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Macroeconomic imbalances in the West African Monetary Zone: Implications for monetary integration

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Macroeconomic Imbalances in the West African Monetary Zone: Implications for Monetary Integration¹

WAMI OCCASSIONAL PAPER SERIES 35

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TABLE OF CONTENTS

TABLE OF CONTENTS	2
LIST OF TABLES	3
LIST OF FIGURES	3
ABSTRACT	4
1. INTRODUCTION.....	4
2. STYLISTED FACTS ON MACROECONOMIC IMBALANCES IN THE WAMZ	6
2.1 Trend Analysis of Macroeconomic Imbalances in the WAMZ from 2001 to 2022	6
2.1.1 Annual Inflation Rate.....	7
2.1.2 Fiscal Balance (including Grants) in percentage of GDP	8
2.1.3 GDP Growth Rate	9
2.1.4 Current Account Balance in percentage of GDP	10
2.1.5 Nominal Exchange Rate.....	11
2.1.6 Lending Rate.....	12
3. LITERATURE REVIEW.....	13
3.1 Theoretical Literature Review	13
3.2 Empirical Literature Review	14
4. METHODOLOGY	17
4.1 Modelling Strategy.....	17
4.2 Econometric Model Specification.....	18
4.3 Optimal Lag Number for Model Estimation.....	20
5. EMPIRICAL RESULTS AND DISCUSSIONS.....	20
5.1 Description of Data and Sources.....	21
5.2 Preliminary Specification Tests	23
5.2.1 Tests of Cross-Sectional Dependence of Residuals.....	23
5.2.2 Unit Root Test.....	23
5.3 Estimation Results from the Panel VAR Model	24
5.3.1 Impulse Response Functions (IRF) from the Baseline Model	24
5.3.2 The Forecast Error Variance Decomposition (FEVD) from the Baseline Model.....	28
5.3.3 The Panel Granger Causality Test Results.....	29
5.3.4 Robustness Checks.....	30
6. CONCLUSION AND RECOMMENDATIONS	30
REFERENCES.....	33
APPENDIX.....	38

LIST OF TABLES

Table 1: Average consumer price index (CPI), Inflation	8
Table 2: Average fiscal balance (% of GDP).....	9
Table 2A: Average fiscal balance (% of GDP).....	9
Table 3: Average GDP Rates in WAMZ	10
Table 3A: Average GDP Rates in WAMZ	10
Table 4: Average current Account balance.....	11
Table 4A: Average current Account balance (% of GDP) in the WAMZ	11
Table 5: Average Nominal Exchange rate in the WAMZ.....	11
Table 5A: Average Nominal Exchange rate variation in the WAMZ.....	12
Table 6: Average lending rate in the WAMZ	13
Table 7 : Descriptive Statistics.....	22
Table 8: Panel unit root test results	24
Table 9: Panel Granger causality results.....	29
Table A. 1: Sources of variables	38
Table A. 2: Tests of cross-sectional dependence of residuals.....	38
Table A. 3: Panel VAR lag order selection.....	38
Table A. 4: Eigenvalue stability condition.....	39
Table A. 5: Forecast error variance decomposition of the PVAR (Share of variance explained)	40

LIST OF FIGURES

Figure 1: Average consumer price index (CPI), Inflation.....	8
Figure 2: Real GDP growth shock impulse response function	25
Figure 3: Current account shock impulse response function	26
Figure 4: Fiscal balance impulse response function	27
Figure 5: Inflation shock impulse response function	27
Figure 6 : Lending rate shock impulse response function.....	28
Figure A. 1: Lending rate shock impulse response function, Model 2	41
Figure A. 2: Lending rate shock impulse response function, Model 3	41
Figure A. 3: Lending rate shock impulse response function, Model 4	42
Figure A. 4: Fiscal balance shock impulse response function, Model 2.....	42
Figure A. 5: Fiscal balance shock impulse response function, Model 3.....	43
Figure A. 6: Fiscal balance shock impulse response function, Model 4.....	43

Abstract

The study analysed the macroeconomic developments in the West African Monetary Zone (WAMZ), focusing on macroeconomic imbalances for the period 2001-2022. The variables of interest in this study include inflation rate, real Gross Domestic Product (GDP) growth rate, current account balance, fiscal account balance, lending (interest) rate, and exchange rate. Using the panel vector autoregressive (PVAR) model, we performed the Granger causality test, impulse response functions, and forecast error variance decomposition. The results showed evidence of significant macroeconomic imbalances among the member states in violation of the primary and secondary convergence criteria required for monetary integration in the Zone. Furthermore, innovation in interest rate was found to induce a negative and significant response in inflation with a lag, while fiscal balance, current account, and GDP growth were positively affected. Specifically, a one standard deviation shock in interest rate led to 4.2 percent reduction in inflation in the eighth year, but an increase of 1.4 percent in fiscal balance, 0.2 percent in current account and 1.6 percent in GDP growth in the first year. It is recommended that the authorities in the Zone pursue effective macroeconomic policy mix including the macroeconomic imbalance procedure (MIP), aimed at preventing and correcting these imbalances to accelerate the attainment of a stable economic environment for a resilient monetary union.

Key Words: Macroeconomic Imbalances; Monetary Integration; Inflation; Growth; WAMZ

JEL Classification : E31, O47, C34.

1. INTRODUCTION

The West African Monetary Zone (WAMZ) encapsulates the aspirations of West African nations to forge a united economic front. Established in 2000, the WAMZ comprises The Gambia, Ghana, Guinea, Liberia, Nigeria, and Sierra Leone. Its primary objective is to facilitate the creation of a single currency and foster economic stability among its member states (WAMI, 2002). The journey towards monetary integration in West Africa has its roots in the broader post-colonial era. With a shared history of colonial rule, the nations within the WAMZ have long recognised the potential benefits of economic collaboration (Ajayi, 2002). The

establishment of the West African Monetary Institute (WAMI) in 2001 marked a significant step toward the realisation of a common currency for the Zone.

Despite the lofty goals, the WAMZ region has grappled with persistent macroeconomic imbalances that have posed challenges to the attainment of its objectives (Asongu & Odhiambo, 2019). This is reflected in the countries' inability to meet most of the convergence criteria enlaced by the Authority of Heads of state. These imbalances manifest in various forms, including divergent inflation rates, fiscal deficits, and disparate economic growth trajectories among member countries. The intricate interplay of these factors has raised pertinent questions about the feasibility of achieving a common currency within the stipulated timeframe.

One of the inherent challenges lies in the economic diversity of the member states. While some nations exhibit relatively robust economic growth and stability, others face structural challenges that contribute to disparities in key macroeconomic indicators. Bridging these gaps is crucial for establishing a solid foundation for monetary integration (Aliyu, 2011).

The global economic landscape, characterised by unforeseen external shocks and dynamic geopolitical forces, further complicates the pursuit of monetary integration within WAMZ. The need to insulate member economies from external vulnerabilities while fostering intra-regional resilience becomes a critical consideration in the broader discourse on monetary integration.

Statement of the Problem

The West African Monetary Zone (WAMZ) stands at a critical juncture in its pursuit of monetary integration, aspiring to forge a unified economic front among its member states. However, the region faces persistent and multifaceted macroeconomic imbalances that cast a shadow of doubt over the feasibility and prospects of achieving monetary integration (Mogaji, 2020).

The challenges of economic heterogeneity, external shocks, and divergent policy approaches present formidable obstacles to the realisation of a harmonised monetary framework, and this needs to be addressed. The intricacies of these imbalances demand rigorous examination and analysis to discern their root causes, understand their evolving patterns, and assess their implications for the overarching goal of monetary integration.

Objectives

Against this backdrop, this research aims to:

- i. Analyse the extent of macroeconomic imbalances among the WAMZ member States.
- ii. Evaluate the interaction among the macroeconomic indicators.
- iii. Assess the effects of shocks on the macroeconomic imbalances
- iv. Proffer relevant policy recommendations.

Research Questions

The following research questions are designed to provide a comprehensive exploration of the macroeconomic imbalances within the WAMZ and their implications for the region's pursuit of monetary integration. They offer a solid foundation for conducting a thorough analysis with a focus on the economic dynamics in the region.

- i. What are the key macroeconomic imbalances observed among the WAMZ member States?
- ii. How do these indicators interact and influence each other within the economic structures of WAMZ?
- iii. Are there varying degrees of resilience or vulnerability to shocks across the WAMZ member States?
- iv. How can WAMZ member States strengthen their macroeconomic frameworks to better withstand economic shocks?

The study, therefore, will ultimately aid the formulation of effective strategies to overcome the identified challenges and chart a course toward a more integrated and resilient West African Monetary Zone.

Following this introduction, the rest of the paper is structured as follows. Section 2 presents stylized facts on macroeconomic imbalances in the WAMZ, while section 3 reviews relevant literature. Section 4 deals with methodology and data description. Section 5 presents and discusses the results, while section 6 concludes the paper and proffers recommendations.

2. STYLISTED FACTS ON MACROECONOMIC IMBALANCES IN THE WAMZ

2.1 Trend Analysis of Macroeconomic Imbalances in the WAMZ from 2001 to 2022

The WAMZ members have expressed their desire to establish a monetary union since 2005, but the goal date to achieve this has continuously been extended due to macroeconomic imbalances. This is evidenced by the divergence regarding key macroeconomic indicators within the primary and secondary criteria among member countries over the study period. As

noted in the introductory section, it is essential that macroeconomic imbalances are managed more effectively in the future. This section undertakes the trend analysis of these macroeconomic imbalances, especially those indicators relating to the primary and secondary convergence criteria in the WAMZ for the past 22 years.

The 2014/2015 commodity price slump impacted negatively on the WAMZ countries and was an important reason for which most countries in the zone missed the nominal convergence targets in the subsequent years. This shock revealed macroeconomic imbalances and vulnerabilities which were already in existence before the shock. The harmful nature of the macroeconomic imbalances was not recognised initially due probably to the differences in economic fundamentals of member states and vulnerabilities to external shocks. However, key indicators were already pointing to divergent patterns because of the presence of underlying imbalances among member states before the shock.

Macroeconomic stability can be evaluated using a set of key indicators that provide insight into an economy's internal and external health. Due to data limitations within the Zone, the assessment focuses on indicators aligned with the current primary and secondary convergence criteria for the single currency programme. These indicators are inflation rate, fiscal deficit as a percent of gross domestic product (GDP), GDP growth rate, exchange rate, current account as a percent of GDP and monetary policy rate. The four primary convergence criteria are single digit inflation not exceeding 5 percent, gross external reserves covering at least 3 months of import, central bank financing of the previous year's revenue not exceeding 10 percent, and fiscal deficit not exceeding 3 percent of GDP. The two secondary criteria are exchange rate variation not surpassing 10 percent, and debt to GDP ratio of not exceeding 70 percent.

