

Olowofeso, Olorunsola E. et al.

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**WEST AFRICAN MONETARY
INSTITUTE**



**INSTITUT MONETAIRE DE
L'AFRIQUE DE L'OUEST**

FISCAL CONVERGENCE IN THE WEST AFRICAN MONETARY ZONE¹

Prepared by:

Olorunsola E. Olowofeso (Ph.D)

Maimuna John-Sowe

Santigie M. Kargbo (Ph.D)

Sani Bawa (Ph.D)

Isatou Mendy

Kormay Adams

Adegoke I. Adeleke (Ph.D)

Yaya Cham

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¹ The views expressed in this paper are those of the authors and do not necessarily reflect the official position of the West African Monetary Institute (WAMI). Corresponding authors: Santigie M. Kargbo (skargbo8@gmail.com), Sani Bawa (sanibawa@yahoo.com), Isatou Mendy (aishamendy@hotmail.com), Adegoke I. Adeleke (adelekeibrahim2004@yahoo.com), and Yaya Cham (yham_erdcbg@yahoo.com)

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FISCAL CONVERGENCE IN THE WEST AFRICAN MONETARY ZONE

Abstract

Achieving fiscal convergence between countries of a monetary union helps in the design and implementation of policies to strengthen macroeconomic convergence, which mitigates the contagion effects of macroeconomic instability and ensures the long-term viability of the proposed union. This paper assesses the extent of fiscal convergence among the West African Monetary Zone (WAMZ) countries and explores the response of fiscal convergence to divergence of public debt levels, inflation rates and current account balances to determine whether strengthening of policy synchronisation would contribute to fostering fiscal convergence in these countries. Allowing for heterogeneous fiscal policies among the WAMZ countries, the result from the log t convergence test estimated over the period 2001-2019 provides strong evidence of fiscal divergence among these countries during the period. Equally, by exploiting nonlinearities in policy behaviour among the WAMZ countries in the response of fiscal convergence to policy synchronisation, the results from the dynamic panel threshold models show remarkably strong evidence that reducing divergence in public debt levels, inflation rates and current account balances would reduce fiscal divergence. Given these empirical insights, WAMZ countries would need to strengthen fiscal consolidation measures to improve the primary balance and enhance capacity to reduce public debt to sustainable levels. Similarly, these countries should provide support to enhance domestic productive capacity and diversify the export sector to improve external sector performance. These measures should be accompanied by additional fiscal reforms to constrain discretion in fiscal policies to promote fiscal convergence, including the implementation of fiscal rules and Fiscal Responsibility Act.

JEL Classification: C33, E62, H60, 055

Key Words: fiscal convergence, public debt, inflation, current account, dynamic panel, WAMZ

1.0 Introduction

There is growing recognition among policymakers across the different Regional Economic Communities (RECs) in Africa on the importance of fostering fiscal convergence due to its relevance to the realisation of a monetary union and ensuring its sustainability (e.g. Bhatia, Zhang, Kiptoo, 2011).² In the Economic Community of West African States (ECOWAS) region, the pressing concern about the degree of fiscal convergence among countries is not unexpected in light of the conclusion reached in an earlier study that lack of fiscal convergence is the main obstacle to the creation of a monetary union in this region (Debrun, Masson, and Pattillo, 2005). At its basic level, fiscal convergence occurs when a country that has run persistently high budget deficits undertakes reforms and closes the fiscal gap with other countries (Darvas, Rose, and Szapary, 2005). Research on the benefits of fiscal convergence shows that it is critical for the acceding country and ensuring the stability of an existing monetary union (Onorante, 2006). The argument is that an increase in public debt level of one-member country can inflate the entire union area (Bergin, 2000). A similar view is echoed by Gupta and McHugh (2014) who stressed that large and persistent fiscal deficits and rapid debt accumulation associated with uncoordinated fiscal policies would weaken monetary and price stability when a single currency is adopted, unless enforcing mechanisms are implemented. This is a concern among policymakers since large fiscal deficits and inflation rates experienced in one country would induce contagion effects of macroeconomic instability across countries in existing and aspiring monetary union (Bhatia, Zhang, Kiptoo, 2011). It is anticipated that through macroeconomic policy convergence, member countries would enhance efficiency and growth through the elimination of exchange rate uncertainty and transaction costs; ensuring monetary stability; and promoting fiscal discipline which ensures lower fiscal deficits (Masalila, 2010).

The literature on the endogeneity theory of the Optimum Currency Area (OCA), developed by Frankel and Rose (1998), recognises convergence as an endogenous process because efforts to meet the convergence criteria would facilitate the adoption of economic and institutional reforms in the participating countries. A growing body of empirical works have demonstrated that fiscal convergence would lead to more synchronised business cycles (Darvas et al, 2005; Inklaar et al., 2008; Duval et al., 2014; Atenga and Martial, 2017; Nzimande and Ngalawa, 2017; Bunyan et al., 2019; Egbuna et al., 2020). Darvas et al. (2005) stress that fiscal convergence leads to the elimination of idiosyncratic fiscal shocks, which increases the coherence of business cycles among countries. They argue that fiscal convergence and business cycle synchronization are two important criteria that make countries better candidates for a currency union. A separate strand of the literature considers the potential nonlinearities in monetary and fiscal policy behaviour across countries over time. The argument is that such a nonlinear policy behaviour can be induced through the variation in the intensity of monetary and fiscal policy measures adopted in response to rising inflation and public debt levels, respectively (Piergallini, 2019). More specifically, the literature on the fiscal reaction function developed by Bohn (1998), points to a non-linear fiscal reaction function as countries can possibly slip into a fiscal fatigue position (Ghosh et al., 2013). This

² A monetary union is described in terms of three basic arrangements: the adoption of a common currency, establishment of a common central bank, and the implementation of a common monetary policy across countries (Mati, Civeir, and Ozdeser, 2019).

literature suggests the existence of threshold of public debt ratio beyond which fiscal policy becomes unsustainable. The situation arises because countries would not be able to generate sufficient primary balances to reduce public debt to sustainable levels.

