



# **COMESA Monetary Institute**

## **Working Paper Series**

**No.010/2023**

**Effects of External Shocks on Macroeconomic Performance in  
Malawi**

by

Austin Chiumia, Chisomo Kuyenda, Chrispin Kamuikeni & Kisu Simwaka

April 2023

# Effects of External Shocks on Macroeconomic Performance in Malawi

by

Austin Chiumia, Chisomo Kuyenda, Chrispin Kamuikeni & Kisu Simwaka  
**Reserve Bank of Malawi**

## Abstract

This paper assesses the impact of external shocks to foreign output, foreign interest rates, terms of trade and foreign grants on the macroeconomic performance in Malawi. A n Structural Vector Autoregressive (SVAR) model is estimated using quarterly data for the period 1990 - 2018. Results suggest that only terms of trade significantly affect domestic output while inflation is mostly affected by foreign grants. All other external shocks appear to be insignificant. These results suggest that the trade channel is quite important for Malawi. Although external shocks are material, they contribute relatively less to overall fluctuations in output and domestic prices when compared to internal shocks. Our findings have several policy implications. First, improving terms of trade is key for macroeconomic firmness. Second, enhancing domestic internal processes that enhance resilience to internal shocks is critical for sustainable macroeconomic stability. Third, identifying sustainable ways of foreign exchange generation-away from the volatile foreign aid is vital for stabilizing inflation.

**Keywords:** External Shocks, Macroeconomic Indicators, Malawi

**JEL:** F42, F61

---

Corresponding Authors are attached to Economic Research Department, Reserve Bank of Malawi. The authors are grateful to the COMESA Monetary Institute (CMI), the anonymous reviewers and the participants at the validation workshop organized by the CMI in Nairobi Kenya for the very valuable comments. The usual disclaimers apply.

## I: Introduction

Over the years, developing countries including Malawi have become more integrated into the global economy through increased trade and financial market linkages. Improved trade and financial flows have helped to fill the consumption, savings and investment gaps that characterize most developing countries, thereby contributing to improved economic performance. However, the linkages have also exposed developing countries to adverse external shocks. Typically, recessions in advanced economies, unfavorable terms of trade arising from changes in international commodity prices and tightening of global financing conditions have tended to negatively affect macroeconomic dynamics in developing economies, including Malawi.

Literature on the impact of external shocks on the domestic economies is largely synchronized and it suggests significant effects. Some of the studies including: Belhedi *et al.* (2015) consider shocks in foreign output, foreign interest rates and commodity prices; O'Grady *et al.* (2017) consider shocks to US interest rate, foreign output, and UK exchange rates; and Hahn (2003) considers shocks to oil prices, exchange rate and non-oil import prices. These studies, together with others conducted on Africa, such as Chinzara and Hoveni (2015), Rasaki and Malikane (2015), and Otoo and Walley (2019) have shown that external shocks have significant effects on economic growth and inflation in developing countries.

However, findings from these studies are not without controversy and cannot be generalized. As argued by Raddatz (2007), the emphasis on external shocks as a source of economic instability in low-income countries might be misplaced. He argues that although significant, external shocks account for only a small fraction of the volatility of Low Income Countries (LIC's) real Gross Domestic Product (GDP). The most important causes of economic instability appear to be internal, related to domestic economic policies and domestic exogenous shocks such as weather. Furthermore, the extent of transmission of external shocks to the domestic economy depends on the level of trade and financial interconnectedness of the domestic economy.

Just like many African countries, Malawi as a developing economy, mostly relies on agriculture which contributes about 30 percent to overall GDP. Malawi's current account is influenced by merchandise trade which equally depends on developments in the agricultural sector. Therefore, frequent adverse shocks to international oil prices, fertilizer prices as well as prices of key export commodities, such as tobacco, tea and sugar have often resulted into persistently unfavorable terms of trade which pose risk to inflation and sustainable economic growth. The process is often compounded by slowdown in foreign inflows including Foreign Direct Investment (FDI).

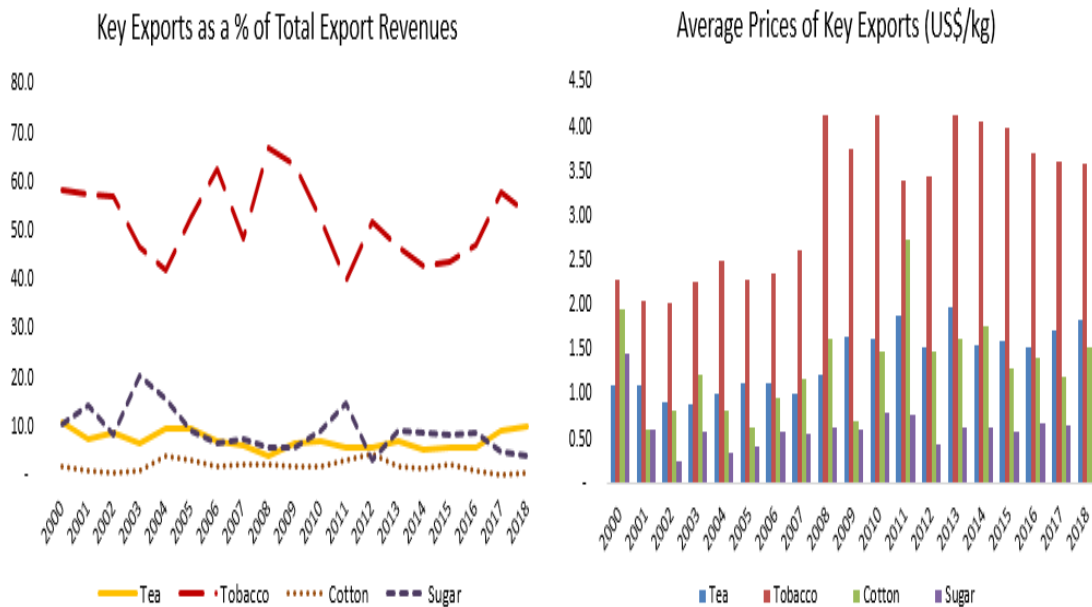
This paper aims to analyze the impact of external shocks on macroeconomic performance in Malawi and to isolate domestic policies necessary to mitigate the effects of adverse external shocks. As argued by Baldini *et al.* (2012), domestic policies have potential to mitigate adverse effects of external shocks. However, they need to be guided by a determination of the magnitude and persistence of the shocks. The main objective of this study is to assess the impact of key external shocks, including global demand, terms of trade, donor inflows and foreign interest rates on selected macroeconomic variables in Malawi. These shocks are chosen basing on their relevance to the domestic economy, the possible process of transmission as well empirical literature. More specifically, the study seeks to examine the



petroleum products and fertilizers (Fig. 3). In 2008-09 fertilizer prices were 51 percent higher than budgeted leading to significant balance of payments problems. Other imports include vehicles and building materials. Major trading partners include Republic of South Africa, Tanzania, Zambia, Europe, United States of America (USA), China, India, Egypt, and Zimbabwe. Given its narrow export base and the importance of its strategic imports, performance of the external sector remains crucial to the stability of the economy. Meanwhile, the terms of trade have lately been improving after consistently declining since 1980s (Fig. 3)

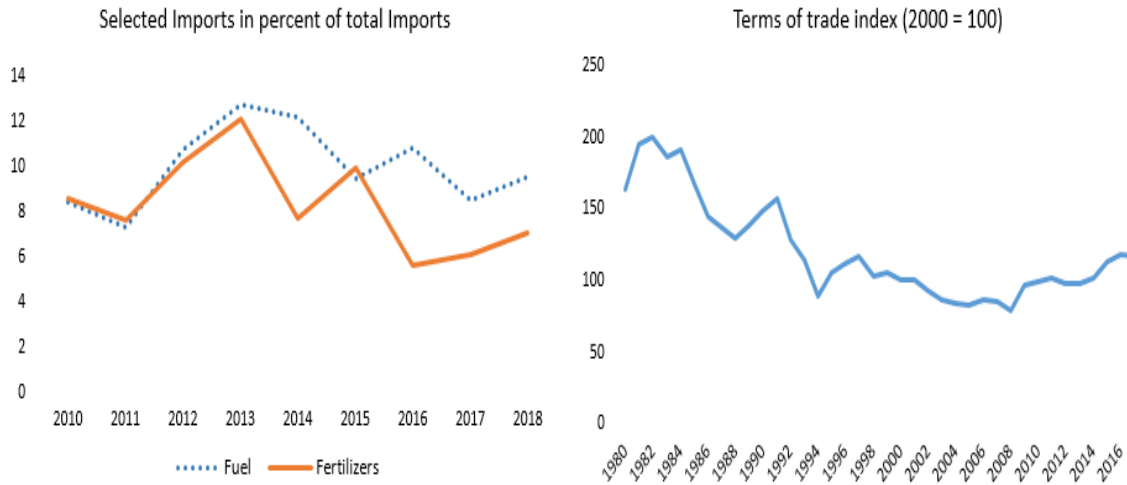
Trade openness, measured by the ratio of the sum of exports and imports to real GDP is estimated to have grown from about 30.0 percent in 2002 to about 50.0 percent in 2018. In contrast, financial openness, measured by total flows of international capital as a percentage of GDP has remained stagnant at around 21.0 percent between 2001 and 2018 (Fig. 3). This suggests that effects of external shocks on the domestic economy may mostly occur via the trade rather than financial channel.

