Does the accumulation of external debt spur the appetite for increased importation in the West African Monetary Zone (WAMZ)?

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Abstract. ***Objective:*** *The role of debt accumulation in reducing the financial constraints that face countries has been largely emphasized in literature. For many reasons, debt accumulation is essential for developing countries in order for them to shore up their income level. However, it has been observed that debt accumulation could lead to increased importation judging from the angle that the debts assist in improving the revenue base of the debtor countries. Such hypothesis is tested in this study as the paper examined the response of importation to external debt accumulation in the West African Monetary Zone (WAMZ).* ***Method:*** *The study used the panel vector error correction model VECM from which both the impulse response function and the variance decomposition were obtained and it covered the period from 1982-2022.* ***Results:*** *Finding indicates that in period one through period five, marginal propensity to import responded positively to external debt per capita which confirms the hypothesis stated in the study. It was equally found that marginal propensity to import responded positively to exchange rate only in periods one and two but afterward the response became negative till the last period.* ***Originality****: This study contributes to the literature by focusing on the WAMZ countries and testing the influence of external debt on the marginal propensity to import in these countries.*

Keywords: *import; external debt, exchange rate; panel VECM*
JEL Classification: *F34, F31, C33*

1. Introduction

To bridge the shortfall in revenue projections, external flow of capital into an economy has become paramount. As observed by Agyeman et al. (2022), the major rationale for the rising reliance on external sources of capital mainly in the developing countries is because of the huge investment-savings gap. Due to poor mobilization of domestic savings both in the public and private sectors, external capital is essential. Among these external sources of capital, external debt accumulation has become an essential source of raising funds to support the decline in domestic resources. This is more

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so for developing countries that are confronted with limited funds to implement their budget provisions (Bangura et al., 2025). In literature, the role of external debt in stimulating growth has been emphasized. External debt encourages countries to import capital goods, provide financing to address the problem of budget deficits and to improve domestic demand (Nguepi et al., 2024). It encourages access to huge financial resources (Zanna et al., 2019), just as it supports large-scale infrastructural provision and provides opportunity for foreign knowledge transfer that is germane for effective project implementation (Romer, 1990).

Much as external debt is paramount, its acquisition could have peculiar challenges. External debt accumulation may lead to the debtor nation depending on the foreign creditors, with an adverse consequence on the nation's sovereignty and economic policy (Stiglitz, 2017). Secondly, inability to channel the debt proceeds to areas where they could contribute to a country's growth remains an issue. Particularly in the sub-Saharan African countries, cases of diverting acquired debts to purposes other than their original intentions are rampant. As observed by Agyeman et al. (2022), even though external debt is very high in Africa, there is a high incidence of capital flight. This accounts for part of the reasons for the huge debt stock in these countries. Thirdly, compared to external debts, domestic debt provides a higher degree of independence and economic control, considering that the government can internally mobilize financial resources through various means such as issuing of bonds (Mishkin, 1996). For external debt, so long as repayment has to be made in foreign currency, this poses future payment problems. The depreciation of the currency of a debtor country implies that future external debt repayment has to be huge. So, apart from not utilizing the acquired debts judiciously, domestic exchange rate depreciation of the debtor country is another factor that puts an obstacle to debt repayment. This is an area that seriously confronts the West African Monetary Union (WAMZ) member countries. Over the years, the domestic currencies of these countries have been experiencing depreciation as can be observed in Appendix iv and this is an unhealthy development so long as external debt repayment is concerned.

WAMZ countries are noted to be import-dependent; importing all manner of items, especially when their income level rises. External debt accumulation is among the sources of capital inflows that improves a country's income level. The argument raised in this paper is that since external debt improves a country's income level, the higher the accumulation of external debt, the higher the propensity of a country to import. In a nutshell, it is expected that import should rise alongside external debt accumulation. On the other hand, if a country's imports increase on the back of external debt accumulation, such has the tendency to erode the purchasing power of the debtor country. All these possibilities may pose potential risks for macroeconomic stability (Chekouri et al., 2024). This is especially for the WAMZ countries that often export primary products which compete unfavourably at the international market. With depreciating domestic currency, repayment of the external debt becomes difficult for them. The resultant debt overhang could later lead to severe import strangulation which in effect weakens the growth of the economy.

This present study therefore focuses on examining the response of import to external debt accumulation in the WAMZ countries. The study sets out to test the hypothesis that external debt accumulation could lead to increased import. This hypothesis is partly given an impetus in the study by Xu et al. *(*2023) which revealed that at the micro level, household borrowing raised imports. In this study, marginal propensity to import is used as a proxy for import considering that as the income level of a country improves, such could lead to higher tendency to import. The motivation for carrying out this study in the WAMZ is that the success of a monetary union is hinged on among other factors; fiscal sustainability which is paramount to avoid adverse spill-over effects that could spread from one member country to another. Secondly, debt overhang could result from the acquisition of large and unsustainable debts, undermining the ability of central banks to address the problem of price instability in member countries (Penzin & Akanegbu, 2024). The outcomes are expected to strengthen the policies on the application of external debt in the selected countries. Consequently, regional development is enhanced through a judicious use of external debt. The rest of the paper is divided into the following sections. The related literature is presented in Section 2. The methodology is handled in Section 3. Section 4 empirically examines the role of external debt accumulation in influencing the marginal propensity to import. Section 5 presents the conclusions and policy implications.

1.1 Some stylized facts on the WAMZ

The West African Monetary Zone (WAMZ) was initiated in 2000, following the Accra Declaration. Originally it was a five-member bloc within the Economic Community of West African States (ECOWAS) that teamed up to achieve common economic and monetary integration. However, currently it comprises six countries including The Gambia, Ghana, Guinea, Liberia, Nigeria, and Sierra Leone. Among its specific objectives are the achievement of price stability, exchange rate stability and observing fiscal discipline. Over the years, the WAMZ member countries have been grappling with external debt burden. In order to address this menace, some measures have been initiated by the creditors. For instance, the Paris Club, London Club and other creditor institutions designed and implemented some measures such as debt restructuring, debt swaps and debt rescheduling to facilitate debt repayment. In addition, in 1996 both the International Monetary Fund (IMF) and the World Bank inaugurated the Heavily Indebted Poor Countries (HIPCs) initiative aimed at among others; terminating unsustainable debt and reducing debt burden confronting the world's poor economies (Kalu et al., 2017). Despite these laudable initiatives, the WAMZ member countries are still enmeshed in debt overhang.

Nigeria, which is the largest economy in the WAMZ, has a large deposit of fossil fuels that is enough to reduce the poverty rate in the country. Despite such vast wealth, the country still grapples with decades of poverty and unemployment. Revenues accruing from the sale of crude oil and gas are yet to stop successive regimes in the country from accumulating foreign debt. In 2005, the Paris Club of lenders had an understanding with Nigeria in which a huge amount of its bilateral foreign debt was cancelled. Notwithstanding this gesture, the country after a few years to the debt cancellation, acquired more external debts even when such has not improved the citizens' standard of living (Mqolombeni et al., 2023). In another respect, the Ghanaian economy has potentials in the export of digital technology goods, manufacturing and the export of other resources that have improved its GDP in recent times. To enhance its debt service obligation, the Ghanaian government improved its tax drive even though such has had adverse impact on investment owing to the problem of multiple tax rate (Musibau et al., 2018).

External debt profile in The Gambia has been on the increase over the years. Even when the country was offered the HIPC initiative, its external debt stock only declined marginally. According to Mqolombeni et al. (2023), external debt stock in The Gambia is comprised mainly of Middle East creditors. For Sierra Leone, the bulk of its external debt is dominated by multilateral debt after obtaining debt relief in 2006. As observed by Hassan and Meyer (2021), this is followed by commercial loans and bilateral loans. In a similar vein, multilateral debt dominated Guinea's external debt stock. Hassan and Meyer (2021) noted that between 2006 and 2010, Guinea's multilateral debt share increased but both the bilateral and commercial debts declined. Furthermore, multilateral debt dominated the total debt stock of Liberia followed by bilateral loans. Ehikioya et al. (2020) observed that between 2004 and 2015, the share of multilateral debt was 51.1 percent as against 37.8 percent reported for bilateral debt.