Despite this large body of literature, there is dearth of empirical research on the question of whether policy synchronisation, reflected in lower degree of divergence in public debt levels, inflation rates and current account balances would foster fiscal convergence between countries. Tapsoba, et al. (2019) analysed the role of RECs in promoting fiscal convergence in Africa, while controlling for the effects of divergence of public debt levels, inflation rates, current account balances, similarity in growth rates, and institutions on fiscal convergence in Africa. Their study relied on the averages of divergence of fiscal stances between countries to determine statistically whether countries with membership of the same REC tend to converge fiscally compared to their counterparts that do not belong to a REC. However, there is heterogeneity in policy adjustments across African countries due to differences in institutional characteristics since these RECs are at different stages of economic integration. This calls into question the need to explore such heterogeneous experiences to empirically assess whether countries tend to fiscally converge over time.

Since the early 2000s, countries in the West African Monetary Zone (WAMZ) have adopted wide ranging economic and institutional reforms to achieve and sustain compliance with the convergence criteria.³ Despite efforts to strengthen economic integration over the last two decades, fiscal policies remain heterogeneous across WAMZ countries. This is reflected in the substantial differences in fiscal stances across countries over time, as fiscal balance to GDP ratio ranged from a deficit of 9.7 percent of GDP in Guinea in 2010 to a surplus of 20.1 percent of GDP in Sierra Leone in 2007.⁴ Considering the divergence of fiscal balance to GDP ratio further shows significant fiscal heterogeneity in the WAMZ between country-pairs, ranging from 0.01 percent between The Gambia and Liberia in 2012 to 25.4 percent between Ghana and Sierra Leone in 2007.⁵ The presence of such heterogeneity can substantially affect the degree of fiscal convergence between countries. Similarly, monetary policy frameworks have not been harmonised across countries and the production and export structures remain undiversified. There are significant differences in the divergence of average annual inflation rates between country-pairs, ranging from 0.02 percent between Ghana and Guinea in 2018 to 32.6 percent between The Gambia and Guinea in 2006.

The existence of such heterogeneity raises the question of whether WAMZ countries are fiscally diverging over time. Consistent with the literature on the nonlinear policy behaviour, we argue that the adoption of different monetary policy frameworks across the WAMZ countries would induce

³ The WAMZ primary convergence criteria requires all countries to attain the following: (1) single digit inflation; (2) fiscal deficits (including grants) not exceeding 3 percent of GDP; (3) central bank financing of fiscal deficits of less than 10 percent of previous year's tax revenues; and (4) gross foreign reserves of at least 3 months of import cover. There are two secondary criteria, public debt of less than 70 percent of GDP, and exchange rate variation within the band of 10 percent.

⁴ The data was sourced from the IMF's World Economic Outlook and WAMI databases.

⁵ Fiscal divergence is measured as the absolute value of the difference between the ratio of fiscal balance to GDP between countries (Tapsoba et al., 2019).

differences in the intensity of monetary policy responses across central banks as they adopt corrective measures to contain inflation over time. Similarly, the existence of fiscal heterogeneity suggests that there are differences in the intensity of fiscal policy adjustments undertaken by governments over time to improve the primary balance and reduce public debt to sustainable levels. Such differences in policy actions imply that WAMZ countries would respond differently in terms of adjustments processes to the deterioration in fiscal stances over time. With these issues in mind, we argue that the impact of monetary and fiscal policy measures on fiscal convergence can vary across the WAMZ countries over time, especially when there were shifts in policy regimes during the study period covering 2001-2019. These measures include the adoption of an inflation targeting (IT) monetary policy framework in Ghana and more recently in Liberia, policy actions relating to the Heavily Indebted Poor Countries (HIPC) initiative and the implementation of fiscal consolidation measures. Surprisingly, previous empirical studies neglected how such a time-varying policy behaviour can potentially affect the relationship between these policy synchronisation factors and fiscal convergence.

This paper asks whether strengthening of policy synchronisation would lead to closer fiscal convergence among countries in the WAMZ. It raises important questions of policy relevance to the WAMZ: are the fiscal stances of WAMZ countries diverging or converging following two decades of strengthening of economic ties? Does policy synchronisation by reducing divergence of public debt levels, inflation rates, and current account positions foster fiscal convergence among WAMZ countries?

This paper contributes to the policy debate on fiscal convergence in two ways. First, unlike Tapsoba et al. (2019), the only cross-country study for Africa, it exploits the heterogeneity in fiscal policies across WAMZ countries to empirically determine the extent of fiscal divergence or convergence over the period 2001-2019. The study period was chosen to determine whether policy synchronisation efforts in this sub-region over the last two decades have contributed to fostering fiscal convergence among countries. Previous research points to potential misleading inferences from conventional tests of convergence such as the β - and σ -convergence because these tests may be biased and characterised by poor power properties (Bernard and Durlauf, 1996; Arcabic, 2018). Similarly, these tests implicitly assume that the convergence process follows a linear dynamic process (see Arcabic, 2018). The assumption of linearity is not tenable in WAMZ countries given measures adopted to improve fiscal stances over time, including policy adjustments to enable countries benefit from the Heavily Indebted Poor Countries (HIPC) initiative and recent fiscal consolidation measures to preserve debt sustainability and ensure fiscal prudence. To avoid these problems, this paper employs the log t convergence test developed by Phillips and Sul (2007, 2009) to determine whether WAMZ countries are fiscally diverging or converging over time. Considering the fiscal divergence indicator, this test allows for individual country-heterogeneity in fiscal policies through the nonlinear adjustment in the parameters of a time-varying factor model over time and across the different countries (Arcabic, 2018). To our knowledge, this paper is the first to conduct such a test on the fiscal convergence hypothesis in WAMZ countries. Second, this paper explores whether there exists a nonlinear response of fiscal convergence to the divergence of public debt level, inflation rates and current account balances among WAMZ countries. In contrast, Tapsoba et al. (2019) applied the generalised method of moments (GMM) estimation

using a panel of countries across the different RECs in Africa. However, the GMM approach does not offer a formal test to determine whether there are nonlinearities in policy behaviour among countries. The present paper exploits potential nonlinearities that could stem from the differences in the intensity of policy adjustments over time, induced through the existence of heterogeneous fiscal and monetary policies across the WAMZ countries. We hypothesise that the impact of divergence of public debt levels, inflation rates and current account balances on fiscal convergence will vary across countries and over time. To explore such a nonlinear policy behaviour, this paper employs a recent dynamic panel threshold model proposed by Seo and Shin (2016) and applied by Seo, Kim and Kim (2019). In the ECOWAS region, previous works (Kebalo, 2019; Egbuna et al., 2020) explored the role of fiscal convergence in promoting more synchronised business cycles among countries.

Our study provides strong evidence of fiscal divergence among WAMZ countries during 2001-2019. It finds remarkably strong evidence that reducing divergence of public debt levels, inflation rates and current account balances would foster fiscal convergence between countries in the WAMZ. Following this introduction, the rest of the paper is structured as follows. Section 2 reviews the literature on fiscal convergence, while section 3 analyses the nature of fiscal convergence among WAMZ countries. Section 4 describes the methods and data used, while section 5 presents the results. Section 6 concludes the paper.

2.0 Literature Review

There appears to be consensus in the literature on the significance of both fiscal and monetary convergence for successful economic union (Horvath, 2003; Tapsoba *et al* 2019; Piergallini, 2019). Several studies have analysed the importance of monetary convergence for the economic integration (Tavlas, 1994; Bertasiutea, Massaro, and Weber, 2020). However, few studies have concentrated on analysing fiscal convergence, particularly within the WAMZ. On the theoretical front, there are still unresolved issue of relative importance of monetary and fiscal policy for price stability and general macroeconomic management. Traditional monetary theory assigned the role of price stability to central banks and this draws largely from the quantity theory of money. The fiscal theory of the price level (FTPL), however, opposes this view contending that price level generally varying with fiscal authority's budgetary policies (Leeper, 1991; Woodford, 1994; Sims, 1994). In other words, the theory postulates that general prices are basically influenced by government fiscal policy through expenditure and taxes policies. It explains the policy rules in such a way that general price level is primarily shaped by government debt, the present and future tax, as well as expenditure patterns and plans of government, with little or no role for the monetary policy. This theorem is based on two frontiers – the strong and weak - form of fiscal theory. The weak form hypothesis focuses on the relationship between monetary and fiscal policy. It argued that, since the process of money creation generates revenues, hence, whenever there is budget constraint, it has capacity to influence both monetary and fiscal policy in the long run. This is primarily determined by which of the authority (fiscal or monetary) takes the first initiative. This hypothesis posits that most often, fiscal authority takes the lead by administering either fiscal surplus or deficit, hence, constraining the monetary authority to ensure creating the required seigniorage (Bassetto and Cui, 2018). However, if none of the authorities take the initiative, the economy may suffer unsustainable high debt level. To attract investors to the debt instruments,

government may have to increase monetary policy rate. The strong - form hypothesis on the other hands, contends that fiscal policy autonomously, without recourse to monetary policy, shapes the current and future price level. In other word, it maintains that the general price level is largely influenced by fiscal policy independently of future growth in money supply (Cochrane, 2018; Farmer and Zabczyk, 2019). Building on this theory, Bergin (2000) demonstrates that an increase in the level of public debt of a participating country can induce inflation in the entire union area. In response, each country would need to ensure fiscal discipline at the national level to protect the interests of member of the union.

Another related concept in this regard is the “twin deficits” hypothesis which emphasised the simultaneous occurrence of both fiscal and trade deficits (Bilman and Karaođlan, 2019). This is often explained within opposing theoretical framework that neither theoretical nor empirical analysis had been able to resolve (Nickel and Vansteenkiste, 2008; Bilman and Karaođlan, 2019). The first one is based on the traditional Keynesian absorption theory that fiscal deficit has an important effect on the economy (Salvatore, 2006). It asserts that any improvement in fiscal deficit would spur domestic absorption, and this would likely influence imports, which in turn would weakens the trade balance. In other words, the theory opined that both variables would move in the same direction, that is, improvement in one of the variables will automatically lead to an improvement in the other. This is also buttressed by the Mundell-Fleming framework which assumes that an improvement in fiscal deficits have the tendency of bringing about increase in real domestic interest rates, which would in turn entice both domestic and foreign investors to the domestic debt market. This would likely generate greater inflows (both domestic and foreign) and as a result leading to domestic currency appreciation and weakening of trade balance due to increased imports (Kalou and Paleologou, 2012). The other strand is based on the Ricardian equivalence hypothesis (REH) developed by Barro (1974). It contends that improvement in fiscal deficit will generate instant identical upsurge in private savings, that is, long-lived economic agents have sufficient intuitions to know that future higher taxes are required to finance current fiscal deficits. Based on this reasoning, rational economic agents tend to reduce their current consumption and investment expenditure, hence, constraining the assumed linkages between the fiscal and trade balance. Therefore, this theorem assumes that fiscal deficit has no effect at all on trade balance and other major macroeconomic variables (Enders and Lee, 1990). This theorem states that in the face of a fiscal deficit, rational economic agents will anticipate future increases in taxes. Hence, they will tend to save for the “rainy days” in other to cushion the effects of increased taxation in the future. In other words, economic agents have perfect foresights of the future economic agents based on the current economic realities. Another channel through which this relationship occurs is indirectly via the growth channel. It is anticipated that the deterioration in the current account deficit would induce slower economic growth which in turn worsens budget deficits (Avci and Yucel, 2012).

In a similar vein, Tax-Smoothing hypothesis being a public debt management theory developed by Barro (1979), will also help in analysing this issue. The theorem is premised on government setting fiscal surplus that is equivalent to projected changes in expenditure. It portends that when expenditure is expected to increase, the government executes a budget surplus, and when expenditure is anticipated to decline, it executes a budget deficit. It is a partial equilibrium model

and contends that in a deterministic world, threshold tax rates are constant, however, in the stochastic case with imperfect financial markets, tax rates follow a random model that is generated by a martingale process. The theorem involves adjusting tax rates only when there are anticipated shocks in the economy, that is raising them in turbulent periods and lowering them in tranquil period (Adler, 2006; Karakas, 2014). This connotes that there would normally be no adjustment to tax rates when there are no anticipated changes in the economy. Hence, to maintain relatively smooth and constant fiscal policy, there should be minimal distortions or changes to tax rates. The implication of this hypothesis is that it is possible to expect excess tax burden that is more than equivalent tax rates during turbulent periods, the theorem now propose that government should minimise tax distortions by making tax rates relatively constant or smooth within the periods. The hypothesis categorised changes in government expenditure and economic activity into temporary and permanent. It advocated that tax rates adjustment should only affect permanent government spending and debt obligations and that government should spread these distortions or adjustments in tax rates overtime. However, whenever there are temporary changes in government expenditure and economic activity, government should utilise fiscal surplus (deficit) to ensure that tax rates are kept constant or smooth (Adler, 2006; Karakas, 2014).

The theory of Optimum Currency Areas (OCA) on the other hand serves as the workhorse for analysing the viability of a monetary union. The theory provided insights on the selection of an appropriate exchange rate regime for a given country, the role of exchange rate adjustment in periods of balance of payments disequilibrium and the theory of monetary integration and the design of new monetary unions including Europe's Economic and Monetary Union (Horvath, 2003). Pioneered by Mundell (1961), the theory identified the pre-conditions for an optimal monetary area to include mobility of factors of production, high degree of economic openness, diversification of production and consumption structure, high degree of price and wage flexibility, similarity of business cycles, similarity of inflation rates, financial market integration, fiscal integration, and political integration. Empirical studies have argued that the benefits of forming a common currency area would outweigh the relative costs of loss of monetary policy autonomy if candidate countries for a monetary union comply with the OCA criteria.

The traditional OCA criteria were criticized since the pre-conditions for membership of a monetary union could be endogenous such that countries could attain the OCA criteria through strong economic ties such as increased trade linkages and fiscal integration after joining a monetary union even though they could not satisfy the criteria prior to joining the union (Frankel and Rose, 1998). In addition, OCA theory does not provide a threshold beyond which shocks are too asymmetric and the mitigating factors – factor mobility and fiscal transfers are not easily quantifiable, culminating in the introduction of convergence criteria as a method for evaluating the suitability of membership of a monetary union (Masson, 2016). Convergence criteria are intended to ensure macroeconomic stability and align domestic policies with respect to fiscal deficits, public debt, inflation, interest rates and exchange rates that candidate countries are required to satisfy before the formal launch of a monetary union (Tapsoba *et al* 2019). Jayaraman, Ward and Xu (2007) argued that a currency union, from which there is no easy exit for any member country, will have to adopt one common set of monetary, exchange rate and fiscal policies for dealing with external

and internal shocks, which are expected to impact all countries in a similar manner. These arguments have triggered the interest of convergence and integration of economic indicators.

Fiscal convergence entails limiting government deficits and public debt across countries and has remained the most important criteria in convergence pacts to be fulfilled by member countries prior to the formation of a monetary union (Buti *et al*, 2002; Amadou and Kebalo, 2019). Achieving fiscal convergence allows candidate countries in a proposed monetary union to achieve fiscal discipline, which contributes to reducing idiosyncratic fiscal shocks and thus conducive in achieving synchronised business cycles (Darvas *et al*, 2005). Compliance with the fiscal norm would also give the monetary union better credibility and more flexibility in economic policy management. It also prevents the spill-over of volatile and unstable public finances thereby posing a potential threat to a proposed monetary union (Jensen and Jensen, 1995; Amadou and Kebalo, 2019).

Allowing for heterogeneity in fiscal policies among EU countries, Acrabic (2018) tested the fiscal convergence hypothesis using the log t test and found strong evidence of absolute divergence in government debt, revenues, and expenditures among these countries. A plethora of studies have claimed that participating in a monetary union makes members move faster towards fiscal convergence. Studies such as De Bandt and Mongelli (2000); Busemeyer et al (2004); Bucur and Dragomirescu (2013); Ferreiro et al (2013) and Delgado (2013) have explored this for the European Union. De Bandt and Mongelli (2000) found evidence of steady declines in fiscal dispersion in the Euro area, indicating significant fiscal convergence in the build-up to the EMU. Busemeyer et al (2004) also showed that the process towards the EMU was accompanied with increased fiscal performance in EU member states. Similarly, Bucur and Dragomirescu (2013) stated that the fiscal stability criterion has introduced fiscal discipline in EU member states even though this has deteriorated after the global financial crises in 2008 and the prolonged slowdown in economic growth that followed. In addition, Delgado (2013) and Ferreiro et al (2013) provided evidence of convergence in tax structure and the size of public expenditure in the Euro area. Kocenda et al (2008), however, argued that a significant level of heterogeneity exists in fiscal convergence in the EU and raised concerns on the ability of monetary unions to encourage fiscal convergence for its members. Sanz and Velázquez (2003) find that EU member states are converging towards a different steady state composition of government expenditures and their convergence is faster than the non-EU countries of the OECD. Finding different steady states for each country suggests that each country has its own individual functional distribution of public expenditure in the long term, indicating lack of sustainable EU fiscal policy.

Gammadigbe et al (2018) and Tapsoba et al (2019) also argued that monetary unions proved the most effective in fostering fiscal convergence between countries and stated that African regional economic communities (RECs) significantly reduce fiscal divergence between members. However, empirical works cutting across some of the RECs indicated considerable fiscal divergence among members. For instance, Carmignani (2006) provided evidence of substantial divergence in fiscal policy in Common Market for Eastern and Southern Africa (COMESA) in its build up to establishing a currency union in 2025. Mpatswe et al (2011) discovers that fiscal policies in Central African Economic and Monetary Community (CEMAC) are largely procyclical

as member countries utilize windfall revenues from commodity exports to boost spending thereby making it difficult to achieve fiscal convergence. Findings from Asongu (2012) also suggest an overwhelming absence of fiscal policy convergence and the potential for eliminating idiosyncratic fiscal shocks owing to business cycle incoherence in the West African Monetary Zone (WAMZ) and the upcoming East African Monetary Zone (EAMZ). Corroborating Mpatswe et al (2011), Dessus and Varoudakis (2014) showed that public investment and expenditure have been procyclical in West African Economic and Monetary Union (WAEMU) countries since the introduction of convergence criteria in 1994 and this pose challenges to meeting the criteria. Similarly, Amadou and Kebalo (2019) showed that only four of the fifteen ECOWAS countries would be able to comply with the fiscal criterion and join the proposed monetary union based on fiscal discipline.

A successful monetary union is facilitated when its member states have synchronised business cycles. Consequently, several factors that affect business cycle synchronisation have been identified with fiscal convergence serving as one of the important factors. For instance, Darvas et al (2005) examine the relationship between total government budget deficit (as a ratio of GDP) and the synchronisation of business cycles. The authors shows that countries with divergent fiscal policies characterised by large cross-country differences in the ratio of general government net lending/borrowing tend to have less synchronised business cycles. They estimate that each percentage point of fiscal divergence between a pair of countries reduces their business cycle synchronisation by between 0.03 and 0.12. Similarly, Stavros et al (2014) and Nzimande and Ngalawa (2017) also finds that fiscal convergence influences business cycle synchronisation in a way that is conducive to the operation of a single currency area.

Pecaric and Tolj (2018) examine how fiscal policy convergence influence business cycle synchronisation between Croatia and the Eurozone. The study confirms that fiscal convergence affects business cycle synchronicity between Croatia and the Eurozone, and stresses the need for the Eurozone countries to comply with the Maastricht criteria and the Stability and Growth Pact to lower the macroeconomic costs of monetary integration. Kebalo (2019) sought to confirm the findings of Darvas et al (2005) on a sample of fifteen West African countries in transition to the ECOWAS monetary union. The study shows that a 1 percent increase in fiscal divergence leads to reduced business cycle coherence by 0.105 percent in the fifteen case countries and fiscal divergence in these countries would be harmful to the viability of the ECOWAS monetary union.

Given the insufficient fiscal convergence in member countries of regional economic communities across Africa, few studies investigate whether policy harmonisation would assist these countries move towards fiscal convergence. Gammadigbe et al (2018) and Tapsoba et al (2019) provided evidence that convergence in debt to GDP ratios, inflation and growth rates, current account balances and the simultaneous adoption of fiscal rules as well as political stability encourages fiscal convergence among African countries. However, being a member of a monetary union proved the most effective in promoting fiscal convergence. Crespo-Cuaresma (2011) and Tujula and Wolswijk (2004) have also shown that sustainable public debt levels help in ensuring convergence in fiscal policies. Checherita-Westphal and Zdarek (2017) also considered the

divergence of current account balances as a potential determinant of the divergence in fiscal balances in line with the twin-deficits hypothesis.

Overall, the literature has shown clearly that there is dearth of research on fiscal convergence in a monetary union, particularly in the WAMZ. Recent economic literature also emphasised the need to allow for heterogeneity in fiscal policies in testing the fiscal convergence hypothesis among countries. This study exploits such heterogeneity to assess the extent of fiscal convergence or divergence among WAMZ countries. It explores the nonlinear response of fiscal divergence to divergence of public debt levels, inflation rates and current account balances among the WAMZ countries.

3.0 Fiscal Convergence in WAMZ Countries

3.1 Characteristics of WAMZ Economies

WAMZ countries are small open economies with diverse GDP and population sizes that rely on primary products for foreign exchange earnings. Despite being in the same geographical zone, the economies are naturally disproportionately endowed, with The Gambia, being the least endowed amongst them. These unevenly distributed natural resources, however, are grossly underutilized due to technological deficiencies for value addition on primary products thus the heavy reliance on imports. Coupled with other structural differences and macroeconomic fundamentals, it is imperative to examine the pattern of variances in some key macroeconomic indicators to further unveil their contributive power in the convergence/divergence of these economies towards the single currency programme.

Nigeria the biggest and most populous economy in the zone with a about 85.0 percent of the zone's GDP, is an oil-based economy that accounts for about 90 percent of foreign exchange receipts and contributes about 20 percent of GDP. Consequent on the reliance of oil, the economic went into recession in 2017 due to fall in oil prices which affected the revenue stream of the country. Ghana, one of the top 10 fastest growing economies in the African continent and second largest economy of the Zone rides on the backdrop of gold as one of its main export receipts. Gold accounted for about 10.0 percent of GDP and about 40 percent of foreign exchange earnings of the country in 2019. Improvements in macroeconomic fundamentals were complemented by increase in domestic demand from private consumption that supported growth of 6.5 percent in 2019. However, surge in public debt coupled with revenue shortfall could derail the improved economic prospects of the country. Guinea, holding the world's third largest bauxite reserve deposits and other natural resources combined accounted for about 90 percent of its export receipts. Proceeds from export earnings constituted about 15 percent of tax revenue and contributed about 2.3 percent of GDP in 2019. It is also the third largest economy in the Zone accounting for 2.1 of the zone's GDP. The combined GDP of the smallest economies of the Zone (The Gambia, Liberia, and Sierra Leone) moderated to 1.6 percent in 2019 relative to 1.8 percent in 2018 due to contractionary growth in Liberia. Liberia and Sierra Leone are also richly endowed with mineral resources including diamonds, rubber, rutile, and iron ore and have remained commodity export-dependent economies in recent times. While Liberia relies on the export of rubber and iron ore for its foreign exchange earnings, Sierra Leone was a top producer and exporter of diamond and rutile in the world. The

Gambian economy, however, is characterized by traditional subsistence agriculture, a historic reliance on peanuts or groundnuts for export earnings, a re-export trade built around its ocean port and a vibrant tourism industry. Despite their natural endowed resources, economies of the WAMZ are challenged by mounting public debt levels, fiscal deficits and widening current accounts deficits.

3.2 Nominal Convergence

Macroeconomic convergence requirements have become norms in the formation of economic or monetary integration programmes. These requirements/criteria are means of harmonising domestic policies and fostering the integration process which individual countries are expected to observe and fulfil to join any form of a union. Robust and effective currency unions are built on the foundation of agreed monetary and fiscal policy convergence which seeks to align domestic policies on prices (inflation, interest rate and exchange rate), fiscal deficit and public debt. The WAMZ single currency programme is hinged on the countries satisfying the four primary convergence criteria of (single digit inflation, gross external reserves of not less than three months of import cover, not more than 10 percent of central bank financing of the previous year's revenue, and fiscal deficit not exceeding 3 percent of GDP) and two secondary criteria of exchange rate variation not surpassing 10 percent and debt to GDP ratio of not exceeding 70 percent. The fiscal deficit criterion is one of the most important convergence criteria of any integration programme that seeks to synchronize the fiscal stance of interested parties joining the union to ensure a level playing ground.

Public debt is the most important convergence criterion, once attained and sustained would lead to the rest of the other criteria falling in place for a monetary union. It is the backbone on which the others would ride to achieve a monetary union. Public debt attainment implies fiscal discipline and by extension subdued inflationary pressures. Once these main building blocks of a monetary union are satisfied, growth is enhanced and no recourse for central bank financing or exchange rate pressures that would require the use of reserves for intervention.

However, the crust for the successful implementation of monetary integration is on the execution of national fiscal policies to prevent fiscal divergence of countries in the union. Executing national fiscal policies for the purpose of gaining more from the union could be hurtful to others through crowding-out effects on the economic activities of other members thus increasing fiscal divergence that can be desynchronised to business cycles. Countries might be in compliance with the fiscal deficit criterion, but the divergence would arise as a result of desynchronization or lack of coherence in business cycles as evident in the study of Darvas et al (2005).

In observance of nominal convergence for the single currency union in the WAMZ, economies of the zone were tasked to work toward meeting both the primary and secondary convergence criteria for the single currency programme. To determine if countries are making progress in achieving these criteria, countries' macroeconomic performance are assessed on a semi-annual basis. Below is a table of macroeconomic performance of WAMZ member states vis-à-vis the convergence criteria.

Table 1: Performance of WAMZ countries-Nominal Macroeconomic Convergence in WAMZ Countries (2010 – 2019)

Period	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Primary										
The Gambia	4	3	3	2	2	1	1	3	3	3
Ghana	3	3	3	2	1	2	1	2	3	3
Guinea	0	2	3	3	4	2	3	3	2	4
Liberia	3	3	3	3	3	3	2	1	1	1
Nigeria	2	3	3	4	4	4	2	3	2	2
Sierra Leone	1	1	2	4	2	2	1	1	1	3
WAMZ	2	3	2	4	4	2	2	3	3	3
Secondary										
The Gambia	2	2	1	0	1	0	1	1	1	1
Ghana	2	2	1	1	1	0	1	2	2	2
Guinea	0	0	2	2	2	2	1	2	2	2
Liberia	2	2	2	1	2	2	1	1	1	1
Nigeria	2	1	1	1	2	1	1	2	2	2
Sierra Leone	2	2	2	2	1	1	1	2	1	2
WAMZ	1	1	1	1	1	1	1	1	1	1

Source: WAMI database. This table shows the performance of WAMZ countries with respect to the four primary convergence and two secondary convergence criteria during 2010-2019.

Historical assessment has indicated that countries of the WAMZ met some of the criteria and faltered in others during the various assessment periods as indicated in the above table. No one country could sustain its best performance on the primary criteria for three consecutive assessment periods, which is a requirement for the adoption and commencement of the single currency. This could be attributed to the differences in economic fundamentals of member states and vulnerabilities to external shock influencing prices and public expenditure patterns. For instance, in 2014 the Ebola epidemic directly affected growth and fiscal positions of Guinea, Liberia and Sierra Leone and indirectly the foreign earnings of The Gambia thus putting pressure on the exchange rate. The 2014/2015 commodity price slump impacted negatively on export receipts of commodity exporting countries such as Ghana, Guinea, Liberia, Nigeria, and Sierra Leone resulting to widened current account deficits of these countries. Furthermore, the 2017 recession in Nigeria was on account of serious revenue losses due to the dip in global oil prices.

Unlike the primary criteria, performance on the secondary criteria was somewhat better. At least all the countries sustained their performance on the secondary criteria for three consecutive years at varying periods except for The Gambia which has been challenged with rising public debt levels. So far Guinea is the best performing country on the secondary criteria.

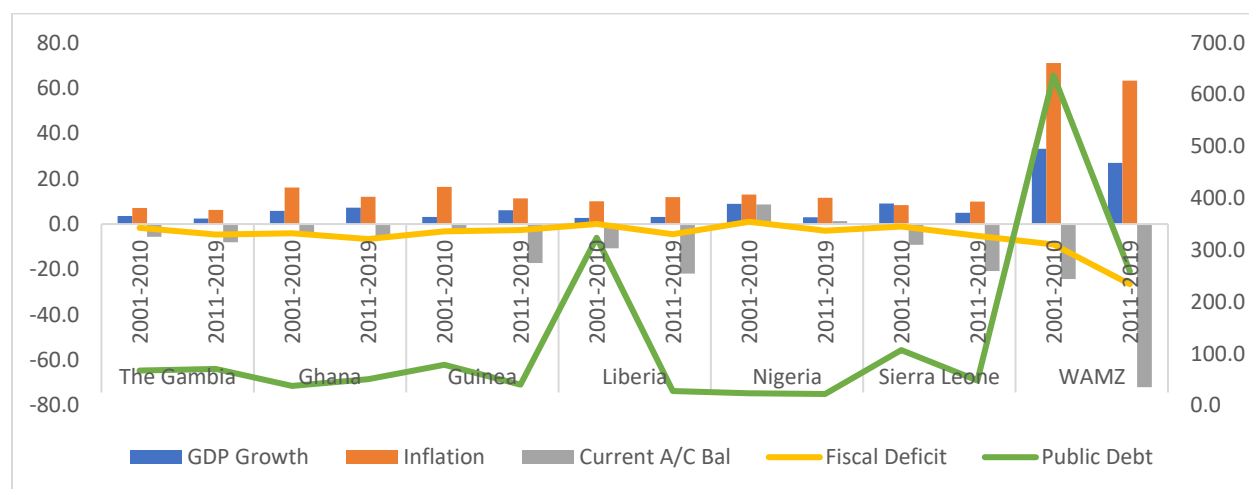
Analysis of the WAMZ convergence criteria revealed that attaining the primary criteria on a sustained basis by member states continues to be a big challenge. Among the criteria, fiscal deficit and single digit inflation has been the most difficult to satisfy. This is as a result of the zone's economies being saddled with budget over-runs due largely to lack of fiscal discipline and limited revenue mobilization associated with inefficiencies in tax administration and collection. The vicious cycle of fiscal deficits and continuous borrowing to finance the deficits would continue to result to mounting debts and inflationary pressures.

Table 2: Trend of WAMZ Countries Macroeconomic selected Variables

Variables (Targets)	The Gambia		Ghana		Guinea		Liberia		Nigeria		Sierra Leone		WAMZ	
	1*	2*	1*	2*	1*	2*	1*	2*	1*	2*	1*	2*	1*	2*
GDP Growth (%)	3.5	2.5	5.8	7.2	3.1	6.2	2.7	3.1	8.9	3.0	9.1	5.0	33.2	27.0
Inflation (less than 10 % per annum)	7.1	6.3	16.1	12.0	16.4	11.3	10.0	11.9	13.0	11.6	8.4	9.9	71.0	63.4
Current A/C Bal (% of GDP)	-5.5	-8.0	-4.3	-5.8	-3.1	-17.2	-10.6	-21.8	8.6	1.3	-9.2	-20.7	-24.2	-71.9
Fiscal Deficit (at most 3 percent of GDP)	-1.7	-4.6	-4.1	-6.7	-3.2	-2.6	0.0	-4.5	1.0	-2.9	-1.1	-5.2	-9.0	-26.5
Primary Bal (% of GDP)	0.7	-1.0	-2.1	-2.3	-1.5	-1.6	0.6	-4.1	2.7	-1.7	1.6	-3.4	2.0	-14.1
Public Debt (at most 70 percent of GDP)	67.1	70.3	37.5	50.4	78.4	40.3	323.6	27.8	23.6	21.9	106.5	48.0	636.7	258.9

Source: WAMI database. * Note: Averaged Values 1 = 2001-2010, 2 = 2011-2019.

Figure 1: Average Ratios of Selected Macroeconomic Indicators Expressed in terms of GDP



Source: WAMI database

Before delving into the measures of convergence, we adopted a simple trend analysis to examine the trend of the variables of interest. Trend country specific indicators show that there are improvements in nominal convergence in some of the indicators and divergence in others. GDP growth for all the countries of the zone except for Nigeria improved on average during the last ten years of the study relative to the first ten years. The slowdown in growth for Nigeria was attributed to the recession the country experienced in 2017 associated mainly to the slump in global oil prices. 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 pump prices and electricity tariff.

In contrast, fiscal balance widened in all the countries for the two comparative period averages except for Guinea that experienced an improved fiscal position during the latter part of the sample period. Deterioration in fiscal balances coupled with worsening current account balances due to unfavorable terms of trade contributed to rising debt levels in some of the WAMZ member states. In Ghana, fiscal slippages contributed to debt accumulation resulting to the country been assessed

as at high risk of external public debt distress in 2019 (IMF/World Bank DSA, 2019). Debt build-up associated with high borrowing to finance deficits and also bail out some State Owned Enterprises (SOEs) led The Gambia to be classified in 2019 as being at a high risk of Public and Publicly External debt distress from moderate risk rating in 2015 (IMF/World Bank DSA, 2019).

At the zone level, growth decelerated from 32.2 percent on average between 2001-2010 to 27.0 percent between the years 2011-2019 mainly on account of the recession in Nigeria in 2017. Similarly, the decline in inflation in the zone is attributed to subdued inflationary pressures in Ghana and Guinea during the second half of the sample period. Fiscal deficit and current account balances widened as countries of the Zone struggled to exercise fiscal restraint amid the impacts of the global financial crisis, Ebola Virus Disease (EVD) and plummeted global commodity prices. The ratio of total public debt to GDP on the other hand, decreased on average to 258.9 percent in the last nine years compared to 636.7 percent on average in the first ten years of the study period mirroring significant decline in public debt levels of Liberia and Sierra Leone during the period.

3.3 Analysis of Fiscal Convergence/Divergence

In analysing fiscal convergence or divergence, various measures have been adopted by researchers to show whether economic indicators of countries in the same geographical area are converging or not. Economies are said to be fiscally converging when the absolute value of difference in the observed indicators for convergence are tending towards zero. The convergence of these indicators serves as the basis for a common currency union. This section presents a brief description of the extent of divergence of fiscal stances among WAMZ countries during 2001-2019. It is complemented by an empirical test of the fiscal convergence hypothesis in the WAMZ using log t convergence test analysed in section 4.

3.3.1 Divergence Indicators in WAMZ Countries

The differences in production and export structures across the WAMZ economies implies that there are structural differences among WAMZ countries that impede the process of achieving the macroeconomic convergence criteria for the adoption of a single currency. Therefore, fiscal convergence is critical for any currency union. Convergence of any form whether fiscal, monetary, or economic is the synchronisation of economic performance of individual countries that are within a monetary union or planning to form a union. Table 3 presents indicators of divergence of fiscal positions and policy synchronisation indicators among WAMZ countries over the period 2001-2019.

Table 3: Divergence Indicators in WAMZ Countries

	fb_ijt	inf_ijt	ggdp_ijt	cab_ijt	debt_ijt
2001-2010	3.97	8.22	5.74	8.41	117.18
2011-2019	2.59	5.41	5.55	13.24	22.27

Source: Authors' computation. Note: "fb_ijt"-divergence of the ratio of fiscal balance to GDP between countries; "inf_ijt" -divergence of inflation rates; "ggdp_ijt"-divergence of growth rates; "cab_ijt"-divergence of current account balances; and "debt_ijt"-divergence of public debt to GDP ratio.

Divergence in fiscal balance, inflation and GDP growth for the zone narrowed on average by 1.4 percentage points, 2.8 percentage points, and 0.2 percentage points between 2001-2010 to an average of 2.6 percent, 5.4 percent, and 5.6 percent, respectively during 2011-2019. Although the divergence of fiscal deficit narrowed in the second half of the study period, this should not be interpreted as an indication of countries moving towards fiscal convergence since the magnitude of divergence is far above zero. The reduction in divergence of fiscal stances reflects the gains achieved in improving fiscal balances through the debt relief packages and the implementation of fiscal consolidation measures over the period. This is further reflected in the significant reduction in the magnitude of divergence of public debt levels of the WAMZ countries from an average of 117.2 percent between 2001-2010 to 22.3 percent for the period 2011-2019. However, in recent years, public debt levels have been increasing in the WAMZ and there are considerable differences in the composition of debt, raising concerns of debt sustainability in some countries.

In contrast, divergence of the current account balances widened to an average of 13.2 percent between 2011-2019 compared to an average of 8.4 percent between 2001-2010. The increase in divergence of current account deficit is an indication of the existence of undiversified production and export structures in the WAMZ, with some countries depending largely on export revenues from oil and gas and minerals. With such an undiversified structures, WