econworld

Research Article

Exchange Rate Scenarios, Export Dynamics, and GDP Responses: A Counterfactual Panel Structural VAR Analysis for WAMZ Countries[a]

RICHARD UMEOKWOBI[b]

Regional monetary integration is seen as a way to enhance trade and growth. This study examines the dynamic interactions among exchange rate unification, exports, and economic growth in West African Monetary Zone (WAMZ) countries using a Panel Structural Vector Auto regression (PSVAR) framework. The model captures both temporal and cross-country dynamics, tolerating the identification of structural shocks and their transmission mechanisms. Three scenarios are considered: a baseline flexible exchange rate regime, an appreciation unification, and a depreciation unification. The baseline flexible regime provided the most stable macroeconomic balance, a sustainable growth path, and minimum welfare losses. The appreciation scenario led to export contraction and income volatility, while the depreciation scenario improved long-run competitiveness but caused short-term instability. The stability test confirmed the model's dynamic soundness, as shocks dissipated over time. The findings suggest that flexible exchange rate management supported by credible macroeconomic policies enhances export competitiveness, sustains GDP growth, and promotes long-term stability in the WAMZ region.

1 Introduction

One of the most popular integrations in the world is the European Union (EU), which took 40 years to be established (Annang, 2018). This financial integration has a history that extends back to the creation of the European Payments Union and the European Investment Bank (EIB) in the 1950s, which eventually led to a series of arrangements for macroeconomic coordination and cooperation within the current monetary union among most members of the European Union. Asian countries developed their capital markets

---

[b] Central Bank of Nigeria, Abuja, Federal Capital Territory, Nigeria. email: umeokwobirichard@gmail.com
0000-0001-9559-2034

after the 1997 financial crisis, which deepened and strengthened their cooperation through the Association of Southeast Asian Nations (ASEAN). The rich Arab countries created the League of Arab States in 1944, aimed to develop cooperation between Arab countries in all fields, which includes trade, finance and defense. According to Corm (2006), the league was ineffective in safeguarding a common Arab position in international affairs, owing to various political and economic factors. In West Africa, the view was that monetary unification would be beneficial for many member states of the Economic Community of West African States (ECOWAS) (Debrun et al., 2003). Monetary union is beneficial but comes with some sacrifice, including giving up some independence to a generic central bank by abandoning national currencies and fixing nominal exchange rates relative to one another (Houssa, 2008). As a result, they lose the ability to adjust the value of their currency, control their money supply, or set their own short-term interest rates. In the absence of exchange rate flexibility, the primary tools for economic adjustment become the movement of capital and labor, as well as wage flexibility. Though some studies oppose a monetary union, claiming that most West African countries have not reached convergence. It should be noted that a monetary union, particularly through exchange rate unification, is expected to benefit member countries.

Ogunkola (2005) argues that monetary integration plays a vital role in international economic relations, particularly in resolving issues arising from multiple currencies and diverse exchange rate regimes, which often obstruct trade between countries. Manneh (2008) found that exchange rate uncertainty is lower in a monetary union regime than in a flexible exchange rate regime. Importers are naturally inclined to favor goods and services from countries with more efficient payment systems and minimal exchange rate risks, which is an increasingly relevant concern in today's globalized economy. Although financial instruments, such as bills of exchange and letters of credit, are commonly used to reduce credit and payment risks, monetary integration remains the most effective means of ensuring currency convertibility and managing exchange rate fluctuations. Furthermore, by fostering policy stability, monetary integration contributes significantly to economic growth. Akinbobola & Akinlo (2005) suggested that the sub-regions of ECOWAS exhibit some potential for forming an optimum currency area.

The motivation for this study stems from the persistent macroeconomic instability in West African Monetary Zone (WAMZ) economies, largely driven by exchange rate misalignments and currency volatility. The literature offers mixed findings on the implications of monetary unification for economic growth. This paper, with the use of scenarios, will examine how exchange rate unification could affect real GDP growth and export performance in the WAMZ. This study seeks to provide evidence-based insights to guide policymakers toward achieving a stable, integrated financial system in West Africa. Using a Panel Structural Vector Auto regression (PSVAR) model, we analyze the dynamic effects of exchange rate harmonization on real GDP growth. To extend the analysis, we introduce a counterfactual framework that estimates potential growth outcomes under a unified exchange rate regime. The counterfactual framework is a simulation-based approach used to estimate potential economic growth outcomes under a hypothetical unified exchange rate regime by comparing actual historical data with simulated scenarios that represent stronger and weaker currency alignments across WAMZ member states. Specifically, we compute upper and lower bounds of economic growth based on historical mean and median exchange rates. This methodology allows us to estimate whether different exchange rate alignments, fluctuating between stronger and weaker currency regimes, would produce differential effects on growth perfor-

mance across WAMZ member states. By merging empirical modeling with counterfactual analysis, this study affords evidence-based comprehension into whether exchange rate unification would aid as a catalyst for economic growth in West Africa, and whether the variation in exchange rate structures through member countries could improve or constrain such outcomes. This study fills the gap in the literature by assessing how exchange rate unification could affect economic performance, particularly the dynamic interactions among exchange rates, exports, and real GDP, in the WAMZ.

After this introduction, Section 2 provides the theoretical and empirical literature review regarding the exchange rate unification. Section 3 explains the data used and the methodology applied, and Section 4 discusses the results. Finally, Section 5 concludes with some policy recommendations.