In recent times, sustained rise in external debt accumulation in the WAMZ countries is a phenomenon that calls for practical solutions. Information displayed in Table 1 reveals that in all these countries, external debt per capita experienced consistent rise except in a few years when it declined for few of the countries. For instance, Nigeria's external debt per capita increased rapidly within the period covered except in 2016 when the debt declined. For Ghana, external debt per capita declined marginally in 2015 and also experienced a decline in 2017 and 2019. Gambia's external debt per capita profile within the study period was higher relative to other countries. In Guinea, external debt per capita was high in 2010 and 2011 but experienced a decline from 2012 and then continuously increased. However, while Liberia's external debt per capita increased consistently in all the years covered, Sierra Leone's external debt per capita only declined in 2022.

Table 1. External debt per capita movement in WAMZ countries

Year	Country					
	Nigeria	**Ghana**	**Gambia**	**Guinea**	**Liberia**	**Sierra Leone**
2010	181.102	1.752641	9283.483	315.9809	104.1931	144.6591
2011	206.2641	0.034332	10668.48	304.8529	107.2529	158.8576
2012	230.9718	0.839276	11226.01	124.3854	112.4613	196.6948
2013	243.8331	0.467635	13406.53	152.1079	119.8872	200.969
2014	260.1892	0.483973	13011.01	162.7294	150.7896	200.7132
2015	244.7058	0.425815	13878.1	175.6566	181.5646	213.0305
2016	231.8156	0.605086	15029.55	186.3197	201.9365	217.1291
2017	336.6625	0.478184	14194.13	195.5972	233.1049	228.311
2018	350.0979	0.608487	14553.64	206.6776	236.752	223.5298
2019	400.2612	0.823977	12981.31	274.8779	254.0983	230.6282
2020	420.7167	0.897335	15791.43	311.1454	287.348	256.1557
2021	451.3106	1.154325	16950.09	340.4954	355.96	291.0353
2022	471.7644	1.208674	16570.56	355.6458	359.0739	270.8893

Source: World Development Indicators.
Note: External debt is measured in Millions of Dollars, while population is measured as total population.

Table 2 indicates that marginal propensity to import for all the countries fluctuated within the sample period. For Nigeria, the trend was high in 2010 but declined afterwards only to rise in 2015. However, from 2017 through 2019 the trend was high but declined subsequently. The food importation ban put in place around 2012 led to fall importation and that could be responsible for the decline in the marginal propensity to import within these periods. The trend in marginal propensity to import for Gambia was high in 2011, 2012 and 2016 but declined in other years. From the results, it indicates that the country did not engage in massive importation within the study period. The same scenario played out in Ghana where the trend was high only in 2011 and 2018, respectively. In the same vein, Guinea's trend was relatively high only in 2019. In fact, the high negative value in 2014 and 2015 indicates that the country's import propensity was very low within the period. However, such cannot be said of Liberia and Sierra Leone where the trend was relatively high in most of the years sampled.

Table 2. Trend in marginal propensity to import in WAMZ countries

Year	Country					
	NIG	**GAMB**	**GHA**	**GUIN**	**LIB**	**SL**
2010	2.052949	-1.5097	1.776247	-44.8175	2.699738	6.178934
2011	-1.01251	11.06027	3.050077	1.374726	1.863649	0.031209
2012	-0.46788	3.213046	-0.00988	-1.01029	-0.2479	-0.38677
2013	1.205316	-1.80447	0.975591	0.445264	20.09149	11.87528
2014	1.207673	-1.00663	-0.5332	-68.8145	18.61767	1.515278
2015	2.162161	-0.96318	-0.10502	-29.4612	-5.15718	4.689208
2016	-1.07291	30.40616	1.884239	-1.06712	48.76666	-3.06081
2017	2.956537	1.954806	0.874433	-0.0987	1.830673	-0.35353
2018	2.907843	-0.95097	8.284039	0.277503	0.270664	-55.1893
2019	3.537604	0.3535	-3.52733	6.533854	-2.31409	54.84981
2020	-3.26454	0.471436	0.477988	-1.31424	2.421378	6.948562
2021	1.678031	1.648915	-0.57047	0.271368	0.911087	-1.32984
2022	0.835232	0.140228	-0.02688	1.979729	1.566345	0.967901

Source: World Development Indicators.
Note: MPI – marginal propensity to import is calculated as ΔImport/ΔGDP.

The trend in the reserves position of the WAMZ countries is shown in Table 3. As expected, there are fluctuations in the reserves across the countries sampled. Comparatively, Nigeria's reserves rose higher in most of the years with the highest rise occurring from 2016 through 2018. This is expected as the country is one of the biggest economies by GDP in the sub-Saharan African countries. Another country with relatively high reserves is the Gambia, whose reserves position was the highest in 2010,

2011, 2013, 2020 and thereafter. The trend in Ghana was relatively high in 2010, 2011 and 2014 through 2017, while that of Guinea was high in 2011, 2013, 2014 and some other years. Between 2020 and 2021, the trend in Sierra Leone was relatively high, such as in 2016 through 2019.

Table 3. Trend in reserves in WAMZ countries

Year	Country					
	NIG	GAMB	GHA	GUIN	LIB	SL
2010	4.377885	7.110878	4.251203	1.911914	2.641188	4.120102
2011	3.531842	6.403204	3.413395	4.017776	2.307069	1.943631
2012	5.193473	6.414045	2.895312	2.78333	2.477584	2.132934
2013	5.08562	6.343441	2.778361	3.130729	2.919542	2.360285
2014	3.924213	3.991872	3.167911	3.747164	2.483258	2.210976
2015	4.067693	3.111068	3.093103	2.731847	3.795759	2.958708
2016	6.169071	2.610665	3.200545	1.893319	4.331653	3.90831
2017	7.997765	3.436034	3.34415	2.711879	4.727281	3.859065
2018	6.052106	3.185419	2.723016	3.362173	2.875377	3.577779
2019	4.09643	4.614155	2.895625	3.660639	2.597914	3.335016
2020	5.604195	6.406761	3.298511	2.771509	2.743618	5.94778
2021	6.230227	10.01766	3.899616	3.245889	4.502291	5.71457
2022	4.659507	7.800571	1.971551	3.293624	3.436736	3.596621

Source: World Development Indicators.
Note: RESERV – Reserves measured as total reserves in months of imports.

2. Literature review

External debt accumulation has been noted to have correlation with a country's imports and this finds support in the Two-Gap model. The Two-Gap model, as postulated by Chenery and Strout (1966) suggests that developing countries are often faced with a savings gap and foreign exchange gap. Consequently, external debt can assist in bridging these gaps by providing financing for imports required for investment and growth. By securing external debt, a country's income level is improved which stimulates imports. However, worthy of note is that excessive debt could result in debt overhang, where future investment and the growth of the country could be stifled by debt burden; adversely impacting on import capacity. If funds borrowed are productively used to improve export capacity, a country's ability to service its debt can be possible which could reduce the reliance on further debt accumulation.

In another vein, the debt overhang theory as put forward by Krugman in 1988 discusses a situation where a country's accumulated debt is larger than the capacity of the country to repay it. Chindengwike (2022) opines that debt overhang is a situation that occurs when the projected repayment of external debt is less than the value of the accumulated debt. If the external debt of a country exceeds its capacity to repay, the expected debt service eats deep into the debtor country's output. The implication of the theory is that due to the high marginal taxes imposed by foreign creditors, external debt accumulation can adversely affect investment, leading to a decline in growth (Adeve & Karabou, 2022; Nambie & Donkor, 2022). Equally, Saungweme and Odhiambo (2021) noted that owing to the obligations to service accumulated debts, projects meant for development may be abandoned because foreign exchange earnings may be geared towards debts repayment. Arising from these theories is the fact that much as external debt accumulation could enhance growth when used judiciously, it can also retard development if channelled improperly.

The literature has shown that some studies have supported the pro-growth hypothesis of external debt accumulation which is encapsulated in the Two-Gap model. Among them is the study by Agyapong and Bedjabeng (2020) which observed that in Africa, external debt enhanced both foreign direct investment (FDI) inflows and financial development. Equally, in a study that comprises ten African countries, namely: Cameroon, Zambia, South Africa, Lesotho, Ethiopia, Ghana, Burundi, Côte d'Ivoire, Botswana and Mauritius, finding by Mohammed (2025) reveals the existence of a correlation

between external debt and economic growth. This is further supported by a study in Nigeria by Umoh (2025) which found that external debt has a significant positive impact on real GDP.