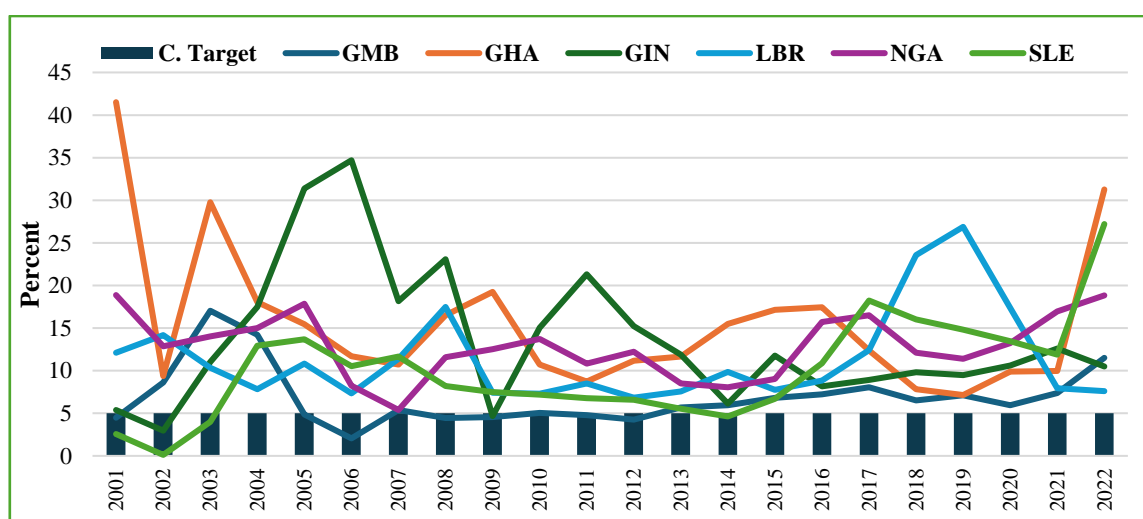
2.1.1 Annual Inflation Rate

WAMZ countries' annual inflation rates have deviated significantly from the 5 percent convergence criterion since 2001. Figure 1 depicts the annual inflation rates of WAMZ members for the past 22 years. It shows clear divergent patterns since 2001 with all member countries except The Gambia recording double digit rates on average during the sample period. For instance, Ghana, Guinea, Liberia, Nigeria, and Sierra Leone recorded an average annual inflation rate of 15.6 percent, 13.7 percent, 11.4 percent, 12.9 percent, and 10.0 percent, respectively. The Gambia's average annual inflation rate during the sample period stood at 6.9 percent, slightly exceeding the 5 percent target by 1.9 percentage points.

The Gambia has managed to maintain a single digit inflation rate since 2003 due to the attractiveness of its Standing Deposit Facility (SDF) rate, which has helped to reduce money in the hands of the public. In addition, increase in remittance inflows has helped to stabilise the exchange rate leading to relative stability in the inflation rate around 7 percent over the sample period.

Comparing the first-half of the sample period (2001-2011) to the second-half (2012-2022), inflation abated in four of the member states on average but inched up in Liberia and Sierra Leone mainly on account of increases in domestic ex-pump prices of fuel and electricity tariff. This suggests that WAMZ countries are relatively unstable in terms of inflation rate (Table 1).

Figure 1: Average consumer price index (CPI), Inflation



Note: The Gambia: GMB; Ghana: GHA; Guinea: GIN; Liberia: LBR; Nigeria: NGA; Sierra Leone: SLE; C. Target: Inflation rate's convergence criterion.

Table 1: Average consumer price index (CPI), Inflation

	2001-2011	2012-2022	2001-2022
The Gambia	6.9	7.0	6.9
Ghana	17.4	13.8	15.6
Guinea	16.8	10.5	13.7
Liberia	10.4	12.4	11.4
Nigeria	12.8	13.0	12.9
Sierra Leone	7.7	12.4	10.1

Source: WAMI staff computation.

2.1.2 Fiscal Balance (including Grants) in percentage of GDP

Average fiscal balance, including grants widened in all the countries for the two comparative periods except for Guinea that experienced an improved fiscal position during the latter part of the sample period (2012-2022). Deterioration in fiscal balances coupled with worsening current account balances

due to unfavourable terms of trade contributed to rising debt levels in some of the WAMZ member states.

Though The Gambia, Liberia and Nigeria positions widened during the second half of the sample period, their positions including Guinea are still favourable with respect to the convergence criterion. Both Ghana and Sierra Leone seem to miss the criterion of fiscal deficit not exceeding 3 percent of GDP (see Table 2).

Table 2: Average fiscal balance (% of GDP)

	2001- 2011	2012- 2022
The Gambia	6.6	0.4
Ghana	-4.2	-6.3
Guinea	-2.5	-1.9
Liberia	0.8	-1.1
Nigeria	0.0	-0.8
Sierra Leone	-3.8	-5.7
Convergence criterion	3.0%	

Source: WAMI staff computation.

Table 3A: Average fiscal balance (% of GDP)

	2001-2005	2006-2010	2011-2015	2016-2020	2021	2022
The Gambia	8.5	4.2	9.6	-4.8	-5.8	-4.8
Ghana	-3.6	-5.5	-4.0	-6.0	-8.6	-10.7
Guinea	-2.4	-3.0	-2.7	-1.3	-1.7	-0.4
Liberia	-1.1	2.3	-1.6	-0.5	0.6	0.0
Nigeria	-1.8	1.6	1.7	-1.6	-4.2	-4.2
Sierra Leone	-6.4	-1.0	-4.1	-6.1	-6.6	-9.2

Source: WAMI staff computation.

2.1.3 GDP Growth Rate

In this sub-section, we perform the trend analysis of economic growth in the WAMZ member countries during the periods (2001-2022). From Table 3, global developments such as the global financial crisis, COVID-19 pandemic, global commodity price slumps, especially during 2014/2015 period, alongside other domestic specific factors have largely influenced economic growth in the Region. Many countries have largely experienced mixed performance. For instance, both The Gambia and Guinea experienced higher real economic growth in the WAMZ in the last eleven years- 2012- 2022 compared to 2001- 2011. The remaining countries within the zone experienced declines in real economic growth. Again,

from Table 3A, besides The Gambia and Guinea, all other countries in the zone recorded lower growth between 2016-2020 on average compared to 2011-2015 due to the corona virus pandemic.

Table 4: Average GDP Rates in WAMZ

	2001-2011	2012-2022
The Gambia	2.5	3.8
Ghana	6.5	4.9
Guinea	3.4	5.9
Liberia	3.2	2.2
Nigeria	8.5	2.5
Sierra Leone	8.9	4.1

Source: WAMI staff computation.

Table 5A: Average GDP Rates in WAMZ

	2001-2005	2006-2010	2011-2015	2016-2020	2021	2022
The Gambia	2.8	4.3	0.5	4.2	5.3	4.9
Ghana	5.0	6.5	6.9	4.9	5.1	3.1
Guinea	3.1	3.2	4.6	7.6	5.0	4.3
Liberia	-2.4	7.8	5.1	-0.7	5.0	4.8
Nigeria	9.6	8.2	4.7	0.3	3.6	3.3
Sierra Leone	13.0	5.2	5.3	3.4	4.1	4.0

Source: WAMI staff computation.

2.1.4 Current Account Balance in percentage of GDP

Current account balances, on average, widened for most countries in the zone between 2012-2022 compared to the period between 2001-2011 (see Table 4). The increase in the current account deficit is an indication of the existence of undiversified production and export structures in the WAMZ, with some countries depending largely on primary commodities. With such undiversified structures, the WAMZ countries generally have limited capacity to respond to adverse shocks. For example, most countries in the zone were affected greatly by global developments such as the global financial crisis of 2007/2008 and commodity price shock of 2014/2015, as well as regional shocks like the Ebola epidemic of 2013/2014. WAMZ economies were affected at varying degrees which might have further worsened the current account balances. However, the trends suggest some improvements.

**Table 6: Average current Account balance
(% of GDP) in the WAMZ**

	2001-2011	2012-2022
The Gambia	-5.7	-7.8
Ghana	-4.5	-5.1
Guinea	-4.5	-13.6
Liberia	-7.6	-20.8
Nigeria	8.1	0.3
Sierra Leone	-14.3	-14.8

Source: WAMI staff computation.

Table 7A: Average current Account balance (% of GDP) in the WAMZ

	2001-2005	2006-2010	2011-2015	2016-2020	2021	2022
The Gambia	-4.1	-7.0	-7.2	-7.1	-8.1	-13.8
Ghana	-2.4	-6.3	-7.3	-3.5	-3.2	-5.3
Guinea	-0.5	-5.8	-15.6	-16.3	-1.3	-7.0
Liberia	-6.1	-10.2	-17.0	-20.5	-17.7	-16.8
Nigeria	8.5	8.8	1.4	-0.2	-0.4	-0.2
Sierra Leone	-6.9	-11.5	-29.0	-11.9	-14.9	-8.5

Source: WAMI staff computation.

2.1.5 Nominal Exchange Rate

Average nominal exchange rate depreciated in all the countries largely due to the abrupt crash of oil price, reduction in capital inflows, and disruptions to global supply chain, among others during 2012-2022 compared to the period 2001-2011.

Table 8: Average Nominal Exchange rate in the WAMZ

	2001-2011	2012-2022
The Gambia	25.6	45.3
Ghana	1.0	4.4
Guinea	3,903.0	8,352.5
Liberia	61.5	124.5
Nigeria	131.9	274.9
Sierra Leone	3.0	7.6

Source: WAMI staff computation.

Table 9A: Average Nominal Exchange rate variation in the WAMZ

	2001-2005	2006-2010	2011-2015	2016-2020	2021	2022
The Gambia	-14.0	1.0	-7.9	-3.8	0.0	-6.3
Ghana	-9.3	-8.2	-16.8	-7.8	-3.6	-29.8
Guinea	-12.5	-7.1	-5.1	-4.6	4.9	6.6
Liberia	-5.7	-4.4	-3.7	-14.4	-15.3	8.6
Nigeria	-4.9	-2.2	-4.6	-11.2	-10.6	-5.8
Sierra Leone	-6.0	-6.0	-4.7	-12.2	-5.8	-25.7
Convergence criterion	+/-10.0					

Source: WAMI staff computation.

2.1.6 Lending Rate

Between 2001 and 2022, lending rates in the WAMZ exhibited significant variability influenced by economic conditions, fiscal policies, and structural factors. Lending rates within the WAMZ varied widely during this period. For instance, between 2001 and 2022, the average rates ranged between 14.8 percent for Liberia and 28.2 percent for Ghana, reflecting divergent monetary policies and economic conditions across member States.

Persistent budget deficits were a significant driver of high lending rates. Other critical factors included foreign interest rates, country risk premiums, and money supply. Individual countries within the WAMZ showed distinct trends. For example, Ghana's average commercial bank lending rate was around 20 percent in 2021 but rose sharply to around 26 percent by the end of 2022 due to inflationary pressures and monetary tightening. High lending rates in the WAMZ were partly attributed to underdeveloped financial markets and limited access to financing. Overall, lending rates in the WAMZ remained relatively high compared to global averages during this period, reflecting both macroeconomic challenges and structural inefficiencies within the region. In comparison with other regions, the averages of lending rates during the sample period were: East Africa recorded 19.5 percent, South Africa stood at 11.8 percent, Europe was 3.8 percent, United States had 4.8 percent and Asia recorded 5.0 percent (Trading Economics, 2023).

Table 10: Average lending rate in the WAMZ

	2001-2005	2006-2010	2011-2015	2016-2020	2021	2022
The Gambia	29.75	27.73	28.20	28.40	19.50	19.50
Ghana	35.27	27.37	26.96	25.04	20.61	26.23
Guinea	17.45	19.10	16.80	12.30	11.50	11.50
Liberia	18.91	14.68	13.57	12.83	12.44	13.44
Nigeria	21.21	17.11	16.59	16.07	11.48	12.33
Sierra Leone	22.62	23.38	20.14	16.75	18.86	19.31

Source: WAMI staff computation.

3. LITERATURE REVIEW

3.1 Theoretical Literature Review

Macroeconomic imbalances refer to the significant deviations in key economic indicators, such as inflation, fiscal deficit, public debt, and current account balance, from sustainable levels. These imbalances often signal underlying structural weaknesses and can impede regional integration efforts (European Commission, 2012). Within monetary unions, addressing these imbalances is crucial to ensure convergence and stability (De Grauwe, 2013).

In the context of the West African Monetary Zone (WAMZ), macroeconomic imbalances remain a critical challenge due to heterogeneous economic structures and diverse fiscal policies (Mensah *et al.*, 2019). The theoretical underpinnings stem from the Optimal Currency Area (OCA) theory, which suggests that macroeconomic convergence is essential for a successful monetary union (Mundell, 1961). OCA criteria, including labour mobility, capital mobility, and fiscal integration, offer a framework to assess the readiness of member states for monetary integration (McKinnon, 1963).

The main indicators typically include inflation, public debt-to-GDP ratio, fiscal deficits, and current account imbalances. The Maastricht criteria for the European Union provide a benchmark for evaluating these indicators (Buiter, 2006). However, in developing regions like WAMZ, additional factors such as exchange rate volatility and external debt sustainability play pivotal roles (Saka *et al.*, 2015). Macroeconomic indicators interact in complex ways, often creating feedback loops. For example, fiscal deficits can lead to rising public debt, which may exacerbate inflationary pressures, especially when financed through monetary expansion (Fischer, 1993). Empirical studies show that current account deficits in WAMZ countries are

frequently linked to fiscal imbalances and exchange rate misalignments (Oshikoya & Tarawalie, 2010).

External and internal shocks significantly impact macroeconomic stability. External shocks, such as fluctuations in global commodity prices, affect export revenues, particularly for resource-dependent WAMZ economies (Gylfason, 2001). Internal shocks, including political instability or natural disasters, also contribute to economic volatility. Theoretical models like the Mundell-Fleming framework illustrate how different types of shocks propagate through open economies (Mundell, 1963). Dynamic Stochastic General Equilibrium (DSGE) models are often used to assess the effects of shocks on macroeconomic variables. These models incorporate various transmission mechanisms and can simulate policy responses (Smets & Wouters, 2003).

Addressing macroeconomic imbalances requires coordinated policy frameworks, focusing on fiscal discipline, inflation targeting, and exchange rate management (Bleaney & Francisco, 2012). For the WAMZ, establishing a robust surveillance mechanism to monitor macroeconomic performance and ensure compliance with convergence criteria is essential (IMF, 2019). The theoretical review establishes the groundwork for understanding macroeconomic imbalances within WAMZ, serving as a foundation for analysing empirical data and formulating policy recommendations.

3.2 Empirical Literature Review

Economic governance framework requires management of macroeconomic imbalances, including early identification of potential risks, prevention of harmful imbalances and correction of excessive imbalances (European Commission, 2011). Global imbalances pose significant global policy challenge and threaten economic and financial stability. There is a disagreement among policymakers regarding the causes of imbalances.

In analysing global imbalances, Bracke *et al.* (2008) provide evidence that there is a combination of structural and cyclical determinants driving the increase in macroeconomic imbalances. For instance, a country's demographic profile, the quality of institutions, monetary aggregates, and initial net foreign asset positions systematically influence its current account balances and net portfolio flows. Furthermore, Altayligil *et al.* (2020) identify key determinants of current account balances, including factors such as fiscal balance, economic growth, terms of trade, exchange rate, trade openness, oil dependency, financial market development and macroeconomic stability. Das (2016) observes a global current account imbalance, with

emerging economies running current account surpluses while developed economies widening their deficits. Particularly, eastern oil exporters have been increasing their potential for current account surpluses since the 1990s, whilst the USA and Eurozone economies have been running large and persistent current account deficits from the 2000s, and China and other emerging economies are running high and persistent current account surpluses. Shirakawa (2011) underlines that unsustainable global financial imbalances can be better captured through information such as the build-up of leverage, gross cross-border capital flows, risk pricing in financial markets, and the extent of currency and maturity mismatches in the financial system. According to Blanchard *et al.* (2010), significant changes in saving and investment patterns across the world have led to a considerable narrowing of imbalances as a result of financial crisis, and there is an urgent need to implement policy changes to address remaining domestic and international distortions that are a key cause of imbalances. Failure to address these distortions could result in the world economy being stuck in "midstream," posing a threat to the sustainability of recovery.

On the other hand, some authors focus their analysis on the interactions among imbalances. Using a panel vector autoregressive (VAR) model for a sample of 22 industrialised countries over the period 1980-2011, Gnimassoun and Mignon (2016) study interactions between financial cycles and macroeconomic imbalances. Their findings show that macroeconomic imbalances strongly interact through a causal relationship, and internal imbalances and exchange-rate misalignments are key drivers of external imbalances, with output gaps and currency overvaluation deepening current-account deficits. Adarov (2019, 2021), with the aid of Bayesian and generalised method of moments (GMM) panel VAR frameworks, studies interactions between financial cycles and macroeconomic imbalances based on a global sample of 24 countries spanning the period 1998–2012. The author finds that financial cycles play an important role in shaping macroeconomic imbalances with expansions inducing economic overheating and a downward pressure on public debt-to-GDP ratios, and vice versa. The results further highlight that bank-based economies exhibit a deeper and faster response of business cycles to financial misalignments, while the impact in market-based economies is milder, but more persistent, as well as more significant for current account and public debt dynamics. Therefore, financial cycles invoke a particularly strong reaction of current account balances and especially public debt ratios in the euro area.

Revisiting the twin deficit hypothesis, Bluedorn and Leigh (2011), and Afonso *et al.* (2022) investigate the effect of fiscal consolidation on the current account. Estimation results suggest

that fiscal consolidation reduces the current account deficit, supporting the twin deficits hypothesis. This effect is found to be substantially larger than that obtained using standard measures of the fiscal policy stance, such as the change in the cyclically adjusted primary balance. Finally, Comunale (2022) underscores the importance of managing these imbalances in the European Union (EU), particularly in the euro area, where the reaction of current account misalignments to Real Effective Exchange Rate (REER) misalignments is significant. These findings point to the need for effective management of macroeconomic imbalances to ensure stability and integration in the monetary system.

In the literature, there is evidence of interaction between macroeconomic imbalances and monetary integration. Some authors show evidence that monetary unions tend to impact macroeconomic imbalances. In analysing macroeconomic imbalances in the Euro area, Holinski *et al.* (2012) document a growing dispersion of external and internal balances between countries in the North and South of the Euro area over the period 1992 to 2007. For the authors, the persistent divergence process seems to have started with the introduction of the common currency and has its roots in the savings and investment behaviour of private sectors. Therefore, Greece, Ireland, Italy, Portugal, and Spain experienced a considerable deterioration of their international competitiveness and incurred high current account deficits (Hausken & Welburn, 2022). Belke *et al.* (2013) find that lack of competitiveness is the main explanation for the external deficits of the countries at the heart of the euro area debt crisis, requiring an asymmetric response to reduce the imbalances. Similarly, Tang (2019) finds that financial market development and integration have affected the current account balances in the EU countries in Central and Eastern Europe (CEE) during 1996–2015. The European Monetary Union (EMU) has eliminated the regulatory restrictions on cross-border capital flows. Thus, the increase in foreign capital inflows has helped finance the growing local consumption and investment needs, which has made the CEE countries run larger current account deficits. Other studies emphasise the effect of macroeconomic imbalances on monetary integration. Macroeconomic imbalances can lead to economic crisis. This is especially true in a monetary union due to the restrictions it imposes on the tools available to economic policymakers (Essl & Stiglbauer, 2011). The years leading up to the outbreak of the global economic crisis were characterised by divergent macroeconomic developments within the euro area, which meant that the impact of the crisis varied across member states and subsequent unexpected challenges have arisen for the single monetary policy and coordinated fiscal and economic policy.

The West African Monetary Zone (WAMZ) faces significant challenges in achieving monetary integration, as highlighted by Masson and Pattillo (2004). These challenges include fiscal imbalances, asymmetries in terms of trade, and inadequate legal and institutional infrastructures. Despite these obstacles, there are some positive signs, such as the progress towards a monetary union in the Economic Community of West African States (ECOWAS) (Ogunkola, 2005). However, the success of this union will depend on the implementation of structural adjustment programs and the convergence of economic policies. The CFA Franc Zone, which represents a form of monetary union, has been found to enhance macroeconomic integration in West Africa (Fielding, 2005). This suggests that there is potential for monetary integration in the region, but it will require significant efforts to address the existing imbalances and establish the necessary legal and institutional frameworks.

It could be seen that most of the available literature on the subject matter are not customised for the WAMZ. Therefore, this study seeks to fill the gap by undertaking an analysis of macroeconomic imbalances and their impact on the economic outcomes, with a view to offering relevant policy recommendations for their management. This will be helpful to policymakers and other stakeholders involved in the integration process.

4. METHODOLOGY

4.1 Modelling Strategy

Addressing macroeconomic imbalances requires dealing with endogeneity problems that arise when imbalances are inherently determined simultaneously. Therefore, drawing conclusions is challenging in an area where cross-country analysis has been a major component of research (Hume, 2020). In empirical macroeconomics, endogeneity issues of this type are, of course, frequent and can be solved using well-established techniques. One method is to utilise a dynamic stochastic general equilibrium (DSGE) model, which can break down previous outturns into a wide range of shocks to the underlying parameters that make up the model since it fully articulates the economic structure. Applying this method to comprehend the causes of macroeconomic imbalances in WAMZ has been attempted in recent years. However, such models may yield contradictory results because of data inadequacy and the sensitivity to the exact structure of WAMZ member states (Kemp & Serghides, 2017; Schorfheide & Song, 2021). Estimating a Vector Auto Regression (VAR) model, in which the structure of the economy is not fully articulated but is reflected in the key properties of a small-scale model, is

an alternative and less strict way to get around the endogeneity problem. It is possible to identify the subset of the shocks that affect the economy and use it to assess its impact.

The interactions among macroeconomic imbalances are investigated using a panel vector autoregressive (PVAR) framework that is estimated using a generalised method of moments (GMM) estimator, which accounts for individual country heterogeneity while allowing for dynamic relationships between multiple endogenous variables. The method is known to yield consistent estimates in panel data settings and is well-suited for panels with a relatively short time dimension. Also, panel VAR framework generally improves estimation quality by increasing the cross-sectional dimension (Canova & Ciccarelli, 2013). Prior to estimating the model, we conducted a cross-sectional dependence of residuals and a panel unit root test.

4.2 Econometric Model Specification

Following Gnimaassoun and Mignon (2016), Love and Zicchino (2006), Abrigo and Love (2016) and Adarov (2019), the model is defined as follows:

$$Y_{it} = \Gamma(L)Y_{it} + \mu_i + \varepsilon_{it} \quad (1)$$

Where Y_{it} is a vector of stationary variables, $\Gamma(L)$ is a matrix polynomial in the lag operator with $\Gamma(L) = \Gamma_1 L^1 + \Gamma_2 L^2 + \dots + \Gamma_p L^p$, μ_i is a vector of country specific effects and ε_{it} is a vector of idiosyncratic errors.

The panel-specific fixed effects will be removed from the above dynamic panel model using forward orthogonal deviation or Helmert transformation to cater for the inconsistency of the fixed effects estimators. According to Arellano and Bover (1995), this transformation preserves homoscedasticity and does not induce serial correlation. In order to investigate the interaction between macroeconomic imbalances and monetary integration, we estimate a first system of stationary variables:

Baseline Model:

$$Y_{it} = \begin{pmatrix} LENDING_{it} \\ GDPGR_{it} \\ CACCOUNT_{it} \\ INFLATION_{it} \\ FISCAL_{it} \end{pmatrix} \quad (2)$$

Where $GDPGR$ is the Real GDP growth rate, $CACCOUNT$ is current account balance (%GDP), $INFLATION$ is annual CPI inflation rate, $FISCAL$ is fiscal balance (%GDP), and $LENDING$ is lending rate.

For robustness check, in the second and third models, we changed the ordering of the variables within the baseline model to see if the results will change significantly. Then in the fourth model, we maintained the same ordering as in the baseline and added exchange rate. As discussed in the introductory section, the WAMZ is yet to form a monetary union. Unlike the WAEMU, the nominal exchange rate for each member country serves as a shock absorber.

Model 4:

$$Y_{it} = \begin{pmatrix} LENDING_{it} \\ GDPGR_{it} \\ CACCOUNT_{it} \\ INFLATION_{it} \\ FISCAL_{it} \\ \Delta LEXCHANGE_{it} \end{pmatrix} \quad (3)$$

Where $\Delta LEXCHANGE$ is the rate of change in the nominal exchange rate (LCU/USD).

Within each of the models, the optimal lag order was selected based on the conventional Akaike information criterion (AIC), the Bayesian information criterion (BIC), and the Hannan-Quinn information criterion (HQIC). After estimating all the coefficients of the panel VAR, the authors compute the impulse response functions (IRFs) and the variance decompositions (VDCs). Impulse response functions describe the response of an endogenous variable over time to a shock in another variable in the system. Variance decompositions measure the contributions of each source of shock to the (forecast error) variance of each endogenous variable at a given forecast horizon. The authors use bootstrap methods to construct the confidence intervals of the IRFs. Additionally, to specify the causal direction of the transmission mechanism between the macroeconomic imbalances, we rely on the panel non-causality test developed by Granger (1969). This test follows the estimation of the reduced-form of the homogeneous panel VAR, to derive whether past values of a variable, say, x , are useful in predicting the values of another variable y , conditional on past values of y . That is, whether x “Granger-causes” y . This is implemented as separate Wald tests with the null hypothesis that the coefficients of all the lags of an endogenous variable are jointly equal to zero.

The ordering of variables used in the Cholesky identification schemes to derive orthogonal shocks may potentially lead to different results due to underlying assumptions about the sequencing of innovations and invoked responses of endogenous variables. The ordering of the variables in the baseline model is the same as the specification in equation (2), that is $[LENDING, GDPGR, CACCOUNT, INFLATION, FISCAL]'$. This factorisation scheme puts

the financial variable first, assuming it is most exogenous of the rest of the vector variables, then followed by the real GDP growth, the current account, inflation, and fiscal balance as the most endogenous. As the financial variable ($LENDING_{it}$) is ordered first, this implies that it affects all other variables both instantaneously and with a lag, but other variables only affect it with a lag. Generally, the lending rate is set by the central bank as part of monetary policy and is usually an independent policy tool that does not directly react to the other variables in the short term (Abdou & Aljohani, 2022). The fiscal balance variable is put last because it is considered to be endogenous in the model and it reacts to economic condition variables such as GDP growth, inflation, and external shocks, among others (Bazzaoui & Nagayasu, 2021). However, the chosen ordering scheme in the baseline model may not always be accurate. Therefore, we apply alternative specifications to check the robustness of our results.

4.3 Optimal Lag Number for Model Estimation

The correct lag length selection is essential for panel vector autoregressive (PVAR) because having lags which are too short may fail to capture the system's dynamics, leading to omitted variable bias. Conversely, having too many lags causes a loss of degrees of freedom, resulting in over-parameterisation.

We choose the optimal lag of the PVAR based on Hansen's (1982) J statistic and corresponding p-value. Similar to maximum likelihood-based information criteria (AIC, BIC, and HQIC), the model that minimises the Moment Bayesian information criterion (MBIC), the Moment Akaike information criterion (MAIC), and the Moment Hannan and Quinn information criterion (MQIC) is the preferred model. Results in Appendix Table A.3 show that the optimal lag for our model estimation is one (1). Therefore, the baseline model and alternative specifications employed in the paper satisfy the eigenvalue stability conditions².

5. EMPIRICAL RESULTS AND DISCUSSIONS

We start with the description of the variables used to assess the macroeconomic imbalances in the WAMZ. Further, we estimate a homogeneous PVAR model with five variables from the six WAMZ member countries, as a baseline case. We compute orthogonalised impulse response functions (IRFs) and forecast error variance decomposition (FEVD) to track the

² Eigenvalue stability condition test and its related graph is reported in Table A.4 of the Appendix

impact of each variable in the system over time. Orthogonalised IRFs are obtained using the Cholesky factorisation scheme.

5.1 Description of Data and Sources

The interaction among macroeconomic imbalances is studied from 2001 to 2022 for the six (6) WAMZ member states based on the availability of data on the variables of interest. Macroeconomic imbalances are measured by inflation rate (%), fiscal balance (% of GDP), real GDP growth rate (%), nominal exchange rate (LCU/USD), current account balance (% of GDP), and lending rate (%). Table A.1 in Appendix presents the sources of the data used in the paper. The data on inflation and nominal exchange rates were obtained from the WAMI database. Similarly, we extracted fiscal and current account balances from the International Monetary Fund's (IMF) World Economic Outlook Databases, while lending rate was sourced from the International Financial Statistics of the IMF. The real GDP growth rate was obtained from the World Bank's World Development Indicators (WDI). For the empirical estimation, inflation rate, fiscal balance, real GDP growth rate, current account balance, and lending rate were used in their natural forms. However, the nominal exchange rate (LCU/USD) was logged and differenced once in order to attain normalisation and stationarity at first difference ($I(1)$).

Table 7 presents the descriptive statistics for the variables employed in the analysis for the period 2001-2022. The statistics reveal substantial variations in real GDP growth rate, inflation rate, fiscal balance, nominal exchange rate, current account balance, and lending rate across member States over time. For instance, The Gambia recorded the lowest average inflation rate of 6.90 percent, while Ghana recorded the highest rate of 14.33 percent over the sample period, deviating from the inflation rate convergence threshold of ≤ 5 percent. Guinea recorded the lowest average fiscal deficit of 1.45 percent, followed by Nigeria (-1.57%), Liberia (-2.18%), The Gambia (-3.09%), Sierra Leone (-3.69%), and Ghana (-6.35%). Clearly, half of the member states met the convergence criterion of ≤ 3 percent fiscal deficit.

With respect to GDP growth rate, The Gambia recorded the highest growth rate of 5.74 percent compared to Liberia with the lowest growth rate of 2.39 percent over the 22 years. Similar to other variables, there were clear statistical differences in the nominal exchange rates among the member states as, on average, the Guinean GNF 6,127.73, the Nigerian ₦ 203.42, Liberian LRD 92.98, The Gambian GMD 35.47, the Sierra Leone SLL 5.27, and the Ghanaian GHS 2.71 were exchanged for USD 1.00. On current account (% GDP), we found that only Nigeria recorded positive average current account balance among the member states. All other member

states recorded substantially large negative current account balances, suggesting weak external sector resilience.

At the WAMZ level, the statistics revealed that the mean value of the nominal exchange rate and lending rate are the highest at 1,077.93 and 20.74 percent, respectively, followed by the mean of inflation rate, real GDP growth rate, current account balance, and fiscal balance. The mean values of inflation rate and real GDP growth rate were shown to be 11.54 percent and 4.39 percent respectively, while the mean value for fiscal balance and current account balance have mean values of -3.06 percent and -7.47 percent, respectively. These variables generally showed significant macroeconomic imbalances and clear deviations from the convergence criteria necessary for achieving monetary union in the WAMZ.

Table 11 : Descriptive Statistics

	Variable	Obs	Mean	Std. dev.	Min	Max
The Gambia	Inflation rate (%)	22	6.90	3.43	2.06	17.03
	Fiscal balance (%GDP)	22	-3.09	1.81	-6.22	0.28
	GDP growth rate (%)	22	5.74	2.90	0.51	14.05
	Nominal exchange rate (LCU/USD)	22	35.47	11.60	15.69	54.92
	Current account (%GDP)	22	-6.61	2.97	-15.02	-2.72
	Lending rate (%)	22	27.70	3.81	19.50	36.50
Ghana	Inflation rate (%)	22	14.33	5.68	8.60	31.47
	Fiscal balance (%GDP)	22	-6.35	3.68	-17.44	-2.01
	GDP growth rate (%)	22	3.07	4.04	-8.13	7.23
	Nominal exchange rate (LCU/USD)	22	2.71	2.14	0.72	8.27
	Current account (%GDP)	22	-4.64	2.57	-8.95	0.08
	Lending rate (%)	22	28.18	5.61	20.61	46.72
Guinea	Inflation rate (%)	22	13.67	8.07	2.96	34.702
	Fiscal balance (%GDP)	22	-1.45	6.04	-9.66	23.23
	GDP growth rate (%)	22	4.58	2.67	-1.12	10.82
	Nominal exchange rate (LCU/USD)	22	6,127.73	2,649.28	1,950.56	9,565.08
	Current account (%GDP)	22	-9.22	8.05	-30.66	0.33
	Lending rate (%)	22	15.97	4.72	9.00	25.25
Liberia	Inflation rate (%)	22	11.42	5.46	6.83	26.88
	Fiscal balance (%GDP)	22	-2.18	2.93	-7.13	4.23
	GDP growth rate (%)	22	2.39	8.14	-30.15	9.54
	Nominal exchange rate (LCU/USD)	22	92.98	45.02	48.59	191.52
	Current account (%GDP)	22	-14.21	10.34	-34.31	2.22
	Lending rate (%)	22	14.81	2.59	12.44	22.14
Nigeria	Inflation rate (%)	22	12.88	3.67	5.39	18.87
	Fiscal balance (%GDP)	22	-1.57	4.31	-6.03	8.76
	GDP growth rate (%)	22	5.15	3.77	-1.79	15.33
	Nominal exchange rate (LCU/USD)	22	203.42	100.36	111.23	425.98
	Current account (%GDP)	22	4.18	6.35	-3.72	21.53

Sierra Leone	Lending rate (%)	22	17.21	3.05	11.48	24.77
	Inflation rate (%)	22	10.05	5.99	0.121	27.21
	Fiscal balance (%GDP)	22	-3.69	5.81	-10.91	20.09
	GDP growth rate (%)	22	5.40	8.99	-20.49	26.52
	Nominal exchange rate (LCU/USD)	22	5.27	3.21	1.99	14.05
	Current account (%GDP)	22	-14.33	13.22	-65.03	-5.04
	Lending rate (%)	22	20.57	2.87	15.66	25.00
WAMZ	Inflation rate (%)	132	11.54	6.05	0.12	34.70
	Fiscal balance (%GDP)	132	-3.06	4.59	-17.44	23.23
	GDP growth rate (%)	132	4.39	5.70	-30.15	26.52
	Current account (%GDP)	132	-7.47	10.24	-65.03	21.53
	Lending rate (%)	132	20.74	6.64	9.00	46.72
	Nominal exchange rate (LCU/USD)	132	1,077.93	2,504.17	0.72	9,565.08

Source: WAMI Staff computations using STATA 17.0 Econometric package. GDP-gross domestic product. LCU/USD: local currency unit per US Dollar.

5.2 Preliminary Specification Tests

5.2.1 Tests of Cross-Sectional Dependence of Residuals

Our preliminary analysis begins by looking at the stochastic properties of the variables of interest. First, we test the cross-sectional dependence of the variables among the panel units. De Hoyos *et al.* (2006) show that the presence of cross-sectional dependence of the residuals makes estimators based on instrumental variables and generalised methods of moments (GMM), such as those of Anderson and Hsiao (1981), Arellano and Bond (1991), and Blundell and Bond (1998), inconsistent. Given that the panel's time dimension is larger than the cross-sectional dimension ($T > N$), we implemented the Lagrange multiplier (LM) test, developed by Breusch and Pagan (1980) for cross-sectional independence in the residuals of a fixed effect regression model. The resulting test statistic (CD) is based on Chi-square distribution under the null hypothesis of cross-sectional independence. The results shown in Appendix Table A.2 indicate that the null hypothesis is rejected at 5 percent level of significance. This confirms that the WAMZ member states are cross-sectionally correlated on the variables of interest.

5.2.2 Unit Root Test

Following the results from the cross-sectional dependence test, we carry out a second-generation panel unit root test, the cross-sectional Im, Pesaran, and Shin (CIPS) statistics for unit roots in heterogeneous panels developed by Pesaran (2007) to determine the degree of integration of our series of interests in the panel of all six WAMZ member countries. Parallel to Im, Pesaran and Shin (IPS, 2003) test, the CIPS test is based on the mean of individual Dickey-Fuller (or Augmented Dickey-Fuller – ADF) t-statistics of each unit in the panel. The

null hypothesis assumes that all series are non-stationary. To eliminate the cross-sectional dependence, the standard ADF regressions are augmented with the cross-section averages of lagged levels and first-differences of the individual series. Table 8 reports the results of the unit root test. At conventional levels of significance, and regardless of the specification (including constant, trend or both) the results show that all variables are stationary except for the nominal exchange rate variable which is only stationary at first difference. Therefore, we consider in the models the variables GDPGR, INFLATION, CACCOUNT, FISCAL and LENDING in level, whilst Δ LEXCHANGE enters in its first difference.

Table 12: Panel unit root test results

Variables	Pesaran PURT with CD – CIPS Statistics		
	<i>Without Constant nor Trend</i>	<i>With Constant</i>	<i>With Constant and Trend</i>
GDPGR	-3.147***	-3.491***	-3.674***
INFLATION	-2.317***	-3.108***	-4.132***
CACCOUNT	-2.471***	-3.055***	-3.459***
FISCAL	-3.203***	-3.734***	-4.273***
LENDING	-2.916***	-2.575***	-2.793*
ALEXCHANGE	-2.831***	-2.894***	-3.085**

*Source: WAMI staff computations. Note: The table shows the Cross-Sectional Im, Pesaran, and Shin (CIPS) statistics for unit roots in heterogeneous panels developed by Pesaran (2007), at critical level of significance (***, **, and * for 1%, 5% and 10% respectively). Null hypothesis: all panels have a unit root. Lags are selected based on the SBIC criterion. PURT – Panel unit root test.*

5.3 Estimation Results from the Panel VAR Model

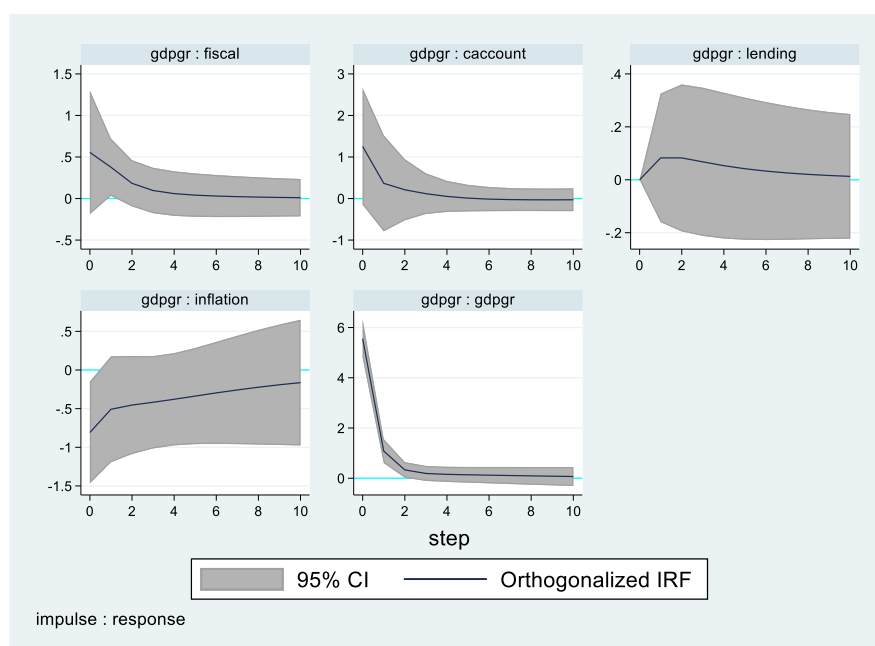
5.3.1 Impulse Response Functions (IRF) from the Baseline Model

From the orthogonalised impulse response functions profiles, there exist evidence of interactions among the imbalances within the WAMZ. The most striking feature from the results is that, in most cases, the confidence bounds indicate a low level of statistical significance. However, key exceptions are noteworthy.

A positive shock in real GDP growth leads to a positive, but insignificant response of the current account and fiscal balance, and a negative and statistically significant effect on inflation contemporaneously (see Figure 2). That is, one standard deviation shock in economic growth leads to an instantaneous increase of about 1.3 percent and 0.6 percent in the current account balance and fiscal balance, respectively, but the effects traced out within a year period. As for inflation, a standard deviation shock in economic growth reduces it by 0.8 percent, before gradually converging to equilibrium. In other words, a shock in GDP growth widens current

account balance and fiscal deficit together with a contraction in inflation. The deterioration in the current account balance could be explained by a demand effect. Indeed, when production factors are limited to meet domestic demand, excess demand is offset by an increase in imports which negatively affects the trade balance in the zone. The negative impact of economic growth shock on fiscal deficit can be explained by pro-cyclical fiscal policies in the zone. In times of economic expansion, governments are tempted to increase spending or reduce taxes, as they may feel more comfortable borrowing or spending, believing the growth will sustain itself.

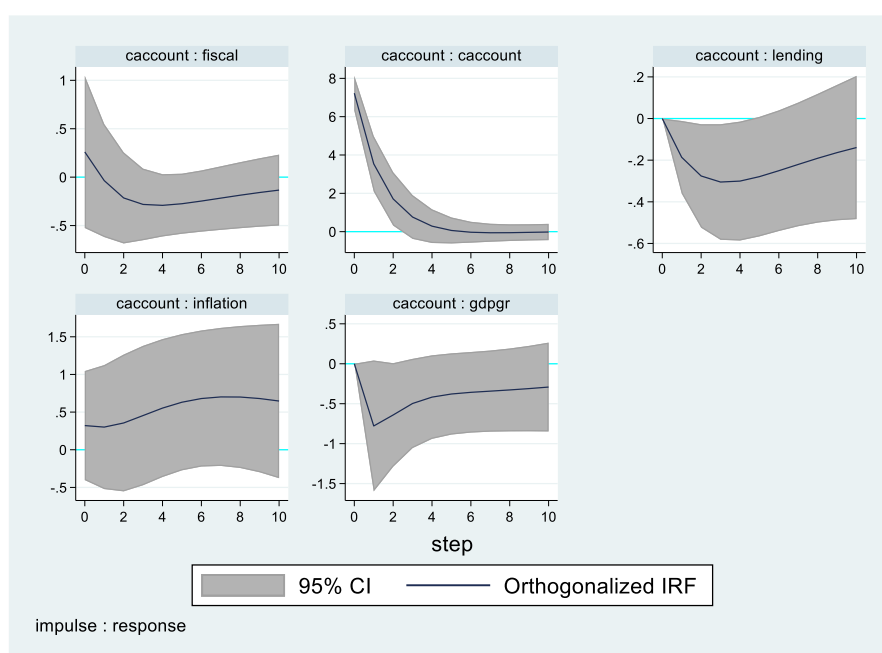
Figure 2: Real GDP growth shock impulse response function



Note: The figure shows orthogonalised impulse response functions (“impulse variable: response variable”) with 95% confidence intervals associated with the baseline GMM PVAR model.

From the impulse response functions in Figure 3, a positive current account shock significantly affects only the interest rate, but the effect appears only after a year. A standard deviation shock in the current account balance induces a fall in the lending rate by 0.2 percent. Its impact on economic growth is found to be negative. The reason is that a persistent current account deficit might signal underlying economic imbalances, such as a lack of competitiveness in domestic industries or an overreliance on imports. These imbalances can cause the country’s deindustrialisation by outsourcing production to other countries, or its potential external dependency undermining the potential for self-sustaining growth (Mankiw, 2021; Thirlwall, 2011). Further, the effect of current account shock is found to be positive on fiscal balance, and inflation, even though it is statistically insignificant.

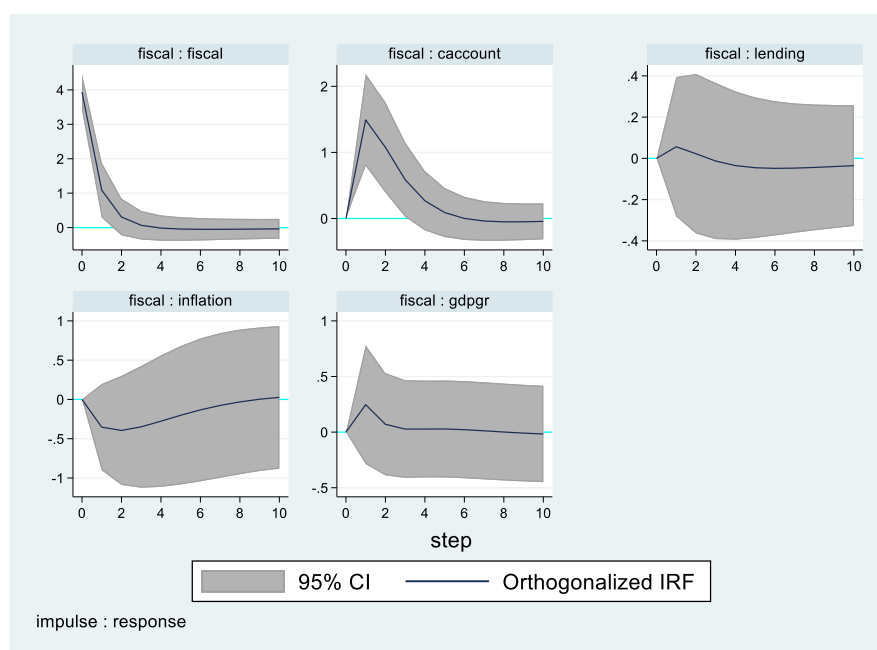
Figure 3: Current account shock impulse response function



Note: The figure shows orthogonalised impulse response functions (“impulse variable: response variable”) with 95% confidence intervals associated with the baseline GMM PVAR model.

In Figure 4, the impulse response functions show that current account balance responds positively and significantly to fiscal shock. An increase of one standard deviation shock in fiscal balance leads to an expansion in current account balance of 1.5 percent in the first year and a then gradually decrease, before it adjusts to the equilibrium after 5 years. These findings support the economic theory of twin deficit in the West African Monetary Zone. However, we could not find evidence of a significant effect on other variables under study. Especially, the response of inflation to a standard deviation shock in fiscal balance leads to a rise in output growth and a decline in inflation in the first two years, before tracing out. In the particular case of inflation, while this result does not meet the expected sign, it could be supported by the Keynesian view that a widened fiscal deficit if it stimulates economic growth and boosts supply-side factors, can lower inflation in the short run (Keynes, 1936; Auerbach & Gorini, 2019).

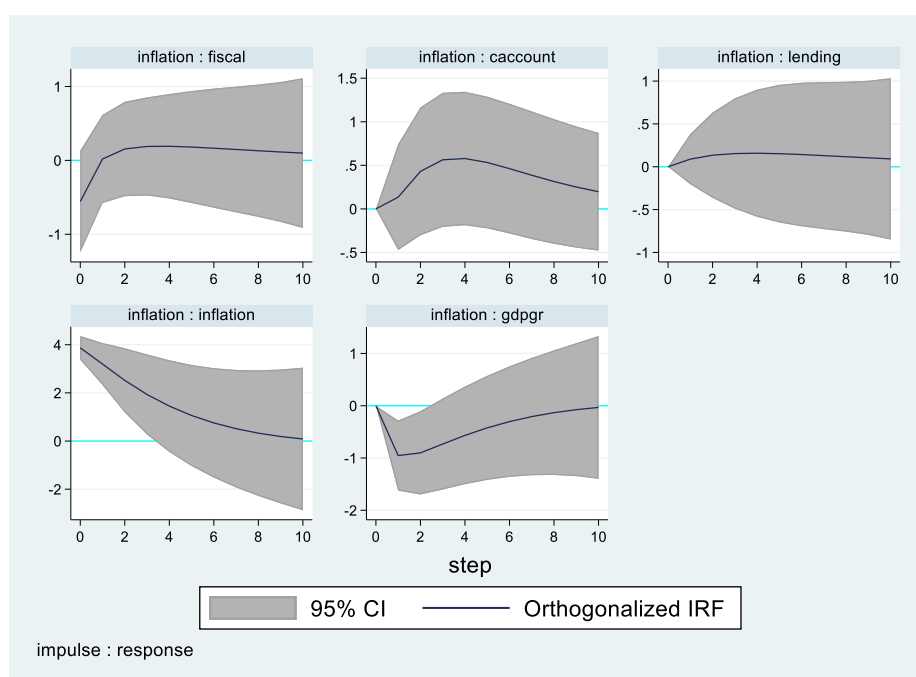
Figure 4: Fiscal balance impulse response function



Note: The figure shows orthogonalised impulse response functions (“impulse variable: response variable”) with 95% confidence intervals associated with the baseline GMM PVAR model.

As displayed in Figure 5, a positive shock in inflation significantly affects only economic growth, as one standard deviation shock induces a fall of 0.9 percent in GDP growth in the first 2 years. As for fiscal balance and current account, the responses from the deviations are not statistically significant, and the magnitudes quite low.

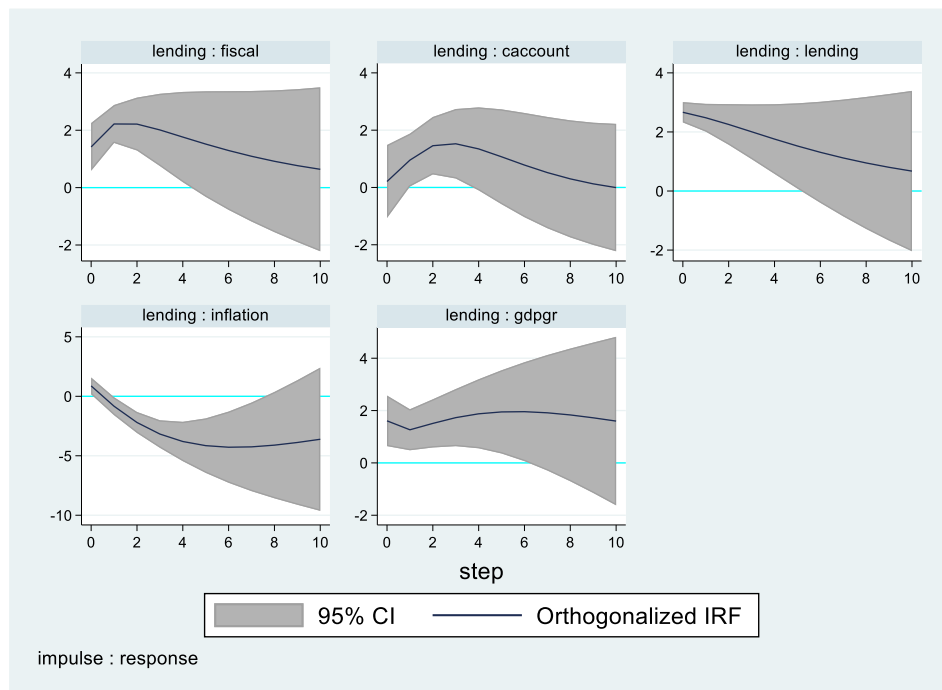
Figure 5: Inflation shock impulse response function



Note: The figure shows orthogonalised impulse response functions (“impulse variable: response variable”) with 95% confidence intervals associated with the baseline GMM PVAR model.

The impulse response functions depicted in Figure 6 indicate that all variables retained react significantly to innovation in the lending (interest) rate. Inflation in the WAMZ responds negatively and significantly with a lag, while fiscal balance, current account, and GDP growth are affected positively. The effect of one standard deviation increase in the financial variable leads to a decrease in inflation, reaching a minimum of 4.2 percent drop in the eighth year, and remains persistent after ten years. However, a standard deviation shock in the interest rate leads to 1.4 percent, 0.2 percent and 1.6 percent increase in fiscal balance, current account, and GDP growth respectively in the first year. Also, the impact is persistent afterward.

Figure 6 : Lending rate shock impulse response function



Note: The figure shows orthogonalised impulse response functions ("impulse variable: response variable") with 95% confidence intervals associated with the baseline GMM PVAR model.

5.3.2 The Forecast Error Variance Decomposition (FEVD) from the Baseline Model

To assess the magnitude of the variations in one variable in explaining changes in other variables, we perform a variance decomposition, presented in Appendix Table A.5. As expected, all the forecast error variance is not only attributed to own innovations, but also to the fluctuations in other variables, and the patterns are consistent with the insights from the impulse response functions.

The most prominent impact comes from innovations in lending rate, explaining inflation by 4.6 percent in the first year, but 43.4 percent and 72.1 percent in the fifth and tenth years, respectively. The financial variable also explains 7.7 percent to 45.1 percent of the variation in economic growth. Similarly, one standard deviation shock to lending rate leads to 11.1 percent

to 58.3 percent variation in fiscal balance, and 0.1 percent to 11 percent variation in current account balance over ten years. Our finding shows that the contribution of lending rate in explaining changes in other variables is persistent over the time horizon.

Furthermore, the results indicate that about 4.6 percent and 2.9 percent of the variation in current account balance is attributable to innovation in fiscal balance in the fifth year, and in economic growth in the first year. Also, 1.7 percent of change in fiscal balance is attributable to GDP growth in the first year.

5.3.3 The Panel Granger Causality Test Results

To understand how the macroeconomic imbalances variables interact with each other, we perform a causality test. The Granger causal direction based on the homogeneous PVAR model in line with Abrigo and Love (2016), is particularly useful to inform policymakers in managing the imbalances. The results presented in Table 9 below indicate that the homogeneous non-causal relationship is rejected from lending rate to inflation, fiscal balance (at 1 percent significance level) and real GDP growth (at 5 percent significance level). In addition, our finding shows significant causal linkages from fiscal balance to current account balance, consistent with our previous conclusion in support of the twin deficit theory in the WAMZ.

Globally, the outcomes from the Granger causality test confirm the impulse response and forecast error variance decomposition analysis, which notably revealed that a shock in interest rate significantly affects almost all other variables of interest. Therefore, managing the financial variable together it with sound policies to improve fiscal deficit and economic growth, could play a role in reducing imbalances in the zone.

Table 13: Panel Granger causality results

Y ↓	X →	LENDING	GDPGR	CACCOUNT	INFLATION	FISCAL
LENDING	χ^2		0.979	4.003**	0.419	0.095
	<i>p-value</i>		0.323	0.045	0.517	0.758
GDPGR	χ^2	6.286**		3.671*	7.567***	0.629
	<i>p-value</i>	0.012		0.055	0.006	0.428
CACCOUNT	χ^2	0.967	0.557		1.277	17.770***
	<i>p-value</i>	0.325	0.456		0.259	0.000
INFLATION	χ^2	37.960***	1.288	0.048		1.317
	<i>p-value</i>	0.000	0.256	0.827		0.251
FISCAL	χ^2	35.634***	3.731*	0.187	0.345	
	<i>p-value</i>	0.000	0.053	0.665	0.557	

*Note: The table shows the results (The Chi-Squared and their corresponding p-value) of the Granger causality Wald test based on the baseline PVAR specification in line with Abrigo and Love (2016). Null-hypothesis: variable X (first row) does not Granger-cause variable Y (first column). ***, **, * indicate statistical significance at the 1%, 5% and 10% levels.*

5.3.4 Robustness Checks

To check the robustness of our results, we perform three different specifications of the model. These include three alternative shock identification schemes to derive the IRF, and one specification by adding a new variable to the baseline model. It is established that the variables of interest used to assess the dynamic of macroeconomic imbalances are interrelated.

Baseline Model : (LENDING, GDPGR, CACCOUNT, INFLATION, FISCAL)

We test these alternative ordering schemes:

Model 2: (FISCAL, INFLATION, CACCOUNT, GDPGR, LENDING)

Model 3: (LENDING, CACCOUNT, GDPGR, FISCAL, INFLATION)

Model 4: (LENDING, GDPGR, CACCOUNT, INFLATION, FISCAL, Δ LEXCHANGE)

The results show that our findings from the baseline model are globally robust both to the ordering of variables used in the Cholesky identification schemes to derive orthogonalised IRF, and the extended model with additional variable. As reported in Appendix Figure A.1 to A.6, a positive shock to the lending rate leads to significant impact on all other variables. Inflation responds negatively and significantly with a lag, while fiscal balance, current account, and GDP growth increased. Like previously, the current account responds positively and significantly to fiscal shocks. In all specifications, although the ordering affects the statistical significance, the magnitudes remained similar and the effects persistent over time. This outcome is also consistent with the analysis with the forecast error variance decomposition from the baseline model.

6. CONCLUSION AND RECOMMENDATIONS

In most developing countries, and specifically in the WAMZ, economies remain characterised by several vulnerabilities due to their structures. These vulnerabilities often cause their economies to diverge from both their long run internal and external equilibrium. These imbalances, if they are not assessed and well managed, represent serious threats for individual economic progress, as well as their integration process. Following Adarov (2019), Gnimaoun and Mignon (2016), and Abrigo and Love (2016), this paper examines macroeconomic imbalances in WAMZ member States and their interactions. The empirical study is conducted using a panel VAR approach with data from all six (6) WAMZ member States, namely: The Gambia, Ghana, Guinea, Liberia, Nigeria and Sierra Leone that spanned the period 2001 to 2022.

Our results show evidence of pertinent interactions among macroeconomic imbalances through a causal relationship and their responses to shocks. A standard deviation shock in economic growth leads to a widening in current account balance and fiscal deficit (1.3% and 0.6%, respectively) together with a significant contraction in inflation (0.8%). While the negative effect of economic overheating on current account balance can be explained by demand effect, its impact on fiscal deficit increase can be attributed to pro-cyclical fiscal behaviour in the Zone. The impulse response function indicates that a standard deviation shock in current account balance induces a decline in lending rate by 0.2 percent in the first year. Its impact on economic growth is however found to be negative (-0.8%). The reason is that a persistent current account deficit is usually a signal of lack of competitiveness in domestic industries or an overreliance on imports (the case in most developing countries). Our findings support the theory of twin deficit in the WAMZ, with the effect going from fiscal deficit to current account deficit. Further, we found that imbalances in price level significantly affect only economic growth. Another key result shows that an increase in lending rate impacts all other variables of interest, by reducing inflation rate and increasing real GDP growth, fiscal balance and current account balance. All these results are aligned with the analysis of the forecast variance error decomposition and the Granger causality test.

Macroeconomic imbalances may have profound implications on the realisation of the convergence criteria and the sustenance of the monetary union in the West African Monetary Zone. High inflation can erode the purchasing power of citizens, particularly hurting lower-income households. It creates uncertainty, making it difficult for economic agents to plan for the future. This often leads to reduced investment, which in turn affects economic growth and employment. Price volatility in the region has made it difficult to achieve the inflation criterion of not more than 5 percent, as a result of factors such as rising food prices, currency depreciation, infrastructural deficit and excessive government borrowing. Large fiscal deficits if financed by borrowing (especially from external sources) can lead to an unsustainable rise in public debt. This affects the countries performance in attaining the secondary convergence criteria of public debt-to-GDP ratio of not more than 70 percent. Current account deficits can lead to a depletion of foreign exchange reserves, which are necessary for stabilising the currency and covering import costs. A reduction in reserves can further exacerbate the balance of payments problem. It becomes difficult for WAMZ member countries to achieve the criterion of gross external reserves (in months of import cover) of at least 3 months. Macroeconomic imbalances, particularly fiscal deficits and inflation can reduce investor

confidence and slow down economic growth. Investors seek stable environments, and persistent imbalances create uncertainty, making it less likely that both foreign and domestic investment will flow into the country. Also, imbalances can divert attention away from critical long-term development goals (such as education, health, and infrastructural development), thus hindering the country's ability to unlock its full growth potential.

Addressing these imbalances typically requires a combination of prudent fiscal management, structural reforms, and policies aimed at increasing export competitiveness, improving social welfare, and fostering long-term economic stability. More specifically, member countries could strengthen tax systems by broadening the tax base and cutting non-essential expenditures to reduce the inherent budget deficit as reflected in our findings. Additionally, they should prioritize investment in infrastructure and social sectors, which have high long-term returns. About the monetary policy, central banks should reinforce measures to attain their core objectives of low and stable inflation, as high inflation undermines purchasing power, reduces investment, and erodes savings. This can be achieved through controlling money supply and adjusting interest rates to influence demand and inflation expectations, given the significant impact of the interest rate on other macroeconomic variables in our study. To tame the high and persistent inflation in the Zone, member states' central banks should adopt inflation targeting framework, which could enhance policy credibility. To reduce current account imbalances and external vulnerabilities, countries should diversify their export base, increase productivity, and reduce reliance on imports. Encouraging sectors like manufacturing, technology, and services can enhance economic resilience. Effective macroeconomic imbalances management requires a close coordination between fiscal policies (government spending and taxation) and monetary policies (interest rates and money supply) to achieve overall stability and growth.

As observed in the Euro area, the implementation of a Macroeconomic Imbalance Procedure (MIP) would help prevent and correct macroeconomic imbalances in the WAMZ and to achieve the objectives of monetary union. The preventive arm of MIP seeks to detect the emergence of imbalances in advance. In case of existing serious imbalances, the corrective arm of the procedure requires member States to put in place a detailed policy plan to achieve their correction and further provides means to effectively enforce it.

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APPENDIX

Table A. 1: Sources of variables

Variable	Notation	Definition	Source
Inflation rate (%)	INFLATION	Annual average percentage change of consumer price indices	WAMI's zonal table
Fiscal balance (%GDP)	FISCAL	General Government fiscal net borrowing/lending in percentage of GDP	World Economic Outlook Database - International Monetary Fund
Real GDP Growth rate (%)	GDPGR	Annual percentage growth rate of GDP at market prices based on constant local currency	World Development Indicators - World Bank
Nominal exchange rate (LCU/USD)	EXCHANGE	Nominal exchange rate against US Dollar, period average	WAMI's zonal table
Current account balance (% GDP)	CACCOUNT	Current account balance as a percentage of GDP	World Economic Outlook Database - International Monetary Fund
Lending rate (%)	LENDING	Bank lending rate, percent per annum	International Financial Statistics - International Monetary Fund

Table A. 2: Tests of cross-sectional dependence of residuals

Correlation matrix of residuals:

	__e1	__e2	__e3	__e4	__e5	__e6
__e1	1.000					
__e2	0.520	1.000				
__e3	-0.459	-0.144	1.000			
__e4	-0.189	-0.199	-0.072	1.000		
__e5	0.349	0.272	0.034	-0.157	1.000	
__e6	0.205	0.310	0.253	0.333	0.366	1.000

Note: Lagrange multiplier (LM) test, developed by Breusch and Pagan (1980) for cross-sectional independence in the residuals of a fixed effect regression model: $\chi^2(15) = 27.503$, $Pr = 0.0249$. Based on 22 complete observations, under the null hypothesis of cross-sectional independence.

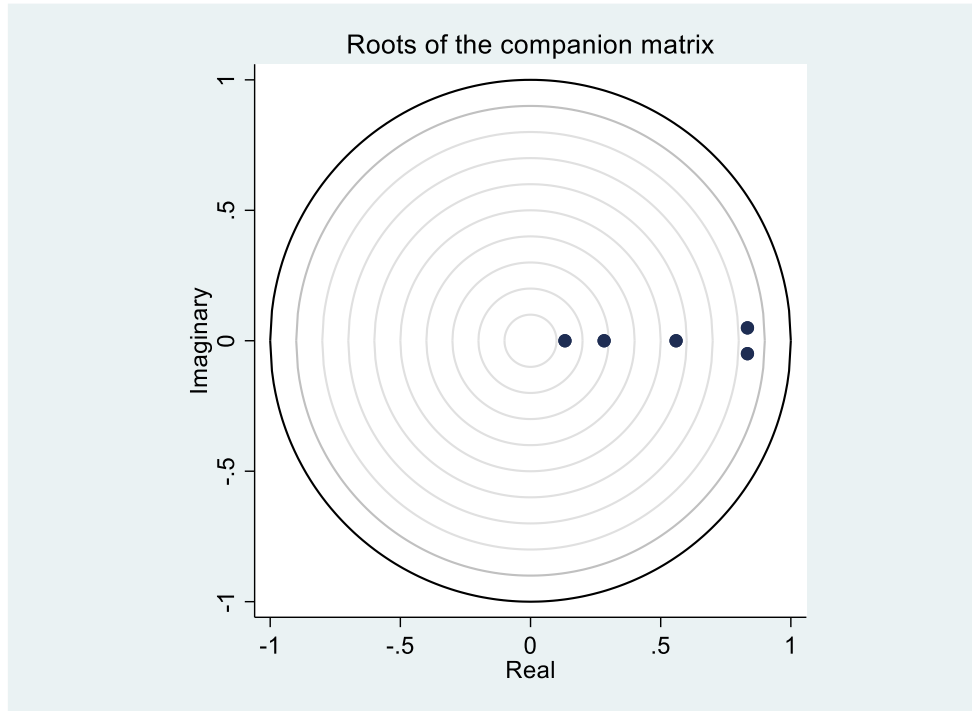
Table A. 3: Panel VAR lag order selection

Selection order criteria				No of obs	= 96	
Sample: 2006 - 2021				No of panels	= 6	
				Ave. no. of T	= 16	
lag	CD	J	J p-value	MBIC	MAIC	MQIC
1	0.718	77.329	0.284	-246.7393*	-64.67057*	-138.2657*
2	0.767	54.652	0.179	-155.308	-37.348	-85.029
3	0.799	23.495	0.318	-72.356	-18.505	-40.272

Note: The table reports the overall coefficient of determination, Hansen's (1982) J statistic and corresponding p-value for the baseline GMM PVAR .

Table A. 4: Eigenvalue stability condition

Eigenvalue		Modulus
Real	Imaginary	
0.8333909	-0.0494493	0.8348567
0.8333909	0.0494493	0.8348567
0.5590755	0	0.5590755
0.2827602	0	0.2827602
0.1323073	0	0.1323073



Check the stability condition of the PVAR estimates as computed by Abrigo and Love (2016).
 All the eigenvalues lie inside the unit circle, our PVAR satisfies stability condition.

Table A. 5: Forecast error variance decomposition of the PVAR (Share of variance explained)

Horizon	Baseline Shock to Innovations					Model 2 Shock to Innovations					Model 3 Shock to Innovations					Model 4 Shock to Innovations				
	LENDING	CACCOUNT	FISCAL	GDPRG	INFLATION	LENDING	CACCOUNT	FISCAL	GDPRG	INFLATION	LENDING	CACCOUNT	FISCAL	GDPRG	INFLATION	LENDING	CACCOUNT	FISCAL	GDPRG	INFLATION
FEVD for LENDING																				
1	100.00%	0.00%	0.00%	0.00%	0.00%	77.00%	0.00%	11.10%	6.10%	5.80%	100.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%
5	98.50%	1.10%	0.00%	0.10%	0.30%	72.40%	1.30%	10.70%	8.40%	7.20%	98.50%	1.00%	0.00%	0.20%	0.30%	89.80%	0.30%	0.10%	0.00%	0.50%
10	97.70%	1.70%	0.00%	0.10%	0.50%	71.70%	1.90%	9.90%	8.70%	7.80%	97.70%	1.50%	0.10%	0.20%	0.50%	87.80%	0.30%	0.20%	0.00%	2.60%
FEVD for CACCOUNT																				
1	0.10%	97.00%	0.00%	2.90%	0.00%	0.00%	98.80%	0.80%	0.00%	0.30%	0.10%	99.90%	0.00%	0.00%	0.00%	0.30%	98.00%	0.00%	1.60%	0.00%
5	8.80%	83.40%	4.60%	2.20%	1.00%	3.20%	82.50%	9.90%	0.40%	4.00%	8.80%	85.40%	4.20%	0.10%	1.50%	5.90%	88.10%	3.40%	1.20%	0.80%
10	11.00%	80.50%	4.50%	2.10%	2.00%	4.40%	79.60%	9.80%	0.70%	5.60%	11.00%	82.50%	4.10%	0.10%	2.40%	9.40%	83.50%	3.30%	1.20%	1.00%
FEVD for FISCAL																				
1	11.10%	0.40%	85.20%	1.70%	1.70%	0.00%	0.00%	100.00%	0.00%	0.00%	11.10%	0.70%	86.90%	1.40%	0.00%	11.50%	0.20%	85.00%	1.70%	1.70%
5	51.40%	0.80%	45.40%	1.30%	1.10%	27.90%	0.70%	62.80%	4.70%	3.90%	51.40%	0.80%	46.10%	1.30%	0.40%	53.00%	0.60%	40.70%	1.00%	1.00%
10	58.30%	1.20%	38.20%	1.10%	1.20%	34.30%	1.20%	53.90%	5.60%	5.00%	58.30%	1.20%	38.90%	1.10%	0.50%	65.10%	0.40%	25.90%	0.60%	2.20%
FEVD for GDPRG																				
1	7.70%	0.00%	0.00%	92.30%	0.00%	0.00%	2.50%	4.70%	91.40%	1.30%	7.70%	2.70%	0.00%	89.60%	0.00%	5.30%	0.00%	0.00%	94.70%	0.00%
5	26.40%	2.90%	0.10%	65.30%	5.20%	17.70%	3.80%	7.70%	67.40%	3.40%	26.40%	3.90%	0.40%	64.40%	4.90%	8.40%	5.20%	0.00%	79.00%	2.70%
10	45.10%	3.00%	0.10%	47.50%	4.30%	33.40%	3.60%	8.80%	51.40%	2.80%	45.10%	3.60%	0.30%	46.90%	4.10%	16.70%	4.70%	0.10%	70.70%	3.10%
FEVD for INFLATION																				
1	4.60%	0.60%	0.00%	4.00%	90.80%	0.00%	0.00%	0.50%	0.00%	99.50%	4.60%	0.20%	1.80%	4.40%	89.00%	5.00%	1.20%	0.00%	0.90%	92.90%
5	43.40%	1.20%	0.70%	2.00%	52.70%	40.40%	0.70%	12.80%	3.30%	42.80%	43.40%	0.70%	2.90%	2.50%	50.50%	26.80%	2.40%	0.50%	0.60%	63.90%
10	72.10%	1.90%	0.30%	1.10%	24.50%	59.50%	1.70%	12.90%	6.50%	19.50%	72.10%	1.50%	1.40%	1.50%	23.40%	60.40%	1.10%	0.30%	0.30%	32.70%

Note: This table reports the share (percentage) of the forecast error variance of a variable for different forecast horizons that can be attributed to different variables included in the system. The figures reported are those at the forecast horizons of 1, 5 and 10 years after the initial shock. The ordering schemes for the variables in the different models are as follows:

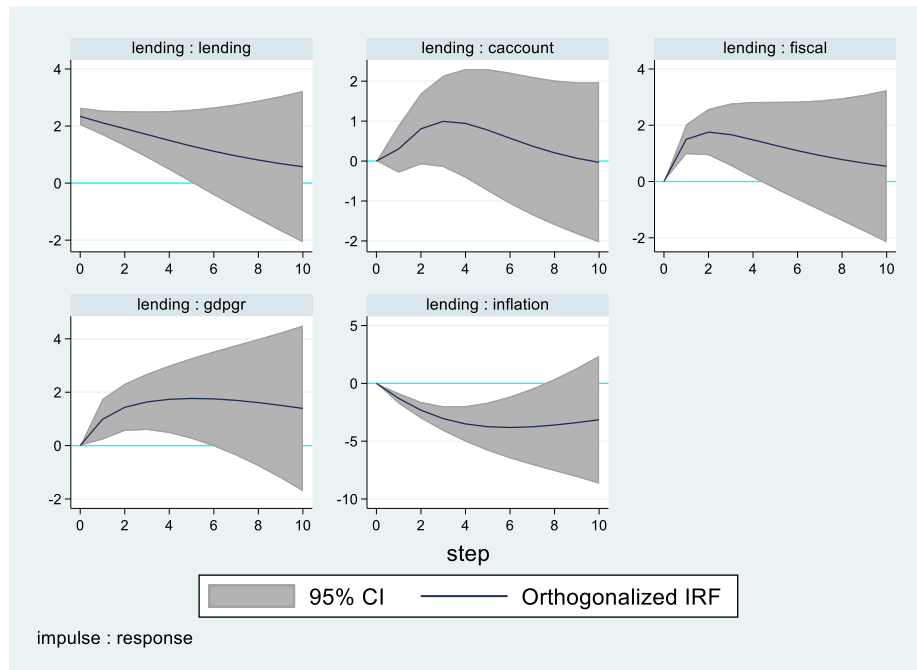
Baseline: (LENDING, GDPRG, CACCOUNT, INFLATION, FISCAL)

Model 2: (FISCAL, INFLATION, CACCOUNT, GDPRG, LENDING)

Model 3: (LENDING, CACCOUNT, GDPRG, FISCAL, INFLATION)

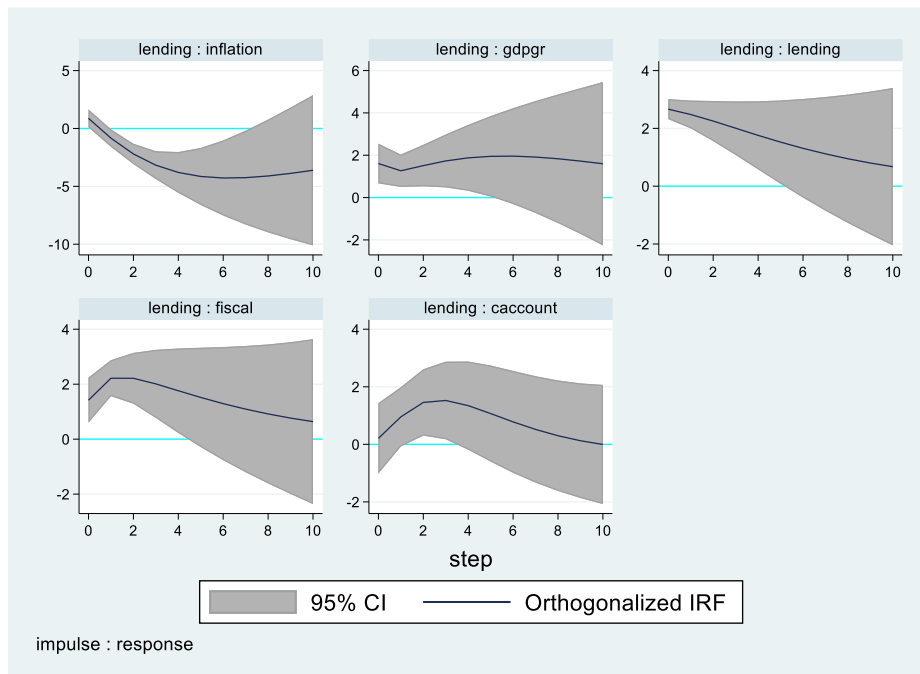
Model 4: (LENDING, GDPRG, CACCOUNT, INFLATION, FISCAL, EXCHANGE).

Figure A. 1: Lending rate shock impulse response function, Model 2



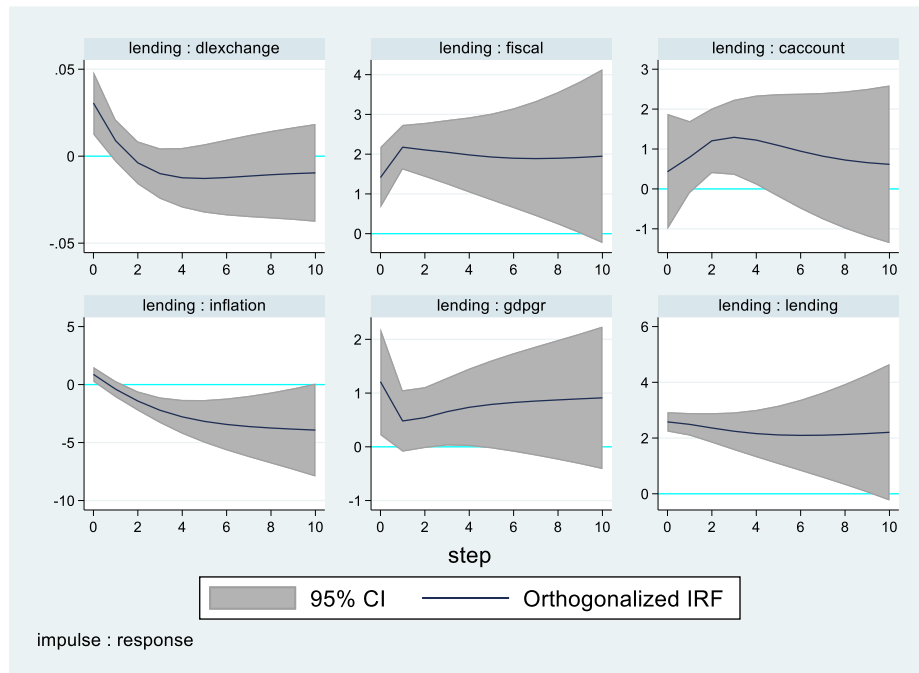
Note: The figure shows orthogonalized impulse response functions (“impulse variable: response variable”) with 95% confidence intervals associated with the first alternative model (Model 2).

Figure A. 2: Lending rate shock impulse response function, Model 3



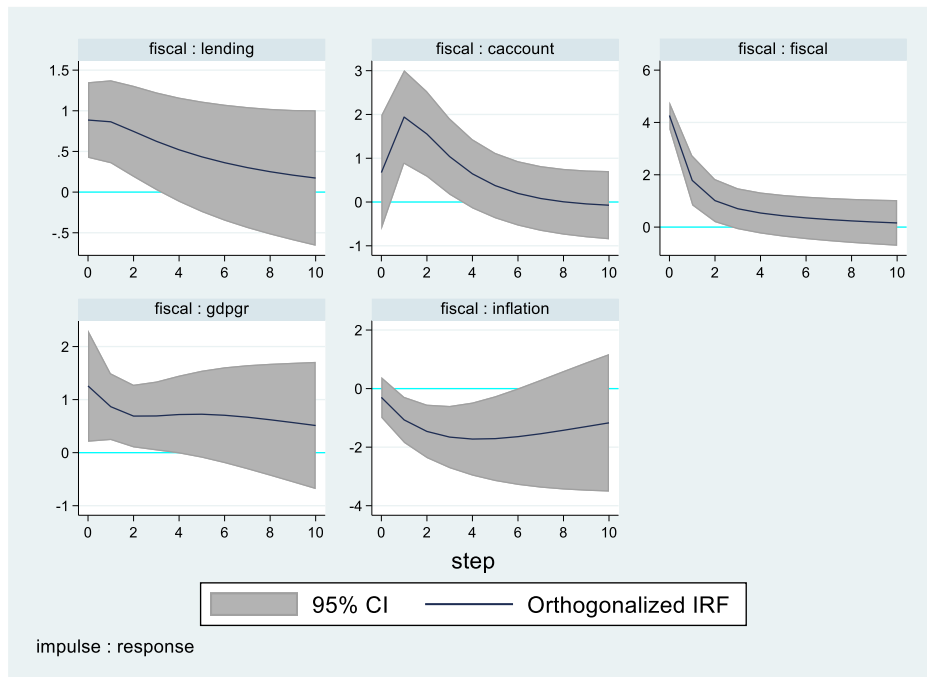
Note: The figure shows orthogonalized impulse response functions (“impulse variable: response variable”) with 95% confidence intervals associated with the second alternative model (Model 3).

Figure A. 3: Lending rate shock impulse response function, Model 4



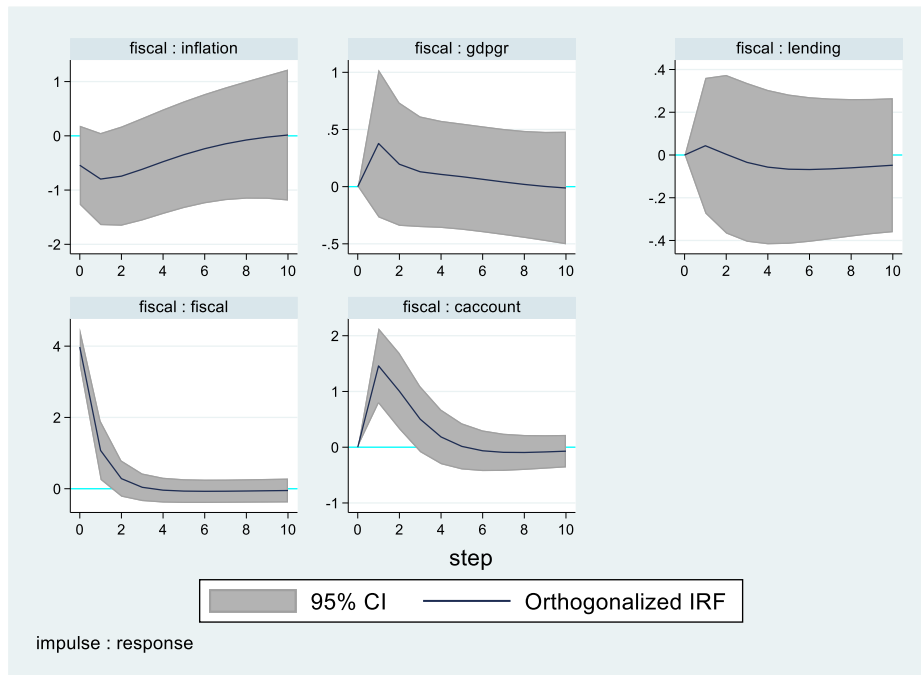
Note: The figure shows orthogonalized impulse response functions (“impulse variable: response variable”) with 95% confidence intervals associated with the third alternative model (Model 4).

Figure A. 4: Fiscal balance shock impulse response function, Model 2



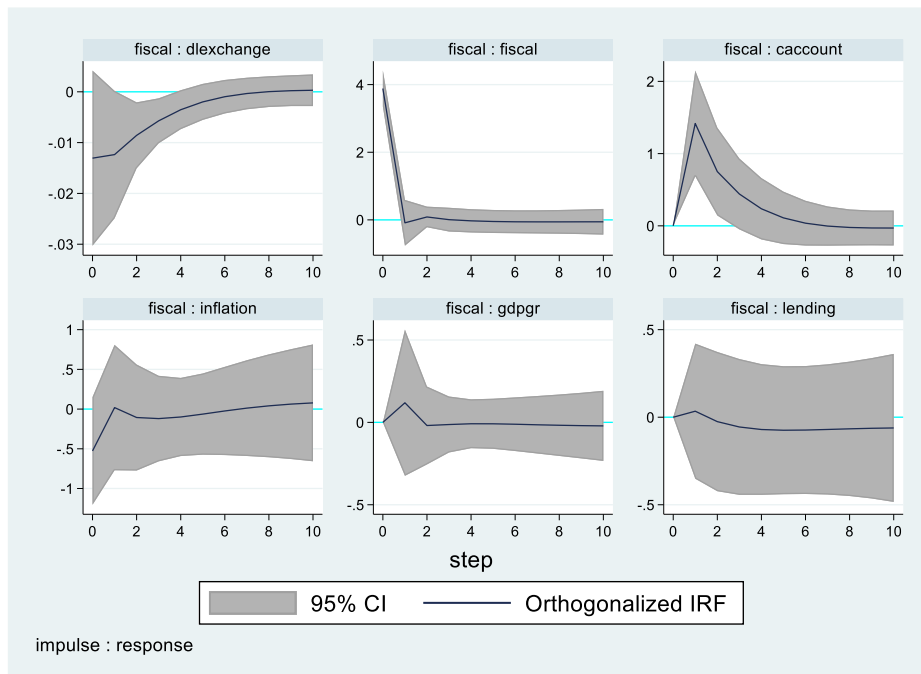
Note: The figure shows orthogonalized impulse response functions (“impulse variable: response variable”) with 95% confidence intervals associated with the first alternative model (Model 2).

Figure A. 5: Fiscal balance shock impulse response function, Model 3



Note: The figure shows orthogonalized impulse response functions (“impulse variable: response variable”) with 95% confidence intervals associated with the second alternative model (Model 3).

Figure A. 6: Fiscal balance shock impulse response function, Model 4



Note: The figure shows orthogonalized impulse response functions (“impulse variable: response variable”) with 95% confidence intervals associated with the third alternative model (Model 4).