2 Literature Review

2.1 Theoretical Literature

The dynamic relationship between exchange rates, exports, and GDP is well-grounded in classical open-economy macroeconomic theory. The Mundell-Fleming framework provides a foundational understanding of short-run interactions between exchange rates, output, and interest rates in a small open economy with imperfect capital mobility. In this model, a currency depreciation improves the competitiveness of exports by lowering their price in foreign currency terms, thereby stimulating GDP through increased export demand. Conversely, a currency appreciation can dampen exports, reducing income and output in the short run. This framework captures the short-term trade-offs between monetary policy, exchange rate fluctuations, and output, providing a theoretical basis for the path $EXC \rightarrow EXP \rightarrow GDP$.

The J-curve hypothesis further elaborates on the dynamic adjustment of trade balances to exchange rate movements (Magee, 1973). Immediately following a depreciation, a country's trade balance or exports may initially worsen due to pre-existing contracts and price inelasticities. However, exports respond to cheaper domestic goods, ultimately boosting GDP. This delayed response underscores the importance of capturing lagged and dynamic effects, which is precisely what a Panel Structural Vector Autoregression (PSVAR) framework is designed to do.

The Optimum Currency Area (OCA) theory provides additional insight into the role of exchange rate stability and alignment across countries (McKinnon, 1963; Mundell, 1961). Economies with similar structures and synchronized business cycles tend to benefit from stable exchange rates, which in turn support export competitiveness and GDP growth. Exchange rate unification, depending on whether the common rate is overvalued or undervalued relative to each country's fundamentals, can produce differential impacts on trade and output. This theoretical perspective underpins counterfactual experiments in PSVAR analysis, where a fixed real effective exchange rate (REER) can simulate a unified currency scenario, allowing researchers to study the dynamic responses of exports and GDP.

Also, insights from open economy growth models and export-led growth theory reinforce the central role of exports in transmitting exchange rate shocks to economic activity (Greenaway & Sapsford, 1994). Exchange rate fluctuations influence the relative prices of tradable goods, while exports act as conduits for foreign demand, investment, and technology spillovers. GDP responds not only through short-term trade effects but also through

longer-term productivity channels. Combined with the insights from the Mundell-Fleming framework and the J-curve effect, this provides a strong theoretical justification for modeling the structural relationships between exchange rates, exports, and GDP within a PSVAR framework.

2.2 Empirical Literature

Empirical studies on exchange rate reforms in developing countries have emphasized the short-term dynamics and policy implications of unifying official and parallel foreign exchange markets. Agénor & Flood (1992) examined the effects of exchange rate unification by analyzing the behavior of the parallel market premium during reform periods. Their findings revealed that expectations about post-reform policy stances play a crucial role in determining the success of unification efforts. Specifically, when agents anticipate consistent and credible macroeconomic policies following unification, speculative pressures and the parallel market premium tend to decline, leading to greater exchange rate stability.

Huang & Wong (1996) examined China's foreign exchange market before and after the 1994 unification of the official and swap exchange rates. Using market data from various Foreign Exchange Adjustment Centers (FEACs), they assessed the degree of segmentation and the strength of linkages across different trading centers. Their results showed that prior to unification, weak linkages among FEACs allowed persistent price differentials, indicating inefficiencies and partial market integration. The 1994 reform, which unified the dual exchange rates, was therefore essential to enhancing market efficiency and promoting a more transparent, unified pricing mechanism.

Kiguel & Lizondo (2010), under the auspices of the World Bank and IMF, analyzed the adoption and abandonment of dual exchange rate systems as policy responses to persistent balance of payments problems. They observed that dual exchange rate regimes where some transactions are executed at a fixed official rate while others occur at a market-determined depreciated rate often emerge from unsustainable crawling peg arrangements coupled with fiscal imbalances. The authors found that although such systems can temporarily ease external pressures, balance of payments deficits persist without appropriate domestic policy adjustments. Their findings further indicated that the success of unifying the foreign exchange market depends on adopting a unified crawling peg system, with the financial exchange rate serving as a guide for determining the new equilibrium rate.

De la Torre & Ize (2014) examined the challenges and policy trade-offs associated with Cuba's exchange rate unification from an international perspective. By comparing alternative approaches to achieving a unified exchange rate system, they argued in favor of a rapid unification supported by transitional measures such as lump-sum taxes and enterprise-specific subsidies. The authors emphasized that immediate unification would maximize efficiency gains by eliminating price distortions and enhancing market transparency.

Patterson (2001) investigated the effects of exchange rate unification and the persistence of the parallel market in Ethiopia after the July 1995 policy reform that unified the official and parallel exchange rates. The study revealed that the parallel market did not disappear despite the reform, largely because the foreign exchange auction system continued to generate excess demand pressures. The findings suggest that exchange rate unification without complementary market liberalization measures is insufficient to eliminate rate divergence.

Kusuma et al. (2013) examined the potential for monetary integration among ASEAN-5 countries (Indonesia, Malaysia, the Philippines, Thailand, and Singapore) through the lens

of OCA theory. Using the nominal deviation indicator assessment to measure exchange rate volatility, the study found that pegging national currencies to the Chinese Yuan would yield the lowest volatility, both in normal and crisis periods. This finding is relevant for WAMZ countries, as it underscores the importance of exchange rate alignment and reduced volatility as prerequisites for successful monetary integration and unified exchange rate regimes.

The costs and benefits of a common currency in WAMZ have been investigated by Okafor (2013) using a VAR methodology and a panel structure. He found out that fiscal policy distortions constitute a serious policy challenge to the monetary union in the zone. Rahman et al. (2024) examined the correlation of the underlying structural shocks and the degree of the impulse response of output, inflation and trade shock to non-oil commodities price and exchange rate in WAMZ from 1990q1 to 2020q1 using SVAR and found that the WAMZ may not suffer from joining the monetary union. Ndongo & Diop (2021) studied the impact of output, exchange rate, prices, and economic policy shocks on ECOWAS in the 1977-2019 period. The results showed that a monetary policy shock stimulated growth and led to an appreciation of national currencies against the US dollar, while a fiscal policy shock contracted growth and led to depreciation. The authors also showed that exchange rate shocks tend to create inflation and a decline in economic activity. They found out that shocks are more persistent in the WAMZ countries. Oyadeyi (2024) investigated the possibility of forming a monetary union across West Africa utilizing an SVAR model covering the period 1986 to 2020 and suggested that West African countries are not ready for a monetary union. They further disclosed that the West African Economic and Monetary Union (WAEMU) countries are the closest to achieving a monetary union because they have achieved a level of their convergence criteria. They recommended that central banks focus on harmonizing their monetary policies and removing all barriers to factor mobility, for all countries to meet convergence criteria. Famoroti & Adeleke (2022) analyzed the impact of monetary policy shocks on the growth in 12 ECOWAS countries using quarterly data that ranged from 1980q1 to 2017q4 utilizing a PSVAR model, in order to analyse the shocks into WAMZ and WAEMU. They found out that the exchange rate is a huge significant variable in the real economy of ECOWAS. Adu et al. (2019) tried to examine the response of the REER to exchange rate determinant shocks for WAMZ from 1980 to 2015. Their analysis was based on country-by-country VECM; their findings suggested that WAMZ countries are structurally different, and that an asymmetric shock with an inadequate adjustment mechanism implies a costly monetary union. Raji (2013) examined the impact of exchange rate shocks on four selected WAMZ countries to assess the level of macroeconomic convergence, using an SVAR for each country, and found that the three most promising countries are Gambia, Ghana, and Nigeria due to symmetrical alignment toward achieving a currency union. Omotor & Niringiye (2011), using a VAR framework, concluded that the WAMZ countries are feasible for forming an optimum currency area. Harvey & Cushing (2015), based on an SVAR analysis to determine whether WAMZ countries should adopt a common currency, advised that individual countries should not adopt a common currency, though they can opt for it in the near future if they converge further.

The literature reviewed showed that some authors advise WAMZ countries to join a monetary union, while others suggest that they should converge further before joining one. This would be analyzed using PSVAR to get the actual stance of unification in WAMZ.

3 Data and Methodology

This study made use of the PSVAR model to investigate the dynamic interrelationships among the real effective exchange rate (EXC), exports (EXP, in local currency or USD), and gross domestic product (GDP) per capita growth in Gambia, Ghana, Guinea, Liberia, Nigeria, and Sierra Leone from 2010 to 2023. The PSVAR analysis allows the identification of structural shocks in a panel data context and enables the capture of both cross-sectional and temporal dynamics. This also allows for a counterfactual-based analysis, examining the macroeconomic responses of exports and growth to different unification processes within WAMZ. In the baseline, we assumed a fixed exchange rate index from 2019 to 2023, and appreciation and depreciation of EXC are considered in the counterfactual analyses. This allows for the evaluation of how GDP responds to hypothetical exchange rate shocks, offering policy insights for the WAMZ on the macroeconomic implications of currency stabilization or depreciation policies.

3.1 Data and Variables

The data used in this study were obtained from the World Bank, the FRED database, Trading Economics, and the central banks of countries. Although the dataset spans 2010 to 2023, yielding 14 annual observations per country and a total of 84 panel observations per variable, this sample size remains sufficiently informative for the PSVAR framework for several reasons. First, the panel structure significantly enhances the effective sample size by pooling cross-sectional and time-series information across six WAMZ countries. This cross-country pooling increases the degrees of freedom and mitigates the small-sample bias typically associated with time-series SVAR models. In essence, the PSVAR leverages both within-country dynamics and between-country variations, providing richer identification of structural shocks even when the time dimension is relatively short. Second, recent empirical literature supports the application of panel-based VARs and PSVARs in contexts with limited time observations but multiple cross-sectional units (e.g., Pedroni, 2013; Canova & Ciccarelli, 2013). These studies show that panel estimation techniques improve efficiency by exploiting heterogeneity and common patterns across countries. Moreover, Bayesian shrinkage and system GMM-type estimators often used in PSVARs help to stabilize parameter estimates in small samples, making the results econometrically robust and policy-informative. Third, the choice of annual frequency is justified by the macroeconomic nature of the variables under consideration, which typically respond to policy and external shocks over yearly horizons rather than monthly or quarterly cycles. Using higher-frequency data (e.g., quarterly) could introduce measurement noise and inconsistency across countries with limited data availability. Thus, the use of annual data ensures comparability, data consistency, and alignment with the real-sector transmission mechanisms of exchange rate shocks.

The study mitigates the risk of small-sample bias by focusing on impulse response analysis and counterfactual simulations rather than pure forecasting. These approaches rely more on the estimated direction and magnitude of structural relationships than on large-sample asymptotics. Therefore, even within the constraint of 84 observations, the PSVAR framework remains a valid and reliable tool for capturing the dynamic transmission of exchange rate shocks to exports and output in the WAMZ economies.