However, a preponderance of studies has supported the debt overhang theory by indicating that external debt accumulation retards growth. In their study in 48 sub-Saharan African countries, Asafo, Matuka and Dominic (2019) revealed that external debt has an adverse effect on the growth of the economy. This finds support in a study by Ehikioya et al. (2020) which revealed that high accumulation of external debt impeded Africa's growth. Further support was found in the result of the study by Safdar, Liaquat and Bibi (2021) which revealed the harmful effect of external debt to the Pakistani GDP. In 201 economies, Le and Phan (2022) found that external debt retarded the growth of the economy which is supported by the finding of a study in selected sub-Saharan African countries in which Agyeman et al. (2022) observed that external debt adversely impacted on growth through high incidence of capital flight.

Another study done in sub-Saharan African countries by Isubalew et al. (2023) indicated that external debt retarded the growth of the economy in a significant way. From another perspective, Asue and Ikyaator (2023) observed that in Nigeria, servicing external debt resulted in exchange rate depreciation and an increase in inflation. Furthermore, Osuma and Nzimande (2024) revealed that in sub-Saharan Africa, external debt accumulation hampered long-term development projects. Compared to domestic debt, Nguepi et al. (2024) revealed that in Cameroon external debt did not contribute to GDP growth. This finds support in a study in emerging countries by Elkhalfi et al. (2024) which showed that rising external debt accumulation encouraged growth at first, but subsequent increase in debt acquisition impacted economic growth adversely. The negative impact of external debt servicing on economic growth finds empirical support in a study by Aladejare and Musa (2024).

Past research is replete with an investigation into the direct impact of external debt on economic growth with limited interest on the role of external debt in stimulating the appetite for importation. This leaves a huge literature gap. Among the arguments of the Two-Gap theory is that external debt has the tendency to provide financing for imports necessary for investment and growth. Even though the argument is on a positive angle, the adverse impact of an increase in import on a country's balance of payments (BoPs) should not be ruled out. This is more so, if the imported items are not tied to productivity, but mainly consumer goods which is often the case in most developing countries. Channeling procured debts to areas other than engaging them in productive ventures is among the reasons for debt overhang mainly in developing countries. The argument of the Two-Gap theory implies that external debt can be linked to imports and this possibility needs to be investigated for effective policy actions in the WAMZ member countries and other developing countries that face similar economic structure.

3. Methodology and data

In this study, a five-variable VAR model was used which comprised the marginal propensity to import, external debt per capita, exchange rate, reserves and trade openness. Marginal propensity to import is chosen because it captures the increase in import as income increases. Since external debt accumulation entails an increase in income, it is expected that as it increases, import could also improve. This proxy has been used by past studies (Marks, 2017; Nzeh et al., 2024). The study chose external debt per capita instead of external debt in nominal form in order to ease comparison across the different countries. Even though most studies employed external debt to GDP, external debt per capita provides a useful insight into an individual country's debt burden. The study included exchange rate since both import and external debt accumulation involve exchange rate. In a similar manner, reserve is included since external debt inflows improves a country's reserves and also for the fact that importation is facilitated by the reserve position. Trade openness is included because importation can only be facilitated if a country's economy is open to the outside world. The rationale for using the VAR method is predicated on the fact that it facilitates the treatment of every variable in the model as endogenous in a way that possible feedback arising from one variable and the other can be captured.

The following VAR specification guided the study:

$$y_{it} = \lambda + \sum_{i-1}^{k} \phi y_{it-1} + \varepsilon_{it} \quad (1)$$

Where: y_t = $(5x1)$ vector of endogenous variables, λ = $(5x1)$ vector of intercept terms, ϕ = coefficient matrix, ε_t = white noise and k = lag order. Since the series exhibited a long-run relationship, the following VECM is specified:

$$\begin{bmatrix} \Delta MPI_{it} \\ \Delta EXTDPC_{it} \\ \Delta EXCHR_{it} \\ \Delta RESERVF_{it} \\ \Delta TOPEN_{it} \end{bmatrix} = \begin{bmatrix} \pi_1 \\ \pi_2 \\ \pi_3 \\ \pi_4 \\ \pi_5 \end{bmatrix} + \begin{bmatrix} \Pi_{1,1} & \Pi_{1,2} & \Pi_{1,3} & \Pi_{1,4} & \Pi_{1,5} \\ \Pi_{2,1} & \Pi_{2,2} & \Pi_{2,3} & \Pi_{2,4} & \Pi_{2,5} \\ \Pi_{3,1} & \Pi_{3,2} & \Pi_{3,3} & \Pi_{3,4} & \Pi_{3,5} \\ \Pi_{4,1} & \Pi_{4,2} & \Pi_{4,3} & \Pi_{4,4} & \Pi_{4,5} \\ \Pi_{5,1} & \Pi_{5,2} & \Pi_{5,3} & \Pi_{5,4} & \Pi_{5,5} \end{bmatrix} \begin{bmatrix} \Delta MPI_{it-1} \\ \Delta EXTDPC_{it-1} \\ \Delta EXCHR_{it-1} \\ \Delta RESERV_{it-1} \\ \Delta TOPEN_{it-1} \end{bmatrix} + \begin{bmatrix} \delta_1 \\ \delta_2 \\ \delta_3 \\ \delta_4 \\ \delta_5 \end{bmatrix} x\left(ECT_{it-1}\right) + \quad (2)$$

$$\begin{bmatrix} \varepsilon_{1it} \\ \varepsilon_{2it} \\ \varepsilon_{3it} \\ \varepsilon_{4it} \\ \varepsilon_{5it} \end{bmatrix}.$$

where: Δ = first difference operator, ECT_{t-1} = one period lag of the error correction term, $\Pi_{ij}s$ = coefficients of the short-run and ε_{1ts} are the error terms assumed to have normal distribution.

In order to provide robust results, some preliminary tests were conducted to ascertain the behaviour of the variables included in the model. These tests include cross-sectional dependence (CDS), Descriptive statistics, stationarity, correlation matrix and cointegration tests. Stationarity test was conducted using some panel unit root tests such as Levin, Lin and Chu (LLC) test (Levin et al., 2002) which accounts for common unit root. However, for individual unit root, the study used the augmented Dickey-Fuller test (ADF) (Dickey & Fuller, 1981) and the Im, Pesaran and Shin (IPS) test (Im et al., 2003). Since all the series were not stationary at level, a test for stationarity at first difference was conducted. The fact that the stationarity results indicated that the series had an admixture of order of integration led to an examination of the existence of co-integration using the Pedroni residual panel cointegration test. Having established the existence of cointegration, the vector error correction model (VECM) was specified. The stability of the VECM was examined using the inverse roots of the autoregressive characteristic polynomial just as a serial correlation test was conducted to ensure that the errors do not suffer from autocorrelation.

From the VECM, the dynamic behaviour of the marginal propensity to import resulting from an unanticipated shock in the external debt accumulation was examined using the impulse response function. The impulse response function shows the evolution of a variable over a time period arising from a shock in another variable. It is the response of a particular variable in the model as a result of one-unit structural shock to another variable. To provide further support for the link between the marginal propensity to import and external debt accumulation, the variance decomposition was used. The variance decomposition shows the part of information contributed by each variable in the model in explaining the changes in other variables.

This study used an annual dataset that spanned the period from 1982-2022 to examine the role of external debt accumulation in influencing importation in the WAMZ countries with the choice of the

sample period influenced by data availability in the selected countries. Table 4 displays the data sources and their measurement.

Table 4. Data sources and measurement

Variable	Abbreviation	Measurement	Sources
Marginal propensity to import	MPI	$\frac{\Delta IMPT}{\Delta GDP}$ where: IMPT = Import, Δ denotes change	WDI
External debt per capita	EXTDPC	$\frac{EXTD}{POP}$ where POP = population	WDI
Exchange rate	EXCHR	Official exchange rate in local currency unit (LCU) per US Dollars	WDI
Reserves	RESERV	Total reserves in months of imports	WDI
Trade openness	TOPEN	$\frac{Export + \text{Im}\, port}{GDP}$	WDI

Source: Author's compilation.
Note: the GDP, export and import used in calculating both the marginal propensity to import and trade openness were measured in constant 2015 US Dollars for all the countries. Also note that POP. – Population measured as total population

4. Research results and comments

To avoid biased and inefficient estimates of the parameters, the study conducted the cross-sectional dependence (CD) test using the Pesaran CD test. In cross-sectional analysis, it is proper to test for the existence of possible dependence of certain common attributes among the entities. Under the null hypothesis that there is no cross-section dependence, result in Table 5 reveals that the study does not have any reason to reject the null hypothesis. This is because the p-value is greater than the 5% level of significance. Consequently, it is concluded that there is no existence of cross-section dependence.

Table 5. Residual cross-section dependence test

Test	Statistic	Prob.
Pesaran CD	1.41	0.16

The results of the descriptive statistics in Table 6 indicate that while the marginal propensity to import has low mean, external debt per capita has relatively high mean. Also, for all the variables; their mean and median are very close, suggesting the existence of symmetry. Given that marginal propensity to import has a very high range, it indicates that it exhibits high volatility within the study period and the same goes to exchange rate and reserves. In particular, the high value of range and kurtosis for the MPI is because the variable varies significantly and contains extreme observations that influence the distribution of its shape. However, trade openness was found to show low volatility given that it has a low range. With the exception of reserves which are positively skewed, other variables are negatively skewed. All the variables are heavy-tailed since their kurtosis has positive signs.

Table 6. Descriptive statistics

	MPI	EXTDPC	EXCHR	RESERV	TOPEN
Mean	-0.28	5.31	2.76	3.30	1.84
Median	0.66	5.68	3.12	2.90	1.87
Maximum	85.91	9.73	9.18	19.20	1.98
Minimum	54.84	3.37	8.19	0.14	1.44
Std. Dev.	12.26	2.65	3.41	2.73	0.11

	MPI	**EXTDPC**	**EXCHR**	**RESERV**	**TOPEN**
Skewness	-3.02	-0.98	-0.48	2.47	-2.28
Kurtosis	24.05	3.54	3.47	12.77	7.41
Jarque-Bera	4879.83	42.56	11.98	1219.7	411.37
Probability	0.00	0.00	0.002	0.00	0.00
Sum	-70.27	1295.85	674.07	806.36	449.75
Sum Sq. Dev.	36558.07	1714.76	2841.4	1817.88	3.10
Observations	244	244	244	244	244

The aim of the correlation matrix test is to examine the degree of correlation among the series. In Table 7, the result indicates that a relatively weak and negative correlation exists between marginal propensity to import and external debt per capita. Also, both exchange rate and trade openness are found to have weak and negative correlation with the marginal propensity to import, while the correlation between the marginal propensity to import and reserves is positive and weak. The correlation among the explanatory variables is also shown to be weak. It should be noted that the weak correlation among the explanatory variables is a sign that there is an absence of multicolinearity. If there is a presence of multicolinearity, it suggests that it is going to be impossible to disentangle the effect of each explanatory variable on the dependent variable.

Table 7. Correlation matrix

	MPI	EXTDPC	EXCHR	RESERV	TOPEN
MPI	1	0.02	-0.13	0.004	0.03
REXTD	0.02	1	-0.12	-0.04	0.16
EXCHR	-0.13	-0.12	1	-0.07	0.14
RESERV	0.004	-0.04	-0.07	1	0.03
TOPEN	0.03	0.16	0.14	0.03	1

The stationarity test was conducted to assist in identifying the order of integration of the series. In Table 8, it is revealed that at level, only the marginal propensity to import achieved stationarity (have no unit root), while others have unit root. That is, the marginal propensity to import became *1(0)* at level. After differencing however, all the series achieved stationarity; that is they all became *I(1).*

Table 8. Panel unit root

	LCC		IPS		ADF – Fisher		Order of integration
Variable	Level	First Diff.	Level	First Diff.	Level	First Diff.	
MPI	-6.06	-20.82	-10.44	-21.83	-8.97	-12.75	*I(0)*
EXTDPC	0.63	-6.99	-0.18	-7.66	-0.26	-7.09	*I(1)*
EXCHR	3.50	-1.28	10.00	-1.45	9.11	-1.43	*I(1)*
RESERV	-0.52	-10.64	-2.60	-8.06	-2.61	-7.56	*I(0)*
TOPEN	-1.06	-2.90	-0.93	-6.91	-0.81	-6.63	*I(1)*

Having found that the series have a mixture of order of integration, the Pedroni panel cointegration test was used to examine the long-run relationship. In Table 9, it is shown that at the 5% level, both the panel PP-statistics and panel ADF-statistics are statistically significant for both within group and between group. The results indicate that a long-run relationship exists among the series.

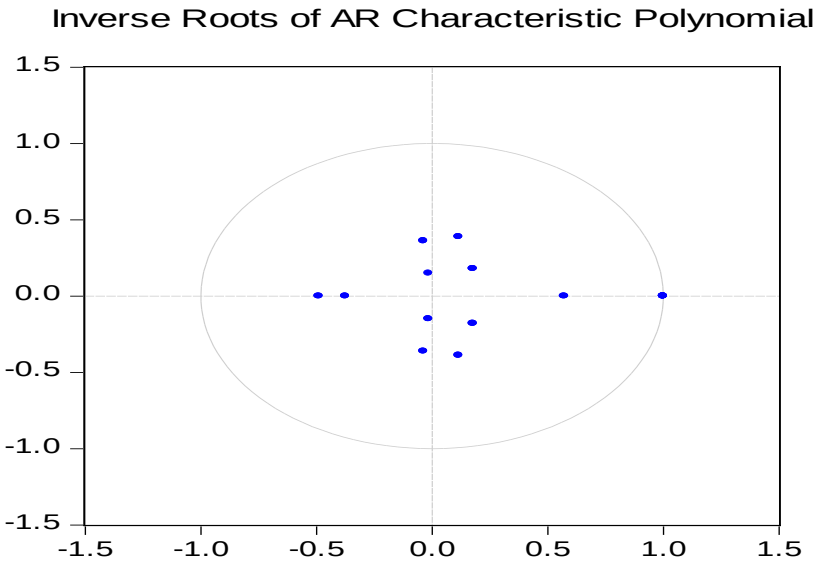
Table 9. Pedroni residual panel cointegration test

	t-statistics	**Prob.**
within group		
Panel v-Statistic	-0.85	0.80
Panel rho-Statistic	-4.81	0.00
Panel PP-Statistic	-15.52	0.00

	t-statistics	**Prob.**
Panel ADF-Statistic	-8.15	0.00
between group		
Group rho-Statistic	-5.15	0.00
Group PP-Statistic	-23.99	0.00
Group ADF-Statistic	-8.65	0.00

The stability of the VEC is very paramount because if it is not so, the reliability of the model will be in doubt. It is against this backdrop that the study conducted the VEC stability test. Evidence in Figure 1 indicates that one of the roots of the characteristic equation of the matrix lies on the unit circle. This indicates the presence of a unit root. It indicates that any shock affecting the system exerts a permanent effect. However, we have been able to take a corrective measure to cushion the effect of this by transforming the stationary processing through first differencing. In the unit root test, we differenced the series to make them stationary.

Figure 1. VEC stability test



To investigate if the VEC residual is serially correlated, the VEC residual serial correlation LM test was conducted. Under the null hypothesis that the residual is not serially correlated, the study did not find any reason to reject the null at the 5% level. This is because in all the lags as shown in Table 10, the p-value is greater than 5% level of significance. Consequently, the study concludes that there is no serial correlation in the VEC residuals.

Table 10. VEC residual serial correlation LM test

Lags	**LM-Stat**	**Prob**
1	18.08	0.83
2	12.38	0.98
3	27.22	0.34

The results of the impulse response function in Appendix i which is replicated in graphical form in Appendix ii indicate that marginal propensity to import responded positively to external debt per capita up to period five but from period six till the last period the response was negative with the exception of period seven when the response was positive. The fact that marginal propensity to import responded positively to external debt accumulation within the period is a sign that in the WAMZ economic bloc, debt accumulation encouraged importation within such study period. This is possible considering that external debt accumulation increases the income level which suggests that it has the tendency to stimulate imports. At the micro level, this result finds empirical support in the study by Xu

et al. (2023) which reported that debt accumulation stimulated household importation. The negative response of marginal propensity to import to shock in external debt per capita indicates the angle where increased external debt results into a fall in importation. One plausible reason for this could be due to the policy interventions of some member countries in regard to foreign exchange. Often times, the creditor institutions advise the debtor countries to embark on currency devaluation to enable them to pay the debts. Such a policy, if implemented, weakens the domestic currency, thus making imports to be expensive. From another perspective, increased importation from improved income could get to the point where the resulting domestic currency depreciation could impede further importation as imports become expensive.

Since the WAMZ countries, just like many developing countries, often face huge debt burden and without much noticeable achievements to show for decades of external debt accumulation, it can safely be argued that the result of our finding supports the debt overhang theory. As observed by N'Zue (2020), debt overhang coupled with other uncertainties retard investment and development, leading to shortages of essential imports which depresses real output. Importation per se is not the issue because if the debt is procured to finance development projects, some inputs needed for the execution of the projects need to be imported. Therefore, if the importation is tailored towards items tied to projects that contribute to the growth of the economy, importation from debt accumulation should be encouraged. The situation is worrisome if it is considered that high volume of importation leads to domestic currency depreciation and the possible displacement of domestic production as well as unfavourable balance of payments. In the WAMZ countries just like in many other developing countries, it has been variously argued that proceeds from external debts are mainly diverted to uses other than development projects which call for a serious concern as it accounts for part of the reasons for high debt burden.

It is found that marginal propensity to import responded positively to exchange rate only in periods one and two but afterward the response became negative till the last period. The result indicates that in periods one and two, the depreciation of exchange rate led to an increase in the marginal propensity to import which does not support popular apriori expectation. In countries where there is no existing policy framework to regulate prices, businessmen often take advantage of such lacuna to increase the prices of their commodities. So, in times of exchange rate depreciation when prices of imported items are high, importers usually seize the opportunity to raise the prices of imported items and that could be a plausible reason for the positive response of the marginal propensity to import to exchange rate depreciation. The urge to make quick profit during such a period is the likely reason for increased importation. To support this argument, information in Appendix iv indicates that the exchange rate of all the member countries of the economic bloc has been depreciating consistently over the period covered.

In another vein, findings show that the marginal propensity to import responded positively to reserves in periods one and four but negative in other periods. While the positive response is in line with a priori expectation, since imports are executed from reserves, what the study finds curious is the negative response of import to reserves. In all the periods, marginal propensity to import was found to respond positively to trade openness. These results are in line with popular theoretical expectation as the opening of a country's borders encourages international trade. The WAMZ countries are all import-dependent and as such it is not surprising to observe that they import more as they open their borders. However, this comes with its own cost implications, one of which is that their terms of trade are bound to continuously deteriorate, since they often export primary commodities, which are less competitive compared to the manufactured goods they import. Equally, by importing more, the exchange rate in these countries will continue to depreciate in relation to the currency of their trading partners, thus posing problems for monetary policy management. This can be observed from the negative response of the exchange rate to the marginal propensity to import in all the periods. Another revealing finding is the negative response of exchange rate to shocks in external debt per capita in all the periods. The negative response is an indication of the currency appreciation impact of external debt accumulation.

To provide further support for the influence of external debt and other explanatory variables on the marginal propensity to import, the results of the variance decomposition in Appendix iii reveal that apart from shock to itself which was 100% in period one, shock to external debt per capita explained about 1.68 % of shocks to marginal propensity to import in period two which declined to 0.13% in

periods three and four and then consistently roll to 0.14% up till the last quarter. Findings equally show that shock to other explanatory variables resulted in sustained increase in the shock to the marginal propensity to import in all the periods.

5. Conclusion

The growth of external debt among the member countries of WAMZ and the consequences of the rising debt accumulation in particular on the propensity to import is an area that has not received adequate research attention. This study therefore sought to contribute to literature by examining the response of the marginal propensity to import to the accumulation of external debt in the WAMZ bloc. To achieve the objective, the study used both the impulse response function and the variance decomposition frameworks.

Findings of the study indicate that in period one through period five, marginal propensity to import responded positively to the accumulation of external debt within the study period and the result has some implications for policy in the WAMZ bloc. In a nutshell, the result implies that as these countries accumulate external debt, the hunger to import more increases and such imports come with their peculiar problems. Considering that by nature, the countries comprising this economic bloc are import-dependent even when they export mainly primary products whose export prices are price elastic, it means that their terms of trade are bound to deteriorate more as they acquire more foreign debts. Consequently, the domestic currency of these countries will continue to depreciate, resulting in repayment difficulties as the debts are paid back in foreign currency. This phenomenon is among the reasons for the debt overhang in developing countries. If the proceeds from these debts are used to import productive inputs that will assist in improving the economy, that is commendable. However, in most cases frivolous items are imported into these countries which drain the already scarce foreign reserves. The aftermath of this scenario is that exiting from the debt trap will be a herculean task if the countries in the bloc continue to use proceeds from external debt to feed their appetite for foreign commodities at the expense of using them to improve their economies.

This study is limited by its inability to provide empirical evidence on the percentage of imports from both the private sector and the public sector which would have revealed the extent to which public funds in particular are spent on importation. Since the study involves a cross-country analysis, lumping all the countries in the bloc together does not provide evidence of the countries that spend more on importation as they accumulate external debt and this is equally another limitation of the study. It is therefore suggested that future studies should focus on these limitations in order to deepen the discussion on this topic.

From the foregoing, it is recommended that even though debt accumulation is among the sources of obtaining funds to complement domestic resources, such funds should not be spent on importing frivolous items. Importation should be tailored to items that contribute meaningfully to growth to enable quick repayments of the debts. Proceeds from external debt accumulation should be used to encourage the importation of inputs for agriculture and manufacturing which are the sectors that serve as the bedrock of the economy. Diversification of the economy of the member countries remains vital, especially the oil producing countries such as Nigeria and Ghana whose economy is mainly tied to the oil sector.

***Authors' contribution**: Introduction, I.C.N.; Literature review, O.G. O; Methodology and data, I.C.N. & I.J.O.; Research results and comments, C.G. O.; Conclusion, K. J.*

References

Adeve, K. A., & Karabou, E. F. (2022.) Public debt and development sustainability issues in the West African Economic and Monetary Union (WAEMU). *Cogent Economics and Finance*, 10 (1), 1-13.

Agyapong, D., & Bedjabeng, K. A. (2020). External debt stock, foreign direct investment and financial development: Evidence from African economies. *Journal of Asian Business and Economic Studies*, 27(1), 81–98.

Agyeman, D., Sakyi, S., & Oteng-Abayie, E. F. (2022). External debt and economic growth in selected sub-Saharan African countries: The role of capital flight. *Research in Globalization*, 5, 100091. https://doi.org/10.1016/j.resglo.2022.100091.

Aladejare, S. A., & Musa, M. A. (2024). Impact of external debt servicing and sustainability on the Nigerian economy. *Journal of Business and Economic Studies,* 1(5), 1-9. doi.org/10.61440/JBES.2024.v1.38.

Asafo, S. S., Matuka, A.& Dominic, N. (2019). External debt and economic growth: Two-step system GMM evidence for Sub-Saharan Africa countries. *International Journal of Business, Economics and Management*, 6 (1), 39-48.

Asue, E. A, & Ikyaator, J. V. (2023). External debt pass-through to inflation in Nigeria. *CBN Journal of Applied Statistics (JAS)*, 14(2). https://dc.cbn.gov.ng/jas/vol14/iss2/5.

Bangura, M., Abidoye, R. B., & Adegoke, A, S. (2025). Examining the enhancers and reducers of external debt servicing capacity: Evidence from Sierra Leone. *African Journal of Economic and Management Studie*s. DOI 10.1108/AJEMS-10-2024-0607.

Chekouri, S. M., Chibi, A., & Benbouziane, M. (2024). Public debt dynamics and fiscal sustainability in selected North African countries: New evidence from recurrent explosive behavior tests and quantile unit root analysis. *Economic Change and Restructuring*, 57, 38.

Chenery, H. B., & Strout, A. M. (1966). Foreign assistance and economic development. *The American Economic Review*, 679-733.

Chindengwike, J. D. (2022). Does an external debt promote sustainable economic development in developing countries? *Journal of Global Economy*, 18 (1), 53-66.

Dickey, B., & Fuller, W. A. (1981). Likelihood ratio statistics for autoregressive time series with a unit root. *Journal of Econometric Society, 49*(4), 1057-1072. https://doi.org/10.2307/1912517.

Ehikioya B. I., Omankhanlen A. E., Osuma, G. O., & Inua, O. I. (2020). Dynamic relations between public external debt and economic growth in African countries: A curse or blessing? *Journal of Open Innovation: Technology, Market, and Complexity*, 6 (88), 1-16.

Elkhalfi, O., Chaabita, R., Benboubker, M., Ghoujdam, M., Zahraoui, K., El Alaoui, H., Laalam, S., Belhaj, I., & Hammouch, H. (2024), The impact of external debt on economic growth: The case of emerging countries. *Research in Globalization*, 9, 1-10.

Hassan, A. S., & Meyer, D. F. (2021). Non-linear effect of external debt on economic growth: Evidence from sub-Saharan African countries. *International Journal of Economics and Management*, 14 (3), 447-460.

Im, K. S., Pesaran, M. H, & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of Econometrics*, 115(1), 53-74. https://doi.org/10.1016/S0304-4076(03)00092-7.

Isubalew, D., Demissie, W. M., & Sore, A. G. (2023). Effect of external debt on economic growth in sub-Saharan Africa: System GMM estimation. *Cogent Economics and Finance*, 11, 2256197.

Kalu, E. U., Igwe, A., Okoyeuzu, C., & Ukpere, W. I. (2017). High indebtedness, economic development and poverty: A focus on highly indebted poor countries. *International Journal of Economic Perspectives*, 11 (4), 26-35.

Le, T. H. & Phan, L. T. (2022). Examining the non-linear impact of external debt on economic convergence. *Journal of Economic Integration*, 37(3), 377-422.

Levin, A., Lin, C. F., & Chu, C. S. J. (2002). Unit root tests in panel data: Asymptotic and finite-sample properties. *Journal of Econometrics, 108*(1), 1-24. https://doi.org/10.1016/S0304-4076(01)00098-7.

Marks, A. (2017). The marginal propensity to import in China and the composition of Australia's exports: Some interesting revelations. *Modern Economy*, 8(7). Doi:10.4236//me.2017.87063.

Mishkin, F. S. (1996). The channels of monetary transmission: Lessons for monetary policy. National Bureau of Economic Research (NBER) Working Paper.

Mohammed, K. (2025). The effect of external debt on economic growth: Evidence from 10 African countries. *Human settlements and sustainability*, 1(1), 41-49.

Mqolombeni, N., Tewari, D. D., & Ilesanmi, K. D. (2023). Exploring the role of high government debt on economic growth: A nonlinearity and threshold analysis for Africa's developing countries. *Economies*, 11 (51), 1-15.

Musibau, H. O., Mahmood, S., Ismail, S., Shamsuddin Z., & Rashid, N. (2018). Does external debt cause economic growth? An experience from ECOWAS member countries, *International Journal of Academic Research in Business and Social Sciences*, 8(11), 1256-1264.

Nambie, N. B., & Donkor, M. J. (2022). External debt, exchange rate and inflation in Africa, a moderating role of governance quality. *International Journal of Economics, Commerce and Management, United Kingdom.* 10 (7), 80-98.

Nguepi, N. D., Ngouhouo, I., & Bilan, I**.** (2024). Foreign or domestic public debt for Cameroon's development? An externality approach. *Sustainability*, 16, 7169. https:// doi.org/10.3390/su16167169.

Nzeh, I. C., Okoli, U.V., Okolie, D. O. & Okolie, J. I. (2024). Marginal propensity to import and terms of trade: Panel Granger causality Evidence from the East African Community (EAC). *Economic and Regional Studies*, 17(2), https://doi.org/10.2478/ers-2024.

N'Zue, F. F. (2020). Is external debt hampering growth in the ECOWAS region? *International Journal of Economics and Finance*; 12 (4), 54-66.

Osuma, G., & Nzimande, N. P. (2024). Exploring the dynamic link between trade openness, external debt, and economic growth in sub-Saharan Africa: Challenges and considerations. *Economies, 12*(11), 283. https://doi.org/10.3390/economies12110283

Penzin, D. J., & Akanegbu, B. N. (2024). Public debt and economic growth in the West African monetary zone (WAMZ). *Scientific African*, 24, e02200. https://doi.org/10.1016/j.sciaf.2024.e02200.

Romer, P. M. (1990). Endogenous technological change. *Journal of Political Economics*, 98(2), 71–102.

Safdar, N., Liaquat, M., & Bibi, S. (2021). Role of external debt and trade deficit in economic performance of Pakistan. *Annals of Social Sciences and Perspective,* 2(1), 1-13.

Saungweme, T., & Odhiambo, N. M. (2021). Public debt service in South Africa and its impact on economic growth: An empirical test. *The Review of Black Political Economy*, 48(3), 313- 327.

Stiglitz, J. E. (2017). *Globalization and its discontents revisited: Anti-globalization in the era of TRUMP*. WW Norton & Company: New York, NY, USA.

Umoh, E. B. (2025). An empirical analysis of the impact of external debt on economic development in Nigeria: Insights and policy lessons for African countries. https://ssrn.com/abstract=5203254 or http://dx.doi.org/10.2139/ssrn.5203254

Xu, C., Jan., P. A., & de Haan, J. (2023). Does household borrowing reduce the trade balance? Evidence from developing and developed countries. *Open Economies Review*, 34, 759. https://doi.org/10.1007/s11079-023-09713-w.

Zanna, L. F., Buffie, E. F., Portillo, R., Berg, A., & Pattillo, C. (2019**).** Borrowing for growth: Big pushes and debt sustainability in low-income countries. *World Bank Economic Review*, 33, 661–689.

Appendix i. Results impulse response function (in rable form)

Response of MPI					
Period	**MPI**	**EXTDPC**	**EXCHR**	**RESERV**	**TOPEN**
1	10.80	0.00	0.00	0.00	0.00
2	-0.45	0.004	0.15	-0.88	0.80
3	-0.48	0.39	-0.46	-0.09	0.45
4	-0.46	0.07	-0.23	0.069	0.20
5	0.23	0.08	-0.13	-0.05	0.14
6	0.10	-0.017	-0.10	-0.10	0.16
7	0.07	0.009	-0.12	-0.08	0.19
8	0.04	-0.02	-0.12	-0.07	0.19
9	0.05	-0.013	-0.12	-0.07	0.18
10	0.05	-0.02	-0.12	-0.07	0.18

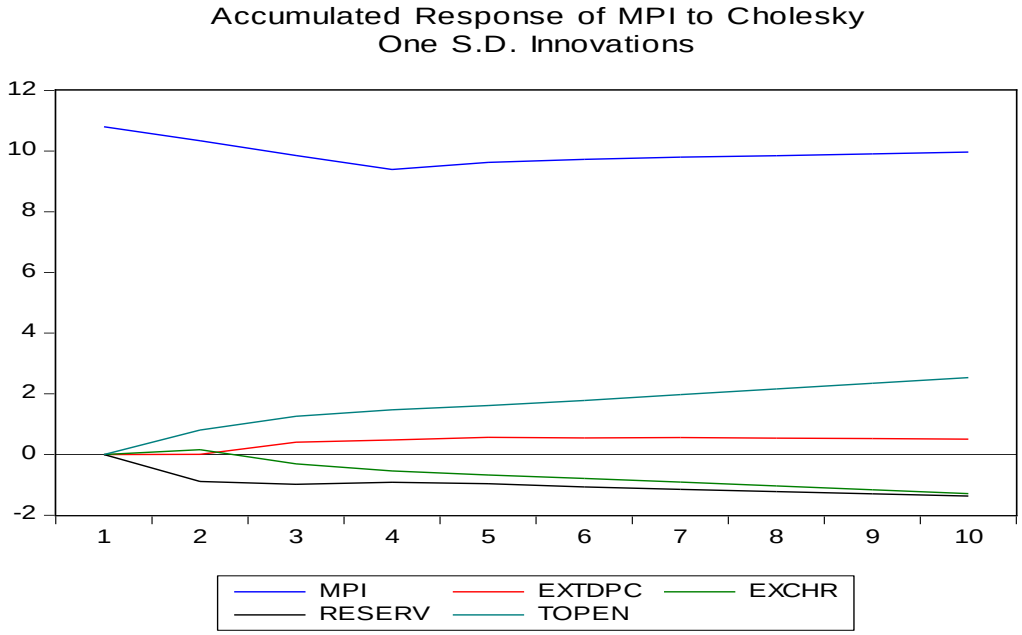
Response of REXTD					
Period	**MPI**	**EXTDPC**	**EXCHR**	**RESERV**	**TOPEN**
1	6.87	394.48	0.00	0.00	0.00
2	4.76	427.98	-7.28	0.62	-0.65
3	18.96	536.86	-16.96	-9.56	-4.99
4	20.76	555.37	-21.99	-10.21	-4.15
5	24.94	587.45	-24.91	-12.02	-3.38
6	24.84	595.42	-26.39	-12.49	-3.04
7	25.82	605.06	-27.44	-13.07	-3.00
8	25.95	608.09	-27.95	-13.20	-2.93
9	26.31	611.03	-28.27	-13.38	-2.90
10	26.37	612.13	-28.44	-13.45	-2.87

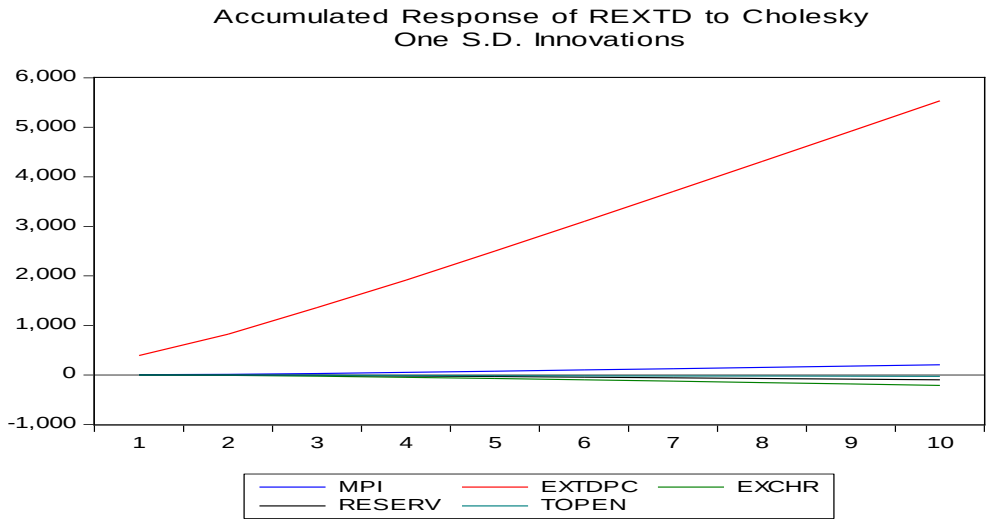
Response of EXCHR					
Period	**MPI**	**EXTDPC**	**EXCHR**	**RESERV**	**TOPEN**
1	-28.95	-4.23	201.25	0.00	0.00
2	-65.98	-9.73	258.33	5.28	-5.36
3	-86.11	-15.69	262.13	7.83	-16.86
4	-75.97	-20.35	260.57	8.85	-21.67
5	-70.75	-23.55	261.33	7.98	-21.77
6	-70.48	-24.83	261.67	7.53	-21.09
7	-71.68	-25.54	261.64	7.67	-20.82
8	-71.94	-25.89	261.60	7.83	-20.85
9	-71.87	-26.15	261.64	7.85	-20.91
10	-71.81	-26.29	261.67	7.84	-20.92

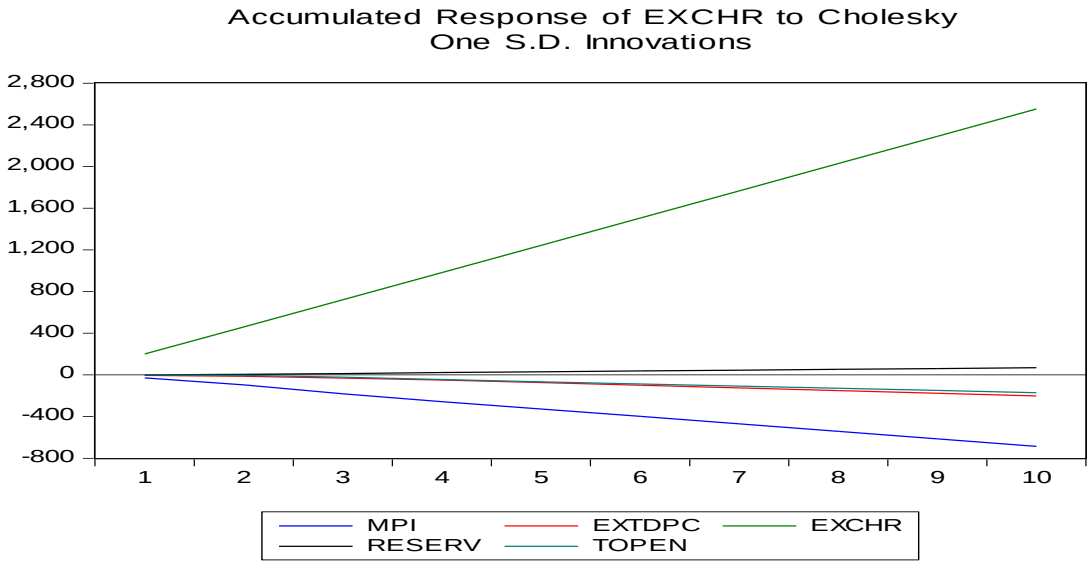
Response of RESERV					
Period	**MPI**	**EXTDPC**	**EXCHR**	**RESERV**	**TOPEN**
1	0.03	0.05	-0.09	1.84	0.00
2	0.12	0.02	-0.04	1.64	-0.04
3	0.08	-0.07	-0.10	1.42	-0.21
4	0.04	-0.07	-0.12	1.47	-0.18
5	0.05	-0.09	-0.11	1.50	-0.15
6	0.05	-0.10	-0.10	1.49	-0.16
7	0.05	-0.10	-0.10	1.49	-0.16
8	0.05	-0.10	-0.10	1.49	-0.16
9	0.05	-0.11	-0.10	1.49	-0.16
10	0.05	-0.11	-0.10	1.49	-0.16

Response of TOPEN					
Period	MPI	EXTDPC	EXCHR	RESERV	TOPEN
1	-8.12	-0.0004	0.004	-0.01	0.04
2	0.005	0.0002	0.006	-0.009	0.03
3	0.004	0.001	0.005	-0.008	0.04
4	0.005	0.002	0.004	-0.009	0.04
5	0.005	0.002	0.004	-0.009	0.04
6	0.005	0.002	0.004	-0.009	0.04
7	0.005	0.002	0.004	-0.009	0.04
8	0.005	0.002	0.004	-0.009	0.04
9	0.005	0.002	0.004	-0.009	0.04
10	0.005	0.002	0.004	-0.009	0.040

Appendix ii. Results of impulse response function (graphical form)






Accumulated Response of EXCHR to Cholesky
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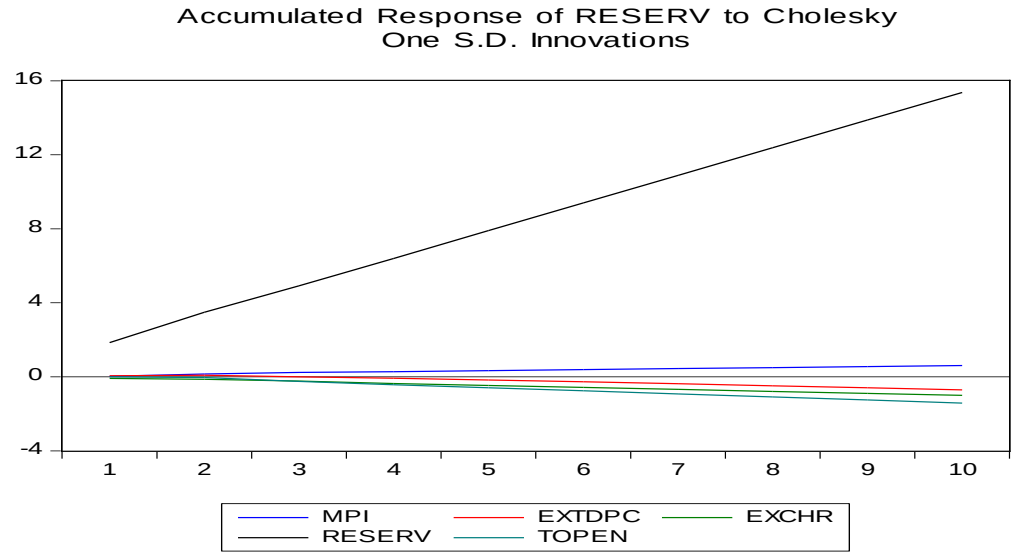
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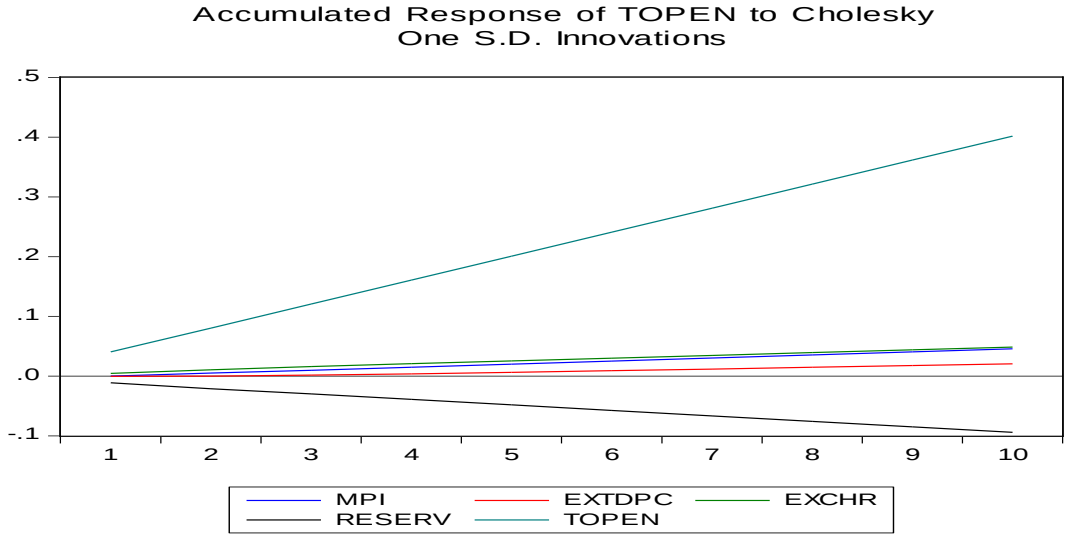
Accumulated Response of TOPEN to Cholesky
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Appendix iii. Results of variance decomposition

Variance decomposition of MPI:						
Period	**S.E.**	**MPI**	**EXTDPC**	**EXCHR**	**RESERV**	**TOPEN**
1	10.80	100.00	0.00	0.00	0.00	0.00
2	10.87	98.76	1.68	0.02	0.66	0.54
3	10.91	98.27	0.13	0.20	0.67	0.71
4	10.93	98.18	0.13	0.24	0.67	0.75
5	10.93	98.14	0.14	0.26	0.67	0.76
6	10.94	98.10	0.14	0.27	0.68	0.79
7	10.94	98.05	0.14	0.28	0.68	0.82
8	10.94	98.01	0.14	0.29	0.69	0.85
9	10.94	97.96	0.14	0.31	0.69	0.88
10	10.95	97.92	0.14	0.32	0.70	0.90

Variance decomposition of REXTD:						
Period	**S.E.**	**MPI**	**EXTDPC**	**EXCHR**	**RESERV**	**TOPEN**
1	394.54	0.03	99.96	0.00	0.00	0.00
2	582.16	0.02	99.96	0.01	0.0001	0.0001
3	792.39	0.06	99.85	0.05	0.01	0.004
4	968.18	0.09	99.79	0.08	0.02	0.004
5	1133.08	0.11	99.74	0.11	0.02	0.004
6	1280.58	0.12	99.70	0.13	0.03	0.003
7	1416.89	0.13	99.68	0.14	0.03	0.003
8	1542.40	0.14	99.66	0.15	0.03	0.003
9	1659.53	0.15	99.64	0.16	0.03	0.003
10	1769.31	0.15	99.63	0.16	0.03	0.003

Variance decomposition of EXCHR						
Period	**S.E.**	**MPI**	**EXTDPC**	**EXCHR**	**RESERV**	**TOPEN**
1	203.36	2.02	0.04	97.92	0.00	0.00
2	335.56	4.61	0.09	95.23	0.02	0.02
3	435.11	6.65	0.18	92.93	0.04	0.16
4	513.77	6.96	0.29	92.38	0.06	0.29
5	581.68	6.91	0.39	92.25	0.06	0.37
6	642.58	6.86	0.47	92.17	0.06	0.41
7	698.32	6.86	0.53	92.09	0.07	0.43
8	749.95	6.87	0.58	92.01	0.07	0.45
9	798.27	6.87	0.62	91.95	0.07	0.47
10	843.83	6.87	0.65	91.90	0.07	0.48

Variance decomposition of RESERV:						
Period	**S.E.**	**MPI**	**EXTDPC**	**EXCHR**	**RESERV**	**TOPEN**
1	1.85	0.02	0.07	0.24	99.65	0.00
2	2.47	0.23	0.05	0.16	99.51	0.02
3	2.87	0.26	0.11	0.24	98.80	0.56
4	3.23	0.22	0.14	0.34	98.52	0.75
5	3.57	0.21	0.19	0.38	98.40	0.81
6	3.88	0.20	0.23	0.39	98.30	0.86
7	4.16	0.19	0.26	0.40	98.22	0.91
8	4.43	0.18	0.29	0.41	98.15	0.94
9	4.68	0.17	0.31	0.42	98.10	0.97
10	4.92	0.17	0.34	0.43	98.05	0.99

Variance decomposition of TOPEN						
Period	**S.E.**	**MPI**	**EXTDPC**	**EXCHR**	**RESERV**	**TOPEN**
1	0.04	0.0003	0.01	1.11	7.03	91.83
2	0.05	0.75	0.008	1.61	6.37	91.24
3	0.07	0.89	0.06	1.62	5.69	91.71
4	0.08	1.06	0.11	1.55	5.44	91.82
5	0.09	1.15	0.16	1.49	5.33	91.85
6	0.10	1.2	0.20	1.44	5.25	91.88
7	0.11	1.25	0.24	1.41	5.19	91.90
8	0.11	1.28	0.27	1.38	5.14	91.90
9	0.12	1.31	0.29	1.36	5.11	91.91
10	0.13	1.33	0.31	1.35	5.08	91.91

Appendix iv. Trend in exchange rate movement in the WAMZ countries

Year	NIG	GAMB	GHA	GUIN	LIB	SLE
2010	150.2975	28.01195	1.429983	5726.071	71.40333	3.978087
2011	153.8625	29.46152	1.520625	6658.031	72.22667	4.349162
2012	157.5	32.07713	1.824867	6985.829	73.51477	4.344037
2013	157.3117	35.95759	1.98135	6907.878	77.52	4.332501
2014	158.5526	41.73296	2.896575	7014.119	83.8925	4.524159
2015	192.4403	42.50621	3.714642	7485.517	86.18837	5.080748
2016	253.492	43.37253	3.909817	8967.927	94.42724	6.290297
2017	305.7901	46.60891	4.350533	9088.319	112.7067	7.384432
2018	306.0837	48.15178	4.585325	9011.134	144.0556	7.931632
2019	306.921	50.06246	5.217367	9183.876	186.4297	9.010221
2020	358.8108	51.50166	5.595708	9565.082	191.518	9.829927
2021	401.152	51.48444	5.8057	9612.86	166.1537	10.43943
2022	425.9792	54.92347	8.2724	9773.163	152.9338	14.04765

Source: World Development Indicators.
Note: NIG – Nigeria, GAMB – Gambia, GHA – Ghana, GUIN – Guinea, LIB – Liberia, SLE – Sierra Leone.