Figure 2: Selected Exports and Export Prices



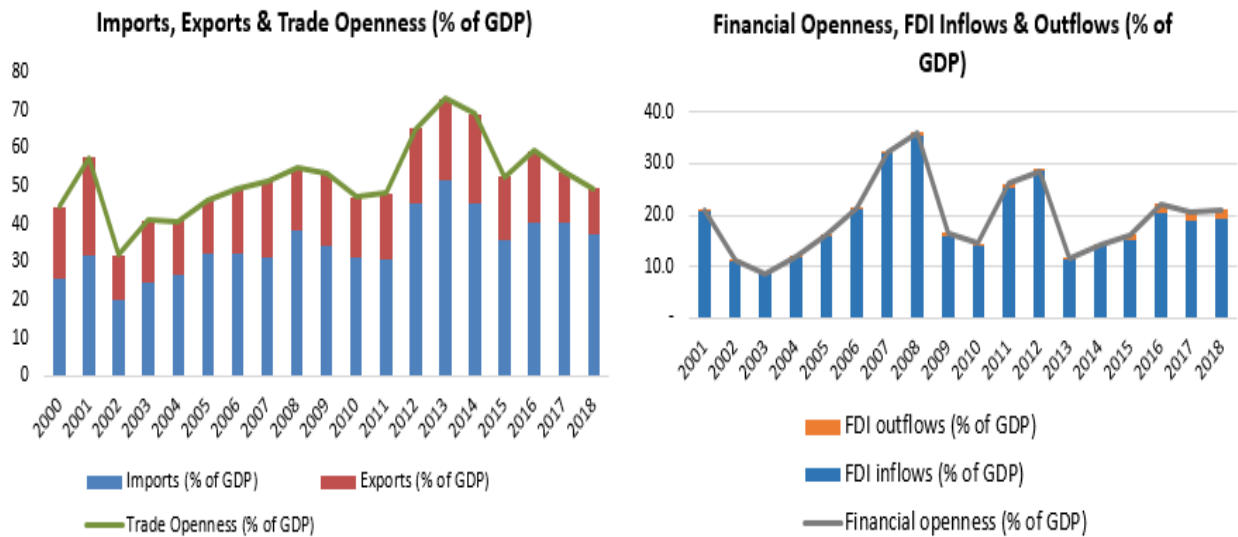
Source: Reserve Bank of Malawi and World Bank

Figure 3: Key Imports and Terms of Trade



Source: Reserve Bank of Malawi and World Bank

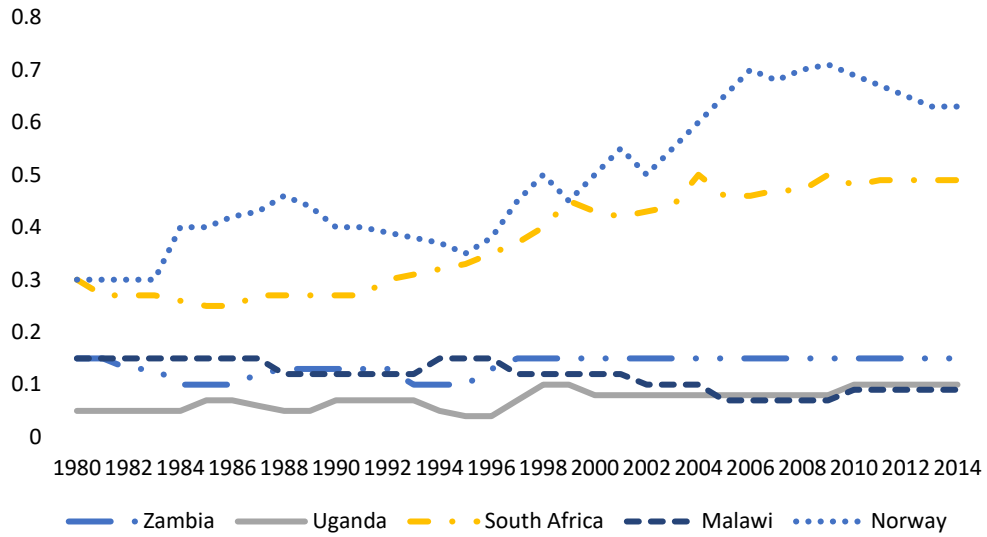
Figure 4: Trade and Financial Openness



Using an index of financial development developed by Svirydenka (2016)<sup>1</sup>, it is revealed that many African countries, including Malawi have underdeveloped financial markets which may limit the degree of pass-through of external financial shocks to the domestic economy (Fig. 5). This raises questions on the efficiency of the transmission process of external financial shocks to domestic economy via the financial markets. Not surprising, the domestic financial markets in many African countries remained largely unaffected after the 2008 global financial crisis.

<sup>1</sup>For detailed derivation of the index, see Svirydenka (2016)

Figure 5: Financial Development Index



Source: Svirydzenka (2016) & Own calculation

Malawi has a history of frequent macroeconomic shocks. These shocks are either exogenous or endogenous. According to the World Bank (Malawi) Country Economic Memorandum (2018), between 1992 and 2019, the country has witnessed about 19 shocks ranging from foreign aid, terms of trade, weather as well as those induced by domestic policy. This typically entails one shock in every two years. Of the 19 shocks, 5 are related to donor fund withdraws; 6 are weather related; 7 are characterized as policy induced while only one appears as a terms of trade shock. These shocks are associated with notable fluctuations in real GDP growth, inflation as well as interest rates. The diversity of the shocks suggests that domestic resilience measures need to be broad based while the high intensity of shocks makes entrenched macroeconomic stability difficult to attain.

Table 1: External and domestic Shocks

<i>Year(s)</i>	<i>Weather or global, economic shock</i>	<i>External aid shock</i>	<i>Policy-induced shock</i>	<i>GDP Growth (%)</i>	<i>Inflation (%)</i>	<i>Interest rates (end of period 91 days Treasury bill)</i>
1992	Severe drought in first quarter, 67% decline in maize output compared with previous year	Cutback in donor Non-humanitarian aid by 3.7% of GDP from earlier projections (asking for multiparty government)	Labor unrest due to low increase in minimum wage, average rise in wages and salaries >50%, monetary accommodation.	-7.2	23.2	20.4
1994	Severe drought in 1993–94 crop season	—	Massive election-related budget overruns in first quarter of fiscal year 1994/95; sizable unbudgeted expenditure, salaries raised, severe labor unrest; free primary education introduced 12,000 new teachers, overspending financed by Reserve Bank of Malawi.	-10.3	34.7	40.6
1997–98	—	—	Spending overruns, teacher recruitment, slackened revenue performance; in fiscal year 1997/98, expenditure slippages led to spending of 4.25% of GDP in excess of program; 47% increase in civil service wages	1997: 6.6 1998: 1.1	1997: 9.1 1998: 29.8	1997: 19.2 1998: 42.2
2001–03	Drought: maize output declined by a third in 2001; maize operation equivalent to 3% of GDP in fiscal year 2002/03 budget	External budgetary financing delayed due to policy slippages	Bad policy decision about sale of entire reserve stock; expenditure 3.5% above programmed amount in fiscal year 2000/01; parastatals bailout, augmented civil service wages, increase in low-priority spending such as travel and representation; during fiscal years 2002/03–2003/04, expenditure in excess of 5% of GDP over program; government domestic debt doubled during this period	2001: -4.1 2002: 1.7 2003: 5.5	2001: 27.4 2002: 14.7 2003: 9.6	2001: 45.7 2002: 36.1 2003: 33.1
2008–09	Terms-of-trade shock: fertilizer bid prices almost 51% higher than budgeted	—	Elections in May 2009; loosened monetary and fiscal policies	2008: 8.3 2009: 9.0	2008: 8.7 2009: 8.4	2008: 13.4 2009: 7.1
2010–12	—	Significant decline in donor grants in response to unsustainable policies: grants declined from 10.3%	Exchange rate policy misaligned; significant foreign exchange shortages	2010: 6.5 2011: 4.3 2012: 1.9	2010: 7.4 2011: 7.6 2012: 21.3	2010: 6.2 2011: 7.7 2012: 20.0



				of GDP in fiscal year 2009/10 to 3.1% of GDP in fiscal year 2011/12		
<b>2013–15</b>	Heavy floods in 2015 followed by drought	Donor grants resumed in fiscal year 2012/13, but on-budget share declined significantly after “cash-gate”	Theft of public funds discovered in second half of 2013; fiscal year 2014/slippages 2% of GDP; unplanned recruitment of 10,500 teachers, unbudgeted wage increase (1.25% of GDP)	2013: 5.2 2014: 5.7 2015: 2.9	2013: 28.3 2014: 23.8 2015: 21.9	2013: 32.3 2014: 26.8 2015: 24.2
<b>2017-18</b>	Dry spell followed by fall army worms negatively affected harvest			2017: 3.7 2018: 4.5	2017: 7.1 2018: 9.2	2017: 14.7 2018: 11.4
<b>2019</b>	Cyclone Idai which affected agriculture and infrastructure					