The descriptive statistics in Table 1 show different patterns across the three variables. EXC has 84 observations with a mean of 99.71 and a median of 106.04, indicating that it

Table 1: Descriptive statistics

Variable	Obs.	Mean	Std.dev	Median	Min	Max	Range	Skewness	Kurtosis	Std.error
EXC	84	99.71	46.88	106.04	0.00	237.97	237.97	-0.41	1.18	5.11
EXP	84	269.4	611.29	70.51	0.02	4,690.84	4690.87	5.04	30.92	66.7
GDP	84	4.21	4.84	4.6	-20.6	21.1	41.7	-1.15	8.42	0.53

Source: Author's computation.

remained relatively stable but experienced moderate variability over time; the currency's real value stayed close to its long-run equilibrium, with mild appreciation periods. The standard deviation of 46.88 shows moderate fluctuations in competitiveness. The negative skewness (–0.41) suggests occasional real depreciations, while the low kurtosis (1.18) indicates a flat distribution with few extreme values.

EXP, on the other hand, shows strong signs of non-normality. Its mean of 269.40 is much higher than the median of 70.51, reflecting right skewness, as indicated by a skewness value of 5.04. The standard deviation of 611.29 indicates significant variability, and the range, spanning from 0.02 to 4,690.84, further suggests the presence of extreme outliers. The very high kurtosis of 30.92 suggests fat tails, implying that a few observations dominate the distribution. This highlights that only a few countries or periods recorded very large values, while the bulk of the data remains relatively low, which is the case with African countries.

In contrast, *GDP* appears somewhat more balanced. The mean of 4.21 is close to the median of 4.60, signifying a more symmetric distribution. However, the negative skewness of -1.15 indicates left-skewed movement, suggesting periods of economic contraction. The standard deviation of 4.84 indicates moderate variability, while the minimum of –20.60 and the maximum of 21.10 highlight the impact of extreme shocks on economic performance. With a kurtosis of 8.42, GDP also shows heavy tails, pinpointing occasional large fluctuations.

The result (f(efp) = 1.45, p = 0.089) of the coefficient homogeneity test, which was conducted using the M-fluctuation procedure (Zeileis, 2005) of the strucchange package in the R programme indicated that the null hypothesis of homogeneity could not be rejected, suggesting that the parameters were relatively stable across WAMZ countries. Consequently, the data were treated as homogeneous, and a pooled correlation analysis was conducted to examine the preliminary relationships among the variables, as shown in Table 2. Weak correlation coefficients across all pairs of variables imply that they do not co-move strongly within the same period. This weak contemporaneous association indicates the absence of multicollinearity, which is desirable for proper identification of the PSVAR model.

Table 2: Correlation analysis

	EXC	*EXP*	*GDP*
EXC	1.00		
EXP	0.14	1.00	
GDP	0.00	-0.03	1.00

Source: Author's computation.

A contemporaneous relationship refers to how variables interact within the same time frame, without considering lagged or delayed effects. For instance, if both the exchange rate and GDP change in the same year, that reflects a contemporaneous effect. However, if GDP reacts only in subsequent years, that depicts a lagged dynamic effect, something that simple correlations cannot capture, but which impulse response functions (IRFs) in the PSVAR

framework can reveal.

Given the weak contemporaneous correlations, the ordering of variables in the Cholesky decomposition should be guided by economic theory rather than statistical association. In this study, it is assumed that exchange rate shocks have an immediate impact on exports and GDP; hence, the variables are ordered as: $EXC \rightarrow EXP \rightarrow GDP$. This ordering implies that exchange rate shocks contemporaneously influence exports and output, while exports may contemporaneously affect GDP but not vice versa. The weak correlations reinforce the notion that the variables are not strongly contemporaneously linked, making theoretical reasoning essential for structural identification. Consequently, deeper economic insights will emerge from impulse response functions and variance decompositions, which trace how shocks propagate over time.

3.2 Model Specification

The PSVAR model builds upon the standard reduced-form VAR but incorporates structural restrictions to identify contemporaneous relationships. The structural form of the VAR is specified as:

$$A_0 \, Y_{it} \;=\; A(L) \, Y_{it} \;+\; \epsilon_{it} \tag{1}$$

Where A_0 is the contemporaneous structural relationships among the variables, and $A_{(L)}$ is a matrix polynomial in the lag operator L. Y_{it} is the vector of endogenous variables, which are EXC_{it}, EXP_{it}, GDP_{it} and ϵ_{it} is a vector of structural shocks.

The PSVAR was estimated to assess the response of GDP to an impulse shock in EXC. We would treat the exchange rate as an exogenous variable that affects the endogenous variables in the model. The pass-through of the shock would look like this;

$$EXC \rightarrow EXP \rightarrow GDP \tag{2}$$

This study employs the Mundell-Fleming Framework, which posits that under imperfect capital mobility, exchange rate shocks affect both trade flows and output. The IS-LM model, propounded by Robert Mundell and Marcus Fleming, states the short-run relationship among output, the rate of interest, and exchange rates, which is broadly explained in the theoretical literature. We still did a counterfactual study, whereby we analyzed the response of GDP to the impulse of EXC. The dynamic structure of the PSVAR allows testing this hypothesis empirically by tracing how exchange rate disturbances are transmitted through the real sector in WAMZ economies.

3.3 Restriction Method

The study employs A-matrix short-run (recursive) restrictions using Cholesky decomposition to achieve identification. Specifically, the A-matrix captures contemporaneous relationships, with restrictions implying that some variables do not respond immediately to shocks in others. The B-matrix, representing contemporaneous responses of structural shocks, is assumed to be diagonal, i.e., shocks are uncorrelated. Therefore, the identification follows

$$A_0 \;=\; \begin{bmatrix} 1 & 0 & 0 \\ a_{21} & 1 & 0 \\ a_{31} & a_{32} & 1 \end{bmatrix} \tag{3}$$

This recursive A-matrix structure allows the estimation of orthogonal shocks through Cholesky decomposition, consistent with economic theory. The study does not employ long-run (B-matrix) or combined AB-matrix restrictions, as the focus is on short-run contemporaneous interactions.

4 Panel Structural VAR

Before proceeding with our econometric analyses, the optimal lag length should be determined. The Akaike (AIC), Hannan–Quinn (HQ), and Schwarz (SC) information criteria, based on a pooled VAR model, selected a lag order of 3, while the Final Prediction Error (FPE) indicated a lag order of 4. Given the consistency across most selection criteria, a lag length of 3 was adopted for the panel VAR estimation.

A Panel Structural Vector Autoregression (PSVAR) is an econometric framework that combines the strength of panel data with the structure of a VAR model. In modest terms, it permits researchers to study how shocks in one variable disturb others over time across numerous countries, regions, or firms simultaneously. Unlike a standard VAR, which is used on only a single time series dataset, the panel version accounts for both time-series dynamics
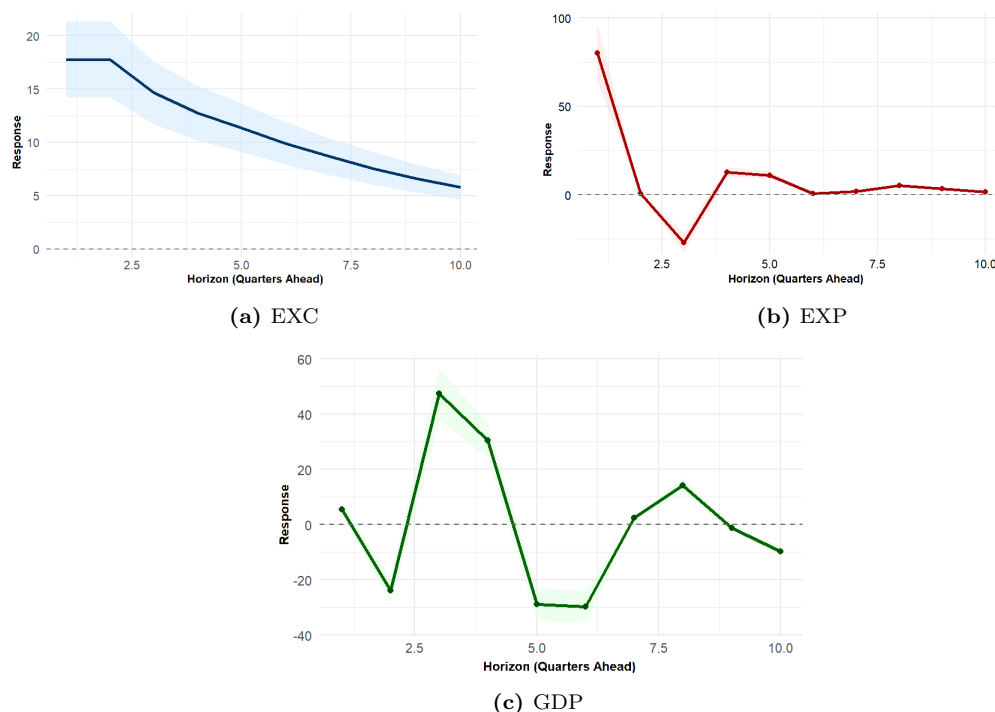

(a) EXC

(b) EXP

(c) GDP

Figure 1: PSVAR impulse response of variables to EXC shock in the baseline
Note: Shaded area is $\pm 20\%$ of response as approximate confidence interval (CI)

and cross-sectional differences, making it useful when analyzing a collection of economies or institutions together.

Figure 1, shows that a real effective exchange rate shock interpreted as a currency depreciation causes the exchange rate to decline gradually and persistently over ten quarters.

Exports exhibit a classic J-curve pattern: an initial rise followed by a sharp drop and subsequent recovery as competitiveness improves. GDP per capita responds with pronounced volatility, reflecting welfare effects initially falling, then surging, and later oscillating before stabilizing. These fluctuations indicate that while depreciation eventually supports exports and income, it also generates substantial short-term instability in household welfare due to income and consumption volatility. The end of the response showed that GDP per capita will fall and remain below its steady state level.
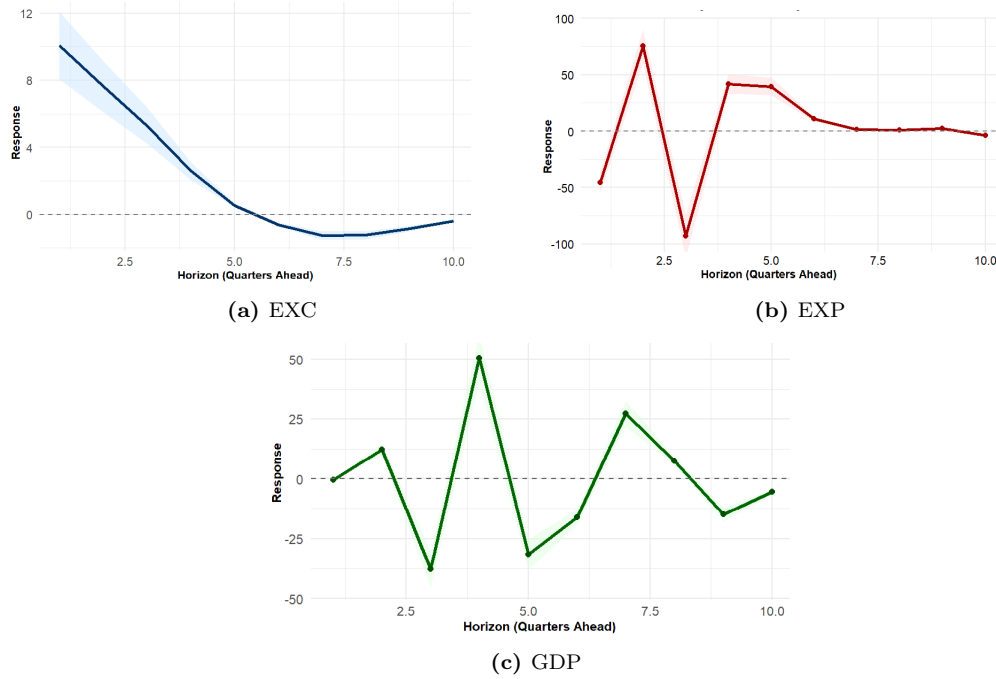

(a) EXC

(b) EXP

(c) GDP

Figure 2: Impulse response of variables to the appreciation scenario of 99.71 USD
Note: Shaded area is $\pm 20\%$ of response as approximate CI

In the appreciation scenario, where the exchange rate unification across WAMZ countries is achieved by fixing EXC at 99.71 (the mean value) from 2019 to 2023, the impulse response results reveal major adjustment effects, as depicted in Figure 2. The unified exchange rate led to a sharp initial loss of competitiveness, triggering a steep export contraction, followed by a volatile recovery. GDP per capita mirrored this instability, with income initially falling as export revenues declined, then fluctuating before settling slightly below its pre-shock level. Therefore, maintaining a fixed unified exchange rate over the period generated short-term volatility and welfare losses, highlighting the trade-off between exchange rate stability and economic flexibility in the WAMZ region.

Figure 3 shows the impulse response functions in depreciation in the unified EXC at 106.04 (the median value) from 2019 to 2023 across WAMZ countries. The PSVAR results show a gradual but turbulent adjustment. The exchange rate shock dissipates smoothly over six quarters, reflecting slow price and wage responses under the fixed regime. Exports react with extreme volatility, initially falling due to transition disruptions, then surging as competitiveness improves, before collapsing sharply during the 2020 pandemic and later
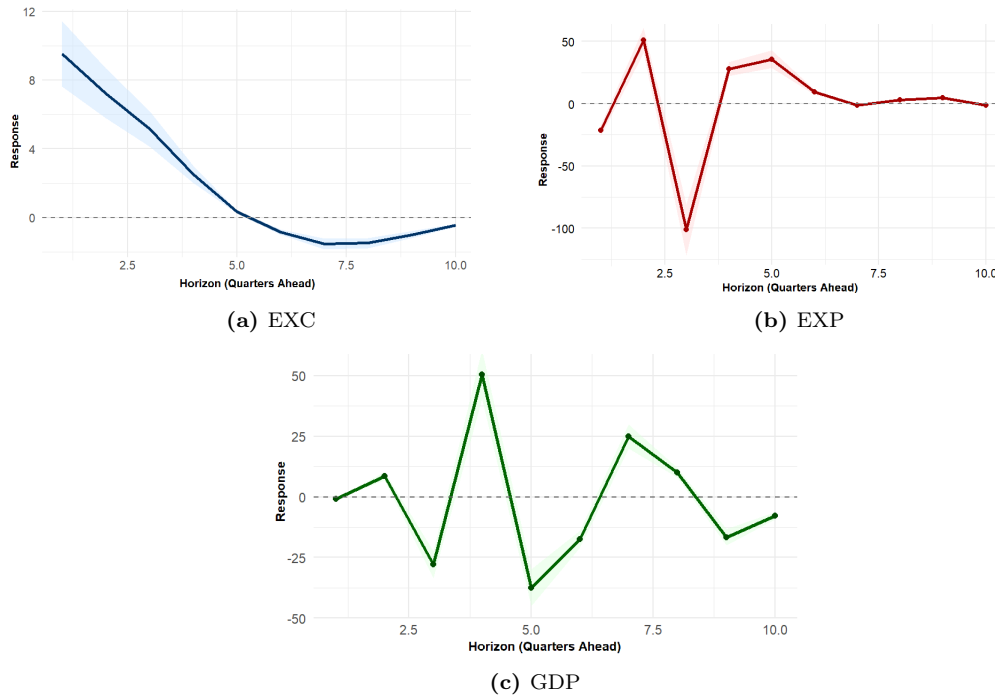
(a) EXC

(b) EXP

(c) GDP

Figure 3: Impulse response of variables to the depreciation scenario of 106.04 USD
Note: Shaded area is ±20% of response as approximate CI

stabilizing as the unified system matures. GDP per capita follows a similar cyclical path, with large income swings before settling slightly below pre-unification levels. Overall, while the unified depreciated rate improved long-run export competitiveness, it caused short-term instability and welfare losses, underscoring the need for coordinated fiscal and social policies to ease adjustment across WAMZ economies.
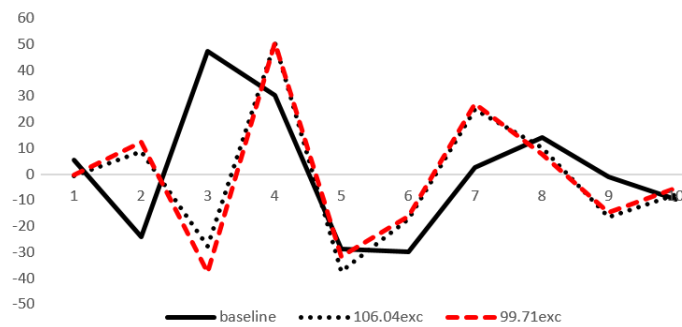

Figure 4: GDP per capita growth rate responses across scenarios

The GDP per capita growth responses across scenarios, depicted in Figure 4, show that the baseline scenario performs better than both the appreciation (99.71) and depreciation (106.04) exchange rate unification cases. The baseline line follows a smoother path with smaller fluctuations, indicating greater macroeconomic stability and resilience to shocks. In

contrast, the appreciation scenario produces sharp peaks and troughs, reflecting high volatility and short-lived growth spurts, while the depreciation scenario shows deeper declines and slower recovery. The result further shows that the baseline scenario, which represents a more flexible exchange rate regime, supports steadier, more sustainable GDP growth, suggesting that exchange rate unification, whether through appreciation or depreciation, may introduce instability and short-term welfare losses across WAMZ economies.

The plot of the roots of the characteristic polynomial shows that all the estimated eigenvalues (represented by the blue dots) lie well within the unit circle, depicted by the red boundary line in Figure 5. This indicates that the Panel VAR system satisfies the stability condition, implying that the model is dynamically stable. In practical terms, it means that the effects of shocks to any of the variables diminish over time rather than persist indefinitely, confirming that the system will eventually return to equilibrium.
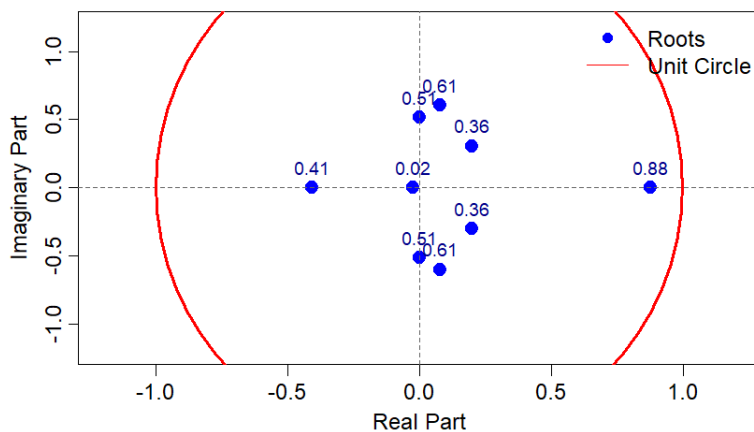

Figure 5: Roots of the Characteristic Polynomial

5 Conclusion

In conclusion, the Panel Structural VAR results indicate that exchange rate shocks have significant, though varying, effects on exports and GDP across WAMZ countries. While the appreciation and depreciation unification scenarios both led to short-term instability and welfare losses, the depreciated exchange rate supported better long-run competitiveness than the appreciated exchange rate. However, the baseline flexible exchange rate regime proved most effective, providing smoother adjustments, greater macroeconomic stability, and more sustainable growth. The stability test further confirms that the model is dynamically sound, as shocks eventually dissipate over time, implying that WAMZ economies tend to revert to equilibrium following disturbances. Overall, flexible exchange rate management remains the most resilient and welfare-enhancing policy option for the region.

The result aligns with Agénor & Flood (1992) by highlighting that the effectiveness of exchange rate unification depends on policy credibility and expectations, as instability arises when reforms are not supported by consistent macroeconomic policies. The observed volatility under fixed unification scenarios also echoes Patterson (2001), who found that exchange rate unification without broader market liberalization fails to eliminate divergence or ensure stability.

In the context of WAMZ, the conclusion that flexible exchange rate regimes provide greater stability aligns with Adu et al. (2019) and Famoroti & Adeleke (2022), who emphasized the critical role of exchange rate adjustments in sustaining growth and macroeconomic resilience across the region. This study conforms with the literature that supports gradual convergence and flexible exchange rate management as more effective strategies for achieving long-term stability and integration in WAMZ.

Based on our analyses, we recommend that WAMZ countries adopt a flexible exchange rate policy that allows market forces to determine currency values, as this enhances export competitiveness and supports sustained GDP growth. Policymakers should avoid rigid exchange rate unification, which tends to create short-term instability and weaken export performance. Instead, gradual and well-coordinated exchange rate adjustments backed by sound monetary and fiscal policies can help stabilize prices, encourage productive exports, and boost overall economic output. Strengthening policy credibility, improving trade infrastructure, and promoting regional coordination will further enhance the positive transmission of exchange rate movements to exports and GDP growth across WAMZ countries.

References

Adu, R., Litsios, I., & Baimbridge, M. (2019). Real exchange rate and asymmetric shocks in the West African Monetary Zone (WAMZ). *Journal of International Financial Markets, Institutions and Money*, *59*, 232–249. doi:10.1016/j.intfin.2018.12.005

Agénor, P. R., & Flood, R. P. (1992). Unification of Foreign Exchange Markets. *Staff Papers (International Monetary Fund)*, *39*(4), 923–947. doi:10.2307/3867426

Akinbobola, T. O., & Akinlo, A. E. (2005). Should the West African countries form a currency union? *South African Journal of Economic and Management Sciences*, *8*(3), 326-338. doi:10.4102/sajems.v8i3.1199

Annang, E. (2018). *The potentials and impediments of regional financial or regional monetary co-operation: A case study on West Africa* (Working Paper,). SSRN. doi:10.2139/ssrn.3647165

Canova, F., & Ciccarelli, M. (2013). Panel Vector Autoregressive Models: A Survey. In N. Hashimzade & M. Thornton (Eds.), *Handbook of Research Methods and Applications in Empirical Macroeconomics* (p. 205–246). Cheltenham, UK: Edward Elgar Publishing. doi:10.4337/9780857931023.00015

Corm, G. (2006). *The Arab experience* (Working Paper, No. 1932). Naciones Unidas Comisión Económica para América Latina y el Caribe (CEPAL). https://ideas.repec.org/b/ecr/col014/1932.html.

Debrun, X., Masson, P., & Pattillo, C. (2003). West African currency unions: Rationale and sustainability. *CESifo Economic Studies*, *49*(3), 381–413. doi:10.1093/cesifo/49.3.381

De la Torre, A., & Ize, A. (2014). *Exchange rate unification: The Cuban case* (Tech. Rep.). Brookings Institution and University of Havana, Center for the Study of the Cuban Economy. https://www.brookings.edu/articles/exchange-rate-unification-the-cuban-case/.

Famoroti, J. O., & Adeleke, O. (2022). Impact of monetary policy transmission mechanism in West African countries. *Studia Universitatis Vasile Goldis Arad-Economics Series*, *32*(1), 20-42. doi:10.2478/sues-2022-0002

Greenaway, D., & Sapsford, D. (1994). Exports, growth, and liberalization: An evaluation. *Journal of Policy Modeling*, *16*(2), 165-186. doi:10.1016/0161-8938(94)90019-1

Harvey, S. K., & Cushing, M. J. (2015). Is West African Monetary Zone (WAMZ) a common currency area? *Review of Development Finance*, *5*(1), 1-17. doi:10.1016/j.rdf.2015.05.001

Houssa, R. (2008). Monetary union in West Africa and asymmetric shocks: A dynamic structural factor model approach. *Journal of Development Economics*, *85*(1-2), 319–347. doi:10.1016/j.jdeveco.2006.05.003

Huang, G., & Wong, C. Y.-P. (1996). Unification of China's foreign exchange rates. *Contemporary Economic Policy*, *14*(4), 32-45. doi:10.1111/j.1465-7287.1996.tb00632.x

Kiguel, M., & Lizondo, J. S. (2010). Adoption and abandonment of dual exchange rate systems. *Economic Analysis Review*, *5*(1), 3-23. https://www.rae-ear.org/index.php/rae/article/view/248.

Kusuma, D., Ashif, S. M. A., Harahap, A. M., & Omarsyah, M. A. (2013). The role of ASEAN exchange rate unit (AERU) for ASEAN-5 monetary integration: An optimum currency area criteria. *Bulletin of Monetary Economics and Banking*, *15*(3), 59-84. doi:10.21098/bemp.v15i3.68

Magee, S. P. (1973). Currency contracts, pass-through, and devaluation. *Brookings Papers on Economic Activity*, *4*(1), 303-325. https://www.brookings.edu/wp-content/uploads/1973/01/1973a_bpea_magee.pdf.

Manneh, P. A. A. (2008). The welfare effects of monetary union and flexible exchange rate regimes: The case for the West African Monetary Zone (WAMZ) and the West Africa Economic and Monetary Union (UEMOA) and the implications for the Gambia. *International NGO Journal*, *3*(11), 177–203. doi:10.5897/INGOJ.9000153

McKinnon, R. I. (1963). Optimum Currency Areas. *American Economic Review*, *53*(4), 717-725.

Mundell, R. A. (1961). A Theory of Optimum Currency Areas. *American Economic Review*, *51*(4), 657-665.

Ndongo, A., & Diop, I. T. (2021). Economic and monetary integration in ECOWAS countries: A panel VAR approach to identify macroeconomic shocks. *World Journal of Applied Economics*, *7*(2), 61-87. doi:10.22440/wjae.7.2.3

Ogunkola, O. (2005). *An evaluation of the viability of a single monetary zone in ECOWAS* (Research Paper, No. 147). African Economic Research Consortium (AERC). https://aercafrica.org/old-website/wp-content/uploads/2018/07/RP_147.pdf.

Okafor, H. O. (2013). Estimating the Costs and Benefits of a Common Currency for the Second West African Monetary Zone (WAMZ). *Journal of Economics and Behavioral Studies*, *5*(2), 57-68. https://files.core.ac.uk/download/pdf/288022652.pdf.

Omotor, D., & Niringiye, A. (2011). Optimum currency area and shock asymmetry: A dynamic analysis of the West African Monetary Zone (WAMZ). *Romanian Journal of Economic Forecasting*, *14*(3), 71-82. https://ipe.ro/rjef/rjef3_11/rjef3_2011p71-82.pdf.

Oyadeyi, O. (2024). Monetary integration across West Africa: Is the region ripe for a monetary union? *SAGE Open*, *14*(2). doi:10.1177/21582440241242958

Patterson, S. (2001). Exchange Rate Unification and the Persistence of the Parallel Market: the Ethiopia case. *African Review of Money Finance and Banking*, 37-50. http://www.jstor.org/stable/23026349.

Pedroni, P. (2013). Structural Panel VARs. *Econometrics*, *1*(2), 180–206. doi:10.3390/econometrics1020180

Rahman, Y. A., Osei-Fosu, A. K., & Sakyi, D. (2024). Correlations of structural shocks, dynamic responses of output and inflation to commodities price shocks and monetary union in WAMZ. *African Journal of Economic and Management Studies*, *15*(3), 419–439. doi:10.1108/AJEMS-04-2023-0129

Raji, R. (2013). Impact of exchange rate on selected macroeconomic variables: A case study of West African Monetary Zone. *Journal of Global Economy*, *9*(1), 3-21. doi:10.1956/jge.v9i1.286

Zeileis, A. (2005). A Unified Approach to Structural Change Tests Based on ML Scores, F Statistics, and OLS Residuals. *Econometric Reviews*, *24*, 445–466. doi:10.1080/07474930500406053