporates capital flows, has an overvalued projected growth rate compared to the simplified model since it does not include the impact of interest rates in its analysis. This furthermore suggests that foreign debt, and not only capital flows, is important in analysing growth dynamics.

5. Conclusion and policy implications

This paper tested Thirlwall's law for Malawi for the period 1980 to 2017 using the ARDL approach. The results show that there is a statistically significant long-run equilibrium relationship between imports, income, and terms of trade. The income elasticity of demand for imports is positive and significant, with an elasticity of 0.97%, holding other variables constant. The terms of trade coefficient is also statistically significant and negatively related with imports as expected, with an elasticity of -0.53%.

The income elasticity of demand and the average export growth rate of 8.91% for the period under study were used to calculate the predicted economic growth rates of the simplified version of Thirwall's law. The results show that the predicted growth rate for Malawi is 9.2 % for the simplified version of the law. The extended version of Thirlwall's law, which includes capital flows, predicts an income growth rate of 5.79%. However, the actual growth rate for Malawi over the study period is much lower at 3.55 %, which suggests that Malawi's economic growth rate is BoP constrained. Thirlwall and Hussain (1982) suggest that the simple model works for developed countries and that developing countries growth depends on capital flows. Hence, the extended version is a good predictor of Malawi's actual growth rate.

The implications of the results is that policy makers need to lift the long run constraint on growth imposed by the Balance of payments. For instance, policies aimed at reducing the income elasticity of demand for imports would allow the relaxation of the BoP constraint on growth. Furthermore, the composition of imports for Malawi need to be re-organised so that a greater share comprises of intermediate inputs that can be used for productive purposes, as suggested by Blecker (2002). Furthermore, Malawi can implement policies that diversify the export basket from agricultural commodities and increase value-added exports by making use of global and regional value chains. The resultant export growth is advantageous because it will increase the country's propensity to export, thereby relaxing the BoP constraint and eventually increasing its economic growth rate. Potential areas for further research on Thirlwall's law in the context of Malawi can also consider research extensions that incorporate the effect of foreign contents in growth of exports and domestic investment, as well extensions that consider disaggregated multi-sectoral balance of payments growth model. The policy makers should also help in designing and implementing policies that leverage capital flows to realise a balanced growth.

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Appendices

Table 1. Share in value of Malawi's main export products between 2010 and 2018 (%)

No	Product	2010	2011	2012	2013	2014	2015	2016	2017	2018
1	Tobacco and manufactured tobacco substitutes	54.88	39.97	53.82	46.86	46.15	46.69	52.74	59.83	56.12
2	Ores, slag and ash	10.72	8.78	11.12	11.14	2.84	0.01	0	0	0
3	Sugars and Sugar Confectionary	6.51	15.08	3.54	9.35	8.89	8.53	9.36	3.91	4.32
4	Coffee, tea, mate and spices	8.23	6.68	6.02	7.64	5.81	6.33	7.08	8.51	10.33
5	Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medicinal	1.56	2.43	4.18	6.59	5.19	1.61	2.2	4.71	4.61

Data Source: International Trade Centre (2020)

Table 3: Descriptive statistics

	Imports	GDP	Terms of trade
Mean	1.13e + 09	3.14e + 09	120.576
Median	7.47e + 08	2.14e + 09	109.251
Maximum	2.51e + 09	8.00e + 09	200.0
Minimum	2e + 08	1.13e + 09	78.961
Standard deviation	7.82e + 08	2.08e + 09	33.964
Skewness	0.721	0.766	0.973
Kurtosis	1.921	2.176	2.901
Jarque-Bera (p_value)	0.076	0.091	0.049
Observations	38	38	38

Source: Own calculations from data obtained from World Development Indicators (World Bank, 2018)

Table 9: Correlation matrix

	logM	Logtot	LogY
LogM	1		
LogToT	-0.693	1	
LogY	0.964	-0.625	1

Source: Authors' computations using Eviews 10