Source: World Bank-Malawi Country Economic Memorandum (2018)

Macroeconomic performance in Malawi has largely been supported by the International Monetary Fund (IMF) programs. Since 1979, Malawi has undergone 15 IMF programs (Table 2). These programs have been pivotal in providing requisite technical and financial resources to support macroeconomic transformation. However, many programs were not completed or were completed with waivers due to policy slippages. Donors mostly rely on IMF’s assessment and tend to withhold aid when the IMF discontinues its programs.

Table 2: IMF Supported Programmes

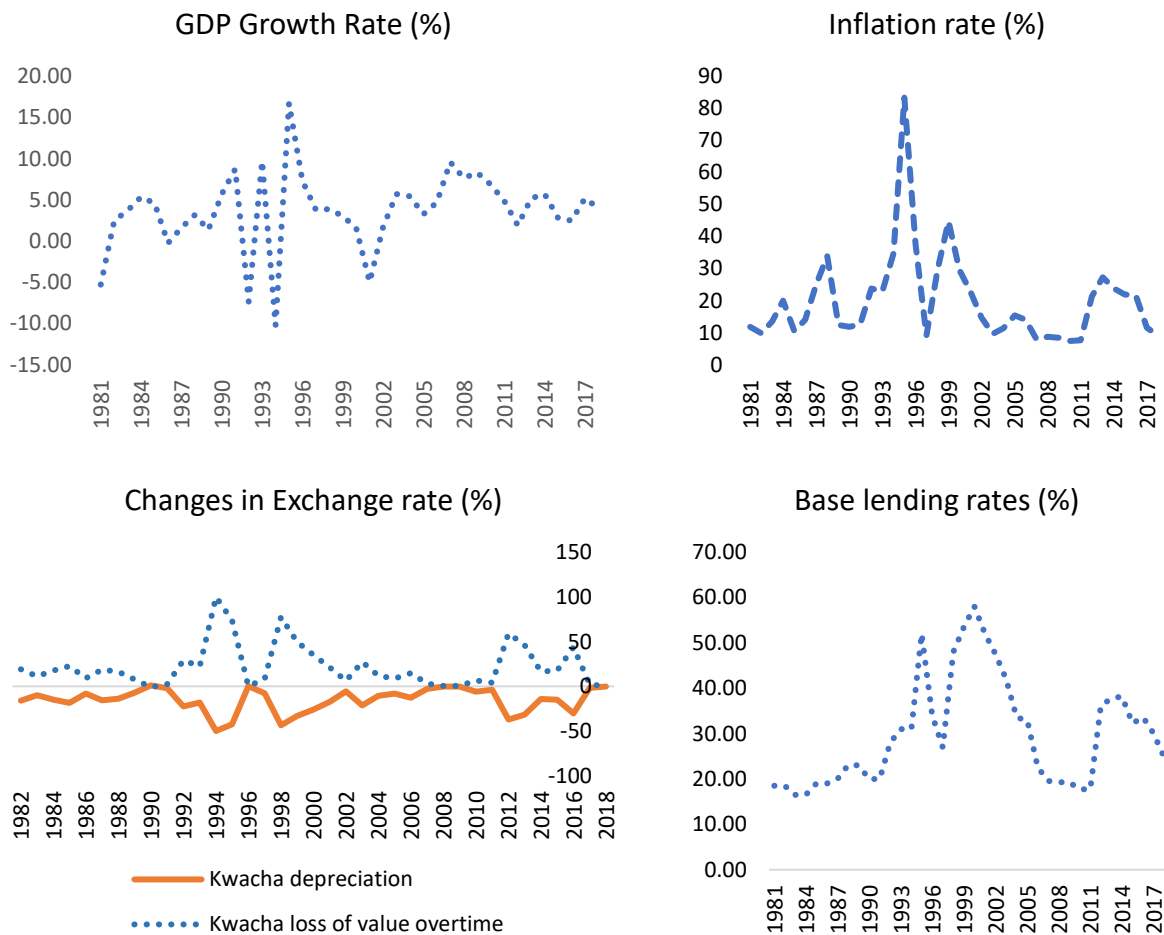
Year	Facility	Purpose	Amount Approved (M’n)	Amount Disbursed (M’n)	Completed with Waivers (W) (D-Disrupted) (U-Under-disbursed)	Reason if disrupted
1979-81	SBA		SDR26.3	SDR5.4	April 1980 (D)	Fiscal Slippage
1980-82	SBA		SDR49.9	SDR40.0	Completed (U)	Fiscal Slippage
1982-83	SBA		SDR22.0	SDR22.0	Completed	
1983-86	EFF		SDR81.0	SDR57.0	Disrupted (Aug 1986)	Fiscal Slippage
1988-89	SBA		SDR13.0	SDR9.3	Completed (U, W)	Fiscal Slippage
1988-94	ESAF		SDR67.0	SDR67.0	Completed (W)	
1994-95	SBA		SDR15.0	SDR12.7	Completed (U, W)	Fiscal Slippage
1995-98	ESAF	Economic and structural reform	US\$60.0 Mn	US\$60.0 Mn	Completed	
2000-05	PRGF	Economic and structural reform	US\$58.0 Mn	..	Disrupted (December 2004)	Fiscal Slippage
2004-05	SMP	-	-	-	-	-

2005-08	PRGF	Economic and structural reform	US\$62.0 Mn	US\$79.0 Mn	Completed (W)	Fiscal performance
2009-12	ESF	Address TOT shocks	US\$79.0 Mn	US\$21.4 million	Cancelled	Fiscal Slippages
2012-15	ECF	Economic and structural reform	US\$156.2 Mn	US\$90.3 Mn	Disrupted (September 2015)	Fiscal Slippage
2018-21	ECF	Economic and Structural Reform	US\$112.0 Mn	-	-	-

Source: IMF website

The macroeconomic outcomes are depicted in Fig.6. Economic growth, inflation, exchange rate and interest rates have been quite volatile overtime. Significant volatility were noticed between 1992 and 1998 following severe drought and a cut in donor aid. During this period, the exchange rate was floated and inflation rose significantly. With repeated shocks of similar nature, macroeconomic performance has remained subpar.

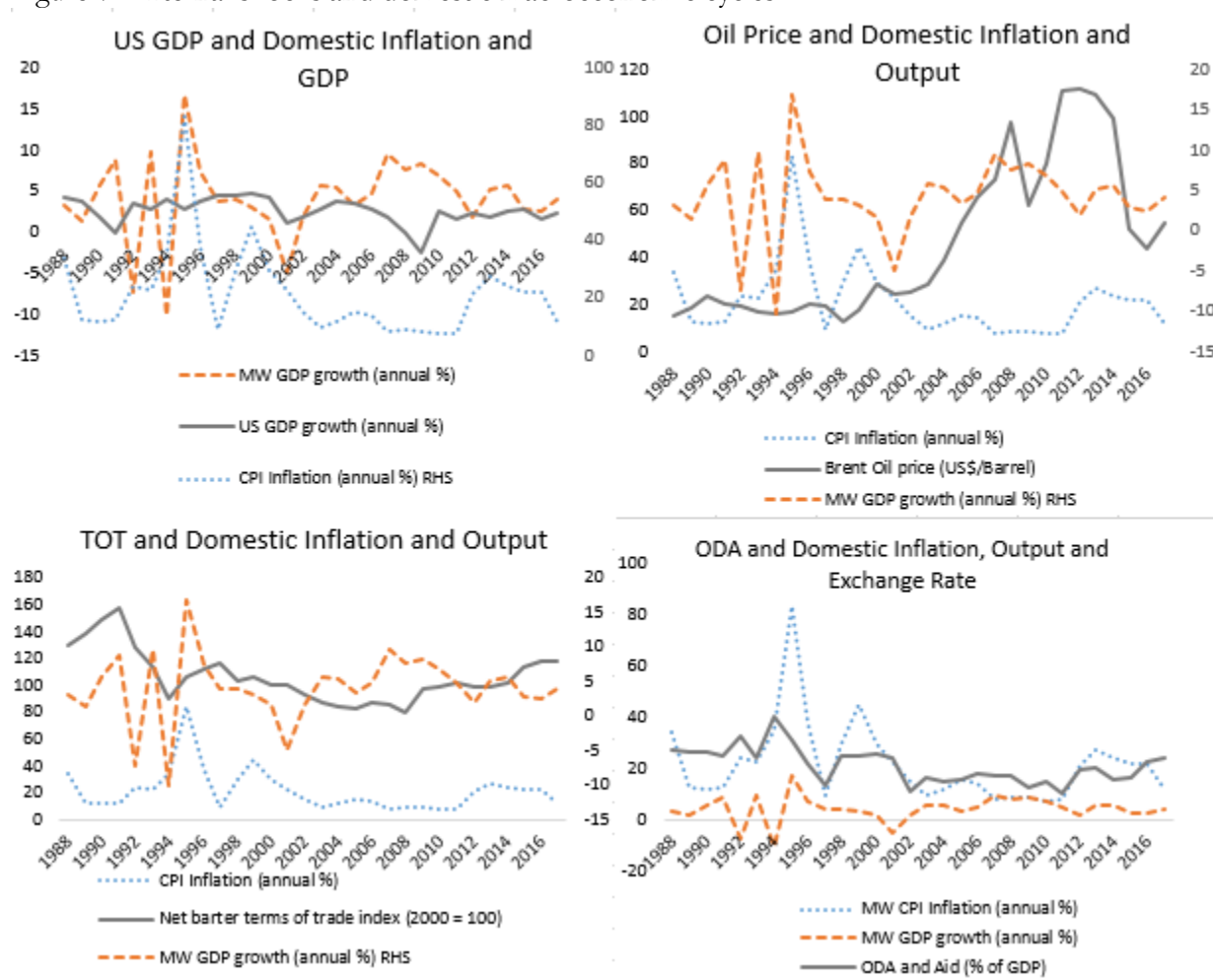
Figure 6: Evolution of Key Macroeconomic Variables



Source: Reserve Bank of Malawi & National Statistics Office

Fig. 7 shows the correlations between key external variables and domestic macroeconomic performance. Mixed relationships appear. Foreign output and domestic GDPs plunged in 2000-01 but diverged between 2007 and 2010. The increase in Malawi's output during the 2008/09 global financial crisis suggests weak interconnectedness with global economic movements. Nevertheless, there appears to be a link between international oil prices and domestic output trends. Meanwhile, the relationship between oil prices and domestic inflation may not be directly readable. Episodes of quickly rising fuel prices are associated with stable or slowly rising domestic prices. This outcome may be attributable to the effect price stabilization fund under the automatic fuel price adjustment mechanism. Official Development Assistance (ODA) have somewhat trended down with some fluctuations. Quite noticeably, the period of sustained decline in ODA (2008-11) was also characterized by some moderation in domestic output.

Figure 7: External shocks and domestic macroeconomic cycles



Source: Reserve Bank of Malawi, World Bank and IMF

Table 3 shows actual correlations between domestic and external variables. The correlations are strong for: foreign output and exchange rate (0.99); grants and exchange rate (0.84); foreign output and domestic inflation (0.81); exchange rate and inflation (0.81); oil prices and domestic inflation (0.50);

foreign output and domestic output (0.68) grants and domestic output (0.57). The close correlation of these variables suggests that foreign output, international crude oil prices, foreign aid exhibit positive and strong relationship with inflation and output in Malawi.

Table 3: Correlation between domestic and external variables

	Inflation	Federal Funds rate	Exchange Rate	GDP	Oil Prices	Treasury bill rate	Terms of Trade	Foreign GDP
Federal Funds Rate	-0.61							
Exchange rate	0.81	-0.71						
GDP	0.63	-0.56	0.67					
Oil Prices	0.50	-0.62	0.66	0.51				
Treasury bill rate	-0.24	-0.22	-0.07	-0.24	-0.52			
Terms of Trade	0.34	-0.01	0.19	0.10	-0.50	0.47		
Foreign GDP	0.81	-0.72	0.99	0.68	0.72	-0.19	0.11	
Grants	0.67	-0.73	0.84	0.57	0.71	-0.28	-0.05	0.87

## 2.1: Transmission of External Shocks

External shocks can be transmitted through various channels. Succinct summary of these is provided by Samake and Yang (2011). Notable channels include, the Trade channel, Foreign Direct Investment channel/Private Capital Flows channel and Official Development Assistance channel.

*Trade Channel:* Trade theory of comparative advantage posits that it is beneficial for countries to export goods and services which they can produce more cheaply while importing those that are more costly to produce. However, external shocks bring about costly distortions to trade linkages. For instance, a decline in trade volumes resulting from a decrease in global demand for domestic exports, a decrease in commodity prices, and/or an increase in international prices of strategic imports may lead to balance sheet problems with adverse effects on domestic output and inflation.

*Foreign Direct Investment Channel (FDI):* FDI is an important driver of economic growth in developing countries. The persistence of current account deficits implies that capital must flow from the rest of the world to satisfy investment gaps in these countries. Loss of FDI may entail rising unemployment, low government revenues and low growth. A typical example of FDI shock is *capital flight*. Cross country interest rate differentials and political factors are key in explaining financial capital flows, particularly in emerging and developing market economies.

*Official Development Assistance Channel:* This channel is similar to the FDI channel in that they both entail supply of international capital. While FDI follow returns, ODA is mostly driven by donor country's assessment of need in the recipient countries. To the extent that these resources compliment government revenue, a sudden reversal directly reduces aggregate demand, but may also severely affect public sector borrowing requirement.

## III: Related Literature

There is vast literature on effects of external shocks on emerging as well as developing economies. Studies on emerging economies mostly mushroomed during the global financial crisis and focused on assessing the impact of monetary policy in advanced economies on emerging economies. For example, Ganelli and Tawk (2016), Hofmann and Takats (2015), Bowman et al. (2015), Bartosz (2006) and

Canova (2005) point to significant effect of US monetary policy on interest rate and the exchange rate in emerging market economies, suggesting that monetary and exchange rate policies in emerging economies are largely affected by policy conducted in advanced economies.

The other strand of literature, such as Rahman (2015), Krznar and Kunovac (2010), Duma (2008) and Calvo et al (1993) focus on the role of international commodity price shocks, such as oil prices on macroeconomic performance in EMEs. These studies also find significant effect of external shocks on output and inflation. The extent of pass-through is however dependent on a number of factors including existence of administered prices, high content of food in the consumption basket as well as domestic economic policies. These findings are similar to Gruss et al. (2019) who argue that the effect of external shocks on inflation and income in EMEs depends on institutional frameworks, level of trade integration and exchange rate flexibility.

Studies for LICs e.g. Belhedi *et al.* (2015) and Berg *et al.* (2011) find that for many LICs, aggregate output declines when export demand decreases. Other studies, such as Chileshe *et al.* (2018), Chinzara and Hoveni (2015), Rasaki and Malikane (2015), Kose & Raymind (1999), Baldini *et al.* (2012) and Otoo and Walley (2019) also focus on understanding the role of commodity price shocks, terms of trade shocks, foreign income shocks, external debt, exchange rate, foreign interest rates, risk premium and world inflation on domestic macroeconomic performance. These studies too, find significant role of external shocks. They also argue that the effect of external shocks depends on the degree of trade openness and financial development of respective economies.

These findings are not surprising. Firstly, many African economies are price takers on the global market and are therefore vulnerable to adverse global price and demand developments. Secondly, these countries are characterized by minimal resilience to external shocks. While many studies suggest that external shocks significantly affect domestic macroeconomic performance, evidence for Malawi is still lacking. Few studies are available e.g. Rasaki and Malikane (2015) consider oil price and risk premium shocks. While oil prices are critical, Malawi also faces huge risks from prices of export commodities such as tobacco. Furthermore, the country has traditionally relied more on donor flow. Previous studies have not considered the effects of shocks to these variables on domestic macroeconomic performance, a gap which this study seeks to close.

## IV: Empirical Strategy

### 4.1 The model

We use a Structural Vector Auto Regressive (SVAR) model, propounded by Christopher Sims (1980), and whose use as a tool for analyzing different channels of transmission of either external or domestic macroeconomic shocks has been growing. We start with a VAR model, described by the following equation:

$$AY_t = B(L)Y_{t-1} + \varepsilon_t ; \varepsilon_t \sim iid(0, \Lambda) \quad (1)$$

Where,  $Y_t$  is an  $n \times 1$  vector of endogenous variables,  $\varepsilon_t$  is a  $n \times 1$  vector of structural disturbances with a zero mean and constant variance,  $\Lambda$ . Cross equation contemporaneous correlation of the error terms are allowed. The value of an economic variable at a time period  $t$  depends potentially on both

contemporaneous and lagged values of all other variables in a stochastic manner;  $A$  is an  $n \times n$  matrix of contemporaneous coefficients; while  $B$  is the matrix of lagged coefficients of interactions in  $Y_t$ ; and  $L$  is the lag operator.

Due to inadequate information, the structural model in eq. (1) cannot not be estimated directly. As such, the existence of the inverse of matrix  $A$ ,  $A^{-1}$  enables us to estimate a reduced form VAR which can be written as:

$$Y_t = A^{-1}B(L)Y_{t-1} + A^{-1}\varepsilon_t ; \varepsilon_t \sim iid(0, \Lambda) \quad (2)$$

or

$$Y_t = D(L)Y_{t-1} + \mu_t ; \mu_t \sim iid(0, \Sigma) \quad (3)$$

where

$$D(L) = A^{-1}B(L); \text{ and } \mu_t = A^{-1}\varepsilon_t$$

Given that  $A$  is a matrix of contemporaneous coefficients in the structural model and  $B(L)$  is matrix of lagged coefficients in the structural model, we can define  $G(L)$  as the matrix of both contemporaneous and lagged coefficients as follows:

$$G(L) = A + B(L) \quad (4)$$

Using equation (4), structural and reduced-form equations can be related by:

$$D(L) = A^{-1}B(L); \text{ and } \delta = A^{-1}C(L) \quad (5)$$

And the disturbance terms through

$$\mu_t = A^{-1}\varepsilon_t \text{ or } \varepsilon_t = A\mu_t$$

Which implies:

$$\Lambda = A^{-1}\Sigma A^{-1} \quad (6)$$

Since matrices  $A$  and  $B$  are both  $(n \times n)$ , a total of  $2n^2$  unknown elements can be identified with  $n(n+1)/2$  restrictions imposed by equation (6). Identifying  $A$  and  $B$  therefore requires at least  $2n^2 - n(n+1)/2$  or  $n(3n-1)/2$  additional restrictions. There are several ways which can be used to impose these restrictions, one of which is recursive factorization based on Cholesky decomposition of Matrix  $A$ . Pioneered by Sims (1980), the main assumption under this methodology is that the elements of the matrix are recursively related and are, therefore, lower triangular. This implies that the identification of structural shocks is dependent on the ordering of variables such that the variable ordered last is assumed to be the most endogenous. Several studies have used this methodology. However, critics of this methodology points out that the assumptions underlying the ordering of the variables are often different in different studies using the same variables such that these studies tend to be not comparable (Ngalawa 2009). As a result, many researchers have opted for structural factorization for identification of structural shocks (Sims & Zha, 1995; Bernanke & Mihov, 1995; Sims, 1986; Bernanke, 1986 and Kim and Roubini, 2000). This approach uses relevant economic theory to impose restrictions on matrices  $A$  and  $B$ .

The identification strategy utilized in the study adopts structural factorization method to identify restrictions. The model is modified to take into account external shocks identified as crucial for Malawi. Since Malawi is a small economy; its shocks are unlikely to have a significant impact on external variables. This assumption has been employed by several studies of small open economies (see Horvath et al, 2008; Chileshe, 2018; and Baskot, 2016). Failure to impose this restriction could result in misleading results. seven variables, exogenous and endogenous, are included in the model. Exogenous variables include, foreign output which is proxied by the US GDP<sup>2</sup>, foreign interest rates which is proxied by the Federal Funds Rate (FFR), terms of trade for (TOT) which are calculated as the ratio of the index of exports to imports and Grants<sup>3</sup> (GRA). Endogenous variables include domestic output (RGDP), domestic inflation (CPI) is measured by the all-items national composite consumer price index and domestic interest rate which is proxied by the 91-day Treasury bill rate (TBR). Shocks to exogenous variables are assumed to affect endogenous variables but not vice-versa.

In our model, USGDP is restricted to respond to own shocks; FFR reacts contemporaneously to foreign GDP on the assumption that the US monetary authorities consider output fluctuations in their interest rate setting. TOT reacts to own shocks while GRA is assumed to contemporaneously react to own shocks and USGDP. On the domestic front, domestic output is expected to respond contemporaneously to own shocks, US GDP and terms of trade. CPI reacts to own shocks, domestic output and policy rate. TBR also responds to own shocks, domestic output, and prices. This is in line with the Reserve Bank of Malawi's objectives. With these restrictions, the identified model is of the following nature:

$$\begin{bmatrix} e_{USGDP} \\ e_{FFR} \\ e_{TOT} \\ e_{GRA} \\ e_{GDP} \\ e_{CPI} \\ e_{TBR} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ \alpha_{21} & 1 & 0 & 0 & 0 & 0 & 0 \\ \alpha_{31} & 0 & 1 & 0 & 0 & 0 & 0 \\ \alpha_{41} & 0 & 0 & 1 & 0 & 0 & 0 \\ \alpha_{51} & 0 & \alpha_{53} & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & \alpha_{65} & 1 & \alpha_{67} \\ 0 & 0 & 0 & 0 & \alpha_{75} & \alpha_{76} & 1 \end{bmatrix} \begin{bmatrix} u_{USGDP} \\ u_{FFR} \\ u_{TOT} \\ u_{GRA} \\ u_{GDP} \\ u_{CPI} \\ u_{TBR} \end{bmatrix} \quad (7)$$

Where  $e_{USGDP}$ ,  $e_{FFR}$ ,  $e_{TOT}$ ,  $e_{GRA}$ ,  $e_{RGDP}$ ,  $e_{CPI}$  and  $e_{TBR}$  are structural disturbances, specifically, foreign demand shock, foreign financial shock, terms of trade shock, foreign aid shock, domestic output shock, CPI shock and policy rate shock, respectively. Meanwhile,  $u_{USGDP}$ ,  $u_{FFR}$ ,  $u_{TOT}$ ,  $u_{GRA}$ ,  $u_{RGDP}$ ,  $u_{CPI}$  and  $u_{TBR}$  are the residuals in the reduced form equations.

## 4.2 The Data

To examine the effects of external shocks on Malawi's macroeconomic variables, quarterly data is used covering the period 1990Q1 to 2018Q4. The starting date has been chosen as some of the variables are only available from 1990 while the cut-off date corresponds to the latest data available to create a balanced sample. Data on foreign variables namely USGDP and FFR were obtained from FRED

<sup>2</sup> Results do not change when we proxy foreign output by weighted GDP of the Malawi's major trading partners. These countries include South Africa and China as main sources of Malawi's imports; and USA and the Euro area as Malawi's major export destinations.

<sup>3</sup> Results do not change when we proxy foreign aid using Official Development Assistance (ODA)

database of the Federal Reserve Bank of Louis; Terms of Trade for Malawi was sourced from World Bank; data on total government grants were obtained from the Ministry of Finance, Economic Planning and Development. T-bill rate was obtained from the Reserve Bank of Malawi while inflation and real GDP was obtained from the National Statistical Office.

All variables, except GDP and TOT, are on quarterly basis. To obtain quarterly GDP, we follow Ngalawa (2009) who interpolate annual GDP using quarterly export revenues. Thus, the ratio of quarterly exports to annual exports is applied to annual GDP. The rationale for this approach is that in Malawi movements in GDP mimic movements in exports of tobacco which is an important contributor to GDP. All variables except FFR, T-bill rate and TOT are expressed in logarithms. All series are seasonally adjusted using the X-13 census.

## **V: Results**

The effects of external shocks on macroeconomic variables in Malawi are investigated by examining Impulse Response Functions, Forecast Error Variance Decompositions and Historical Decompositions. The variables in the study were subjected to stationarity test using the Dickey Fuller with GLS detrending by Elliot-Rothenberg-Stock (1996). Results in Appendix 1 indicate that all variables are  $I(0)$ , except RGDP and TOT which are  $I(1)$ . A VAR model is thus fitted. The estimated model satisfies stability test as all characteristic roots lie within the unit circle (Appendix 3).

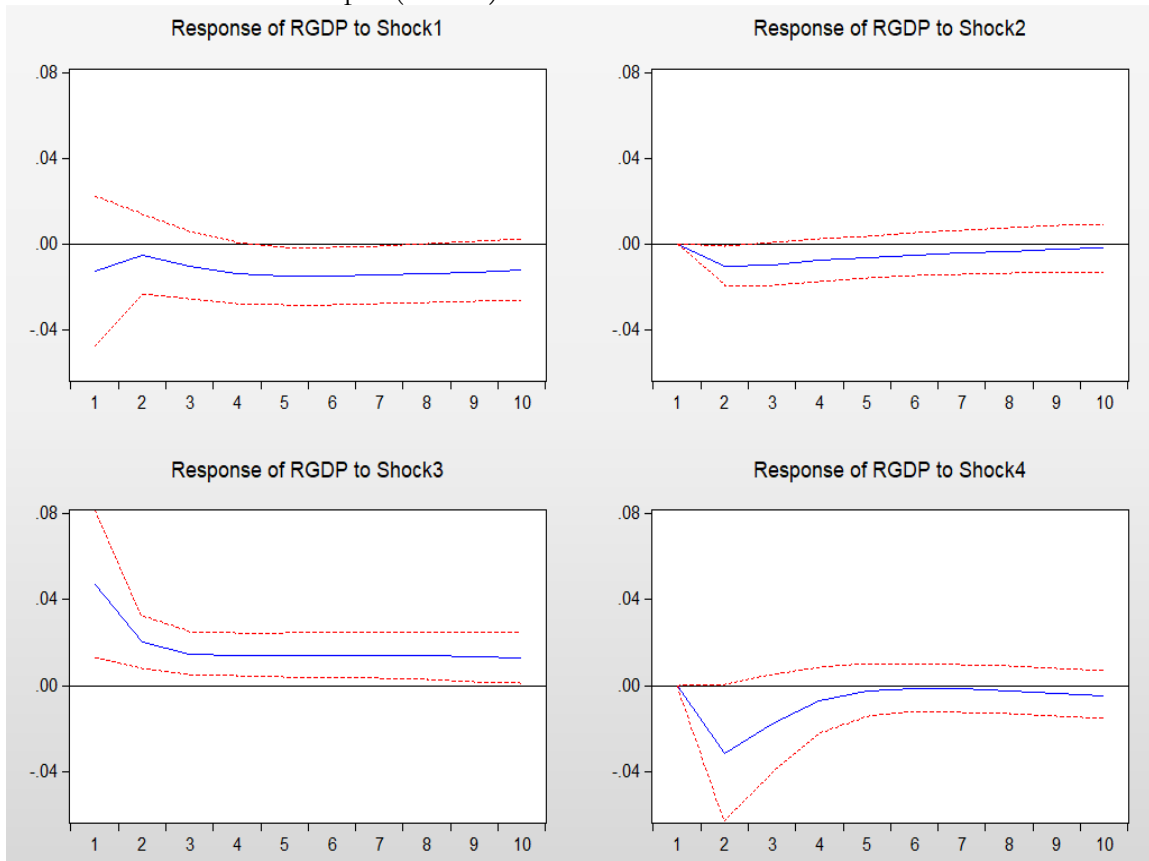
### **5.1 Impulse Responses**

Impulse responses presented in Fig. 8 suggest that domestic output increases following a positive shock to terms of trade shock. A positive shock may arise from an increase in the price of export products or a decrease in price of import products. This outcome is consistent with Chileshe *et al* (2018) who reported that commodity price shocks positively and contemporaneously increase domestic output in Zambia. Meanwhile, foreign output has no discernible effect on domestic output. This reflects lower levels of Malawi's business cycle synchronization with foreign economies. Similarly, foreign interest rates have no effect on domestic output. This result probably reflects the lower degree of financial integration in Malawi. Financial markets which are key for the transmission of international financial shocks to the domestic economy remain relatively underdeveloped which inhibits the pass-through. The other finding is that despite huge reliance on foreign aid, grants do not seem to significantly influence domestic output.

Impulse responses of domestic prices presented in Fig. (9) however, show that inflation significantly responds to a shock in foreign grants. The effects of foreign output, foreign interest rates and terms of trade appear to be statistically insignificant. Aid cuts entail low supply of foreign currency which puts pressure on inflation via the effect it has on the exchange rate.

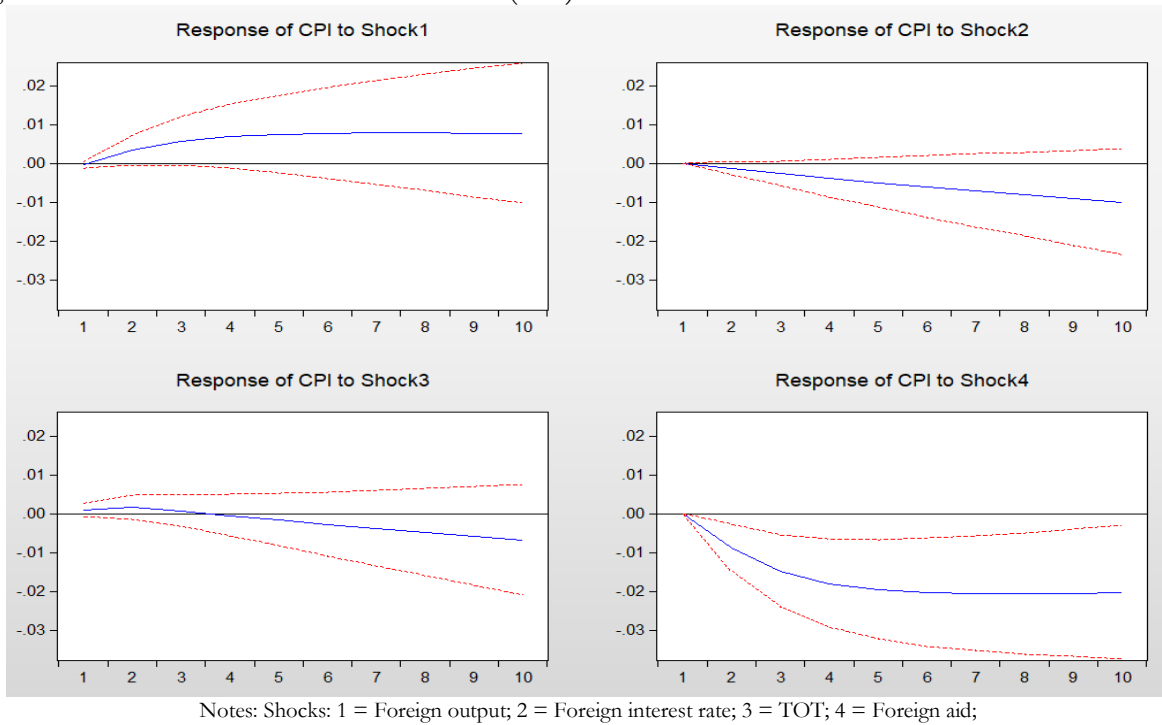


Figure 8: IRF of Domestic Output (RGDP)



Notes: Shocks: 1 = Foreign output; 2 = Foreign interest rate; 3 = TOT; 4 = Foreign aid

Figure 9: IRF of the Consumer Price Index (CPI)



## 5.2 Forecast Error Variance Decomposition

The variance decomposition for output is presented in Table 3. The decompositions suggest that domestic factors explain the bulk part of output variations, with own persistence of GDP shock as a single most factor. Terms of trade follow as a distant second factor. The variance decompositions for inflation are presented in Table 4. Domestic interest rates are found to be key drivers of the variance but that overtime, inflation persistence start to matter more. The third explaining factor are grants. These findings are in line with results from impulse response functions. Overall, the Forecast error variance decompositions suggest that demand shocks, terms of trade mostly explain GDP fluctuations while supply shocks, interest rates and grants explain the error variance of inflation forecasts.

Table 4: Forecast Error Variance Decompositions for GDP

Period	Foreign output	Foreign interest rate	Terms of Trade	Grants	Real GDP	Inflation	T-bill rate
1	0.26	0.00	4.58	0.00	95.15	0.00	0.00
2	0.46	0.10	4.22	1.56	92.02	1.28	0.36
3	0.86	0.20	4.11	2.08	89.13	2.67	0.96
4	1.34	0.26	4.18	2.12	86.96	3.55	1.59
5	1.78	0.31	4.42	2.08	85.29	3.97	2.16
6	2.12	0.35	4.81	2.05	83.92	4.10	2.64
7	2.34	0.39	5.33	2.03	82.76	4.11	3.05
8	2.47	0.42	5.93	2.02	81.72	4.07	3.37
9	2.54	0.46	6.56	2.04	80.77	4.02	3.62
10	2.56	0.50	7.17	2.06	79.90	4.00	3.81
11	2.56	0.54	7.73	2.10	79.12	4.00	3.95
12	2.54	0.58	8.22	2.14	78.42	4.04	4.05

Table 5: Forecast Error Variance Decomposition for Inflation

Period	Foreign output	Foreign interest rate	Terms of Trade	Grants	Real GDP	Inflation	T-bill rate
1	0.00	0.00	0.02	0.00	0.50	21.36	78.12
2	0.56	0.07	0.01	3.54	2.32	28.94	64.56
3	1.24	0.24	0.01	8.03	2.18	33.61	54.69
4	1.78	0.45	0.01	11.45	1.71	36.96	47.64
5	2.15	0.69	0.02	13.67	1.33	39.68	42.46
6	2.37	0.94	0.07	15.03	1.06	42.02	38.51
7	2.50	1.20	0.16	15.82	0.87	44.05	35.41
8	2.54	1.46	0.28	16.25	0.73	45.83	32.91
9	2.54	1.73	0.42	16.46	0.63	47.37	30.86
10	2.49	2.00	0.59	16.52	0.55	48.70	29.15
11	2.41	2.27	0.76	16.49	0.49	49.86	27.72
12	2.31	2.54	0.93	16.40	0.45	50.86	26.51

### 5.3 Historical decomposition

In order to determine key drivers of GDP and inflation fluctuations overtime, we use Historical Decompositions, which are presented in Figs. 9 and 10. The historical decompositions show the contribution of external and internal shocks to output and inflation fluctuations during the study period. The bar depicted as total stochastic process represents the percentage deviation of GDP and Inflation from steady state. The rest of the lines represent each variable's contribution to the total

stochastic process. Of the external shocks, terms of trade shocks appear to have been the most significant in explaining historical fluctuations in domestic output. Positive terms of trade shocks are associated with growth in output in the years 1990-91, 2014-17. Similarly, negative terms of trade shocks coincide with slowdowns in output in the period 2001-04. Grants also substantially account for movements in domestic GDP particularly in 2001 and 2009-14 whereas foreign output shocks were important in 1991, 1998-01. Relatively however, domestic shocks seem to explain more fluctuations in output than external factors. Domestically, demand and interest rate fluctuations significantly contributed to GDP fluctuations over the sample period. On balance, internal shocks appear to drive GDP fluctuations more than external shocks.

In terms of inflation, all external shocks appear to be important in explaining historical variations of inflation (Fig. 10). Grants and foreign output shocks underpinned fluctuations in inflation between 1998 and 2003, 2009 to 2013. Overall, grants are found to be the most important driver of CPI variations among the external variables. This reflects the significant role played by donor inflows. Internally, inflation fluctuations seem to be largely driven by supply shocks as well as domestic interest rates. On balance, Domestic fluctuations arising from interest rates and supply shocks seem to outweigh the contributions by foreign grants and terms of trade in explaining overall inflation fluctuations.

Figure 9: Historical Decomposition of Output

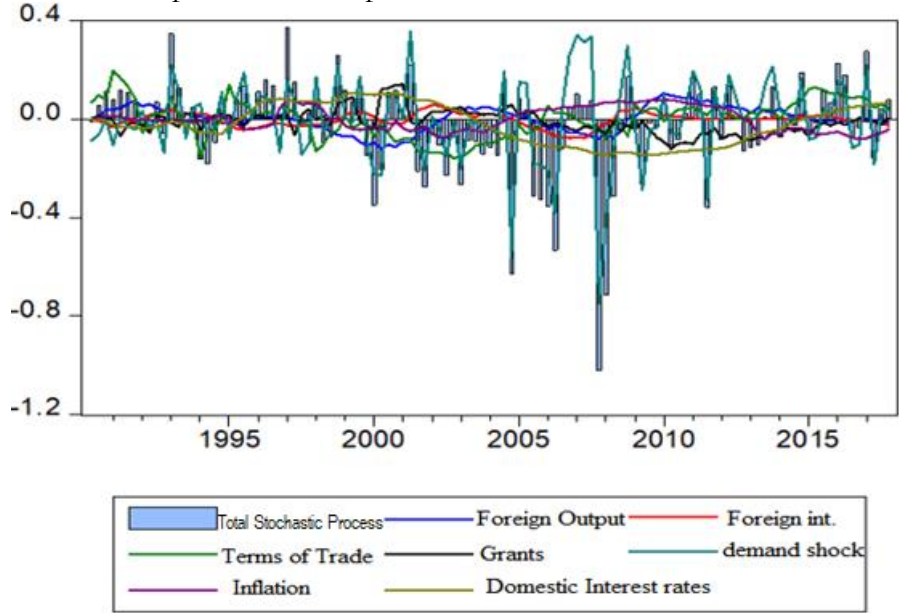
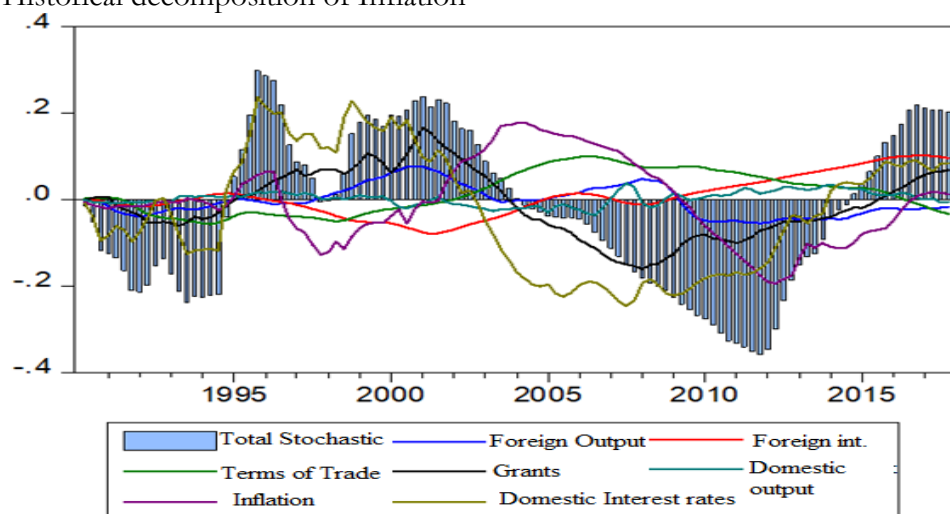


Figure 10: Historical decomposition of Inflation



## VI: Conclusion and Policy Options

This paper analyses the impact of external shocks on macroeconomic performance in Malawi. An SVAR is estimated using quarterly data from 1990 to 2018. External shocks considered are foreign output, foreign interest rates, terms of trade and foreign grants. Results suggest that of the external shocks considered in this paper, only terms of trade significantly affect domestic output while inflation is mostly affected by foreign grants. All other external shocks appear to be insignificant. These results suggest that the trade channel is quite important for Malawi. Low integration with the global economy limits the degree of exposure to financial shocks rendering foreign interest rates less important. Although external shocks have some significance on macroeconomic performance, they contribute relatively less to overall fluctuations in output and domestic prices. Our findings have several policy implications. First, improving terms of trade is key for macroeconomic stability. Second, enhancing domestic internal processes that enhance resilience to internal shocks is critical for sustainable macroeconomic stability. Third, emphasis on identifying sustainable ways of foreign exchange generation away from volatile foreign aid is vital for achieving low and stable inflation.

## References

- Baldini A., Benes J., Berg A., Dao M.C., Portillo R (2012). "Monetary Policy in Low Income Countries in the Face of the Global Crisis: The Case of Zambia", IMF Working Paper, 2012 International Monetary Fund.
- Baskot, B. (2016). "Exogenous Macroeconomic Shocks and their Propagation in Bosnia and Herzegovina", Graduate Institute of International and Development Studies. Working Paper HEIDWP17-2016.
- Belhedi, M., Slama, I., & Lahiani, A. (2015). "Transmission of International Shocks To An Emerging Small Open-Economy: Evidence From Tunisia", *Region et Development*, Region et Development, LEAD, Universite du Sud - Toulon Var, vol. 42, pages 231-258.
- Bernanke, B.S. (1986) 'An alternative explanations of the money-income correlation', in Brunner, K. and Meltzer, A. (Eds.): *Real Business Cycles, Real Exchange Rates, and Actual Policies*, pp.49–99, Carnegie-Rochester Series on Public Policy No. 25, Amsterdam.
- Bernanke, B. S. & Mihov, I. (1995). "Measuring Monetary Policy", *Economics Series 10*, Institute for Advanced Studies.
- Berg A., Papageorgiou C., Pattillo C., Schindler M., Spatafora N., and Weisfeld H. (2011). "Global Shocks and their Impact on Low-Income Countries: Lessons from the Global Financial Crisis", IMF Working Paper No. WP/11/27, International Monetary Fund
- Biljanovska N. and Cirkel A.M, 2016. "Testing Shock Transmission Channels to Low-Income Developing Countries", IMF Working Paper, WP/16/102
- Birmingham, C. & Conefrey, T. 2011. "*The Irish Macroeconomic Response to an External Shock with an Application to Stress Testing*", Research Technical Papers 10/RT/11, Central Bank of Ireland.
- Chileshe, P.M., Chisha, K. and Ngulube, M. (2018) 'The effect of external shocks on macroeconomic performance and monetary policy in a small open economy: evidence from Zambia', *International Journal of Sustainable Economy* 10 (1), pp.18–40
- Chirwa W.E. (2005). "Macroeconomic Policies and Poverty Reduction in Malawi: Can we Infer from Panel Data", Global Development Network (GDN) Suite 1112, 2600 Virginia Avenue NW Washington, DC 20037 United States of America
- Chinzara, Z. and Hoveni, J. (2015). "Capital flows volatility and macroeconomic fluctuations", Biennial Conference of the Economic Society of South Africa. University of Cape Town, Cape Town. South Africa.
- Duma. N. (2008). Pass-Through of External Shocks to Inflation in Sri Lanka, IMF WP/08/78
- Enders, W. (2010). *Applied Econometric Time Series*, 3rd ed., John Wiley and Sons, Tuscaloosa.
- Gafar, J. (1996). Macroeconomic Performance and External Shocks on Small, Open Economies: The Caribbean Experience, *The Journal of Developing Areas* 30(3), pp. 341-360. <https://www.jstor.org/stable/4192567>
- Galesi, A. & Lombardi, M.J. (20019). "External Shocks and International Inflation Linkages: A Global VAR Analysis", European Central Bank WP # 1062. <http://www.ecb.europa.eu>
- Ganelli, G. & Tawk, N. (2016) "Spillovers from Japans's Uniconvetional Monetary Policy to Emerging Asia:A global VAR Approach", IMF WP/16/99.
- Gruss, B., Nabar, M., & Ribeiro, M. (2019). "Domestic Amplifiers of External Shocks: Growth Accelerations and Reversals in Emerging Market and Developing Economies", IMF Working Paper #WP/16/5.
- Hahn, E. (2003). "Pass-through of External Shocks to Euro Area Inflation", European Central Bank Working Paper Series WP #243.
- Horváth, R., Rusná k, M. (2008). "How Important Are Foreign Shocks in Small Open Economy? The Case of Slovakia", IES Working Paper 21/2008. IES FSV. Charles University.

- Kim, S. & Roubini, N. (2000). 'Exchange rate anomalies in the industrial countries: a solution with a structural VAR approach', *Journal of Monetary Economics* 45(3), pp.561-586.
- Kojima M., (2013). "Petroleum Product Pricing and Complementary Policies Experience of 65 Developing Countries since 2009", Policy Research Working Paper 6396. The World Bank Sustainable Energy Department, Oil, Gas, and Mining Unit.
- Kose, M.A. & Raymond, R. (1999). "Trade Shocks and Macroeconomic Fluctuations in Africa", CESifo Working Paper Series 203, CESifo Group Munich.
- Karlsson, S. (1993). *Introduction to multiple time series: H. Lutkepohl, 1991*, (Springer, New York), 552 pp., paperback US\$59.00, ISBN 0-387-53194-7, *International Journal of Forecasting* 9(4), p. 577-578.
- Krznar, I & Kunovac, D. (2010). "Impact of External Shocks on Domestic Inflation and GDP", Working Papers 26, The Croatian National Bank, Croatia.
- Mangani R., (2012). "The Effects of Monetary Policy in Malawi", AERC.
- Ngalawa, Harold P.E. (2009), "Dynamic effects of monetary policy shocks in Malawi", Paper Presented at the 14th Annual Conference of the African Econometric Society, 8-10 July 2009, Abuja, Nigeria.
- O'Grady M., Rice J. and Walsh G. (2017). "Global and Domestic Modeling of Macroeconomic Shocks: AGVAR Analysis of Ireland", Central Bank of Ireland, Research Technical Paper No. 09/RT/17
- Otoo, P. & Walley, B. "The Effect of External Conditions on the Economy of Ghana", Bank of Ghana Working Paper Series. WP/BOG/-2019/01.
- Primus, K. (2016). "Effectiveness of Monetary Policy in Small Open Economies: An Empirical Investigation", IMF paper WP/16/189.
- Raddatz, C. (2007). "Are External Shocks responsible for the instability of output in low-income countries". *Journal of Development Economics* 84 (1), pp 155-187.
- Ragan, C.T.S, & Lipsey, R.G., (2011). "Economics." Pearson Addison Wesley.Canada Inc., Toronto, Ontario. 13th Canadian ed.
- Rahman, A. (2015). "External shocks, monetary policy and the domestic economy: a structural VAR approach for Bangladesh", *Journal of Development Areas* 49(6), pp.305 320.
- Rasaki, M. & Malikane, C. (2015). "[Macroeconomic shocks and fluctuations in African economies.](#)" *Economic Systems*, Elsevier, vol. 39(4), pages 675-696.
- Reinhart, C., Calvo, G., & Leiderman, L. (1993). "Capital Inflows and Real Exchange Rate Appreciation in Latin America: The Role of External Factors." MPRA Paper 7125, University Library of Munich, Germany.
- Saibu, M.O. and Apanisile, O.T. (2013). "A bound test analysis of the effects of global economic shocks on Nigerian economy", *Australian Journal of Business and Management Research* 2(12), pp.58–68.
- Samake and Yang, 2011. "Low-Income Countries' BRIC Linkage: Are There Growth Spillovers?" IMF Working Paper, WP/11/267
- Sims, C. and Zha, T. (1995). "Does Monetary Policy Generate Recessions? Using Less Aggregate Price Data to Identify Monetary Policy". Working Paper, Yale University, New Haven.
- Sims, C. (1980). "*Macroeconomics and reality*", *Econometrica*, Vol. 48, No. 1, pp.1–48.
- Sims, C. (1986). "Are forecasting model usable for policy analysis", Federal Reserve Bank of Minneapolis Quarterly Review, Winter Issue, Vol. 2, No. 2, pp.2–16.
- Stock, James H., and Mark W. Watson (2001). "Vector Autoregressions", *Journal of Economic Perspectives* 15(4), 101-115.
- Svirydzhenka, T. (2016). "Introducing a New Broad-Based Index of Financial Development", IMF Working Paper # WP/16/5.

WTO, 2018. World Trade Statistical Review 2018: available at [https://www.wto.org/english/res\\_e/statis\\_e/wts2018\\_e/wts18\\_toc\\_e.htm](https://www.wto.org/english/res_e/statis_e/wts2018_e/wts18_toc_e.htm)



## Appendices

### Appendix 1: ERS Unit Root Test results

Variable	Level		Trend and Intercept		1st Difference		1st difference trend & intercept		
	t-stat	Critical Value @5%	t-stat	Critical Value @5%	t-stat	Critical Value @5%	t-stat	Critical Value	Inference
CPI	1.137	-1.943	-1.232*	-3.016	-	-	-	-	I(0)
FFR	-0.776	-1.943	-3.299*	-3.017	-	-	-	-	I(0)
GRA	-0.243	-1.943	-4.755*	-3.015	-	-	-	-	I(0)
RGDP	-8.485*	-3.015	-	-	-	-	-	-	I(0)
TBR	-1.960*	-1.943	-	-	-	-	-	-	I(0)
TOT	-1.220	-1.943	-2.082	-3.024	-2.177*	-1.943	-	-	I(1)
USGDP	1.313	-1.943	-1.083	-3.016	-3.672*	-1.943	-	-	I(1)

\*denotes significant at 5%

### Appendix 2: Lag Length Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-928.6555	NA	0.004712	17.34547	17.54415	17.42603
1	212.8951	2092.843	1.02e-11	-2.609169	-0.821081*	-1.884164
2	312.4646	167.7930	5.37e-12*	-3.267863	0.109636	-1.898410*
3	377.1159	99.37143	5.56e-12	-3.279924	1.686986	-1.266023
4	433.2799	78.00552	7.06e-12	-3.134812	3.421508	-0.476463
5	499.2036	81.79424	7.98e-12	-3.170437	4.975295	0.132362
6	568.1954	75.37995	9.35e-12	-3.262878	6.472265	0.684369
7	668.4936	94.72602*	6.97e-12	-3.935066	7.389488	0.656630
8	773.2322	83.40296	5.73e-12	-4.689484*	8.224481	0.546660

\* indicates lag order selected by the criterion

### Appendix 3: Stability Test

Root	Modulus
0.985319 - 0.007946i	0.985351
0.985319 + 0.007946i	0.985351
0.959938 - 0.031388i	0.960451
0.959938 + 0.031388i	0.960451
0.813915 - 0.127282i	0.823808
0.813915 + 0.127282i	0.823808
0.350902 - 0.036189i	0.352763
0.350902 + 0.036189i	0.352763

No root lies outside the unit circle.

VAR satisfies the stability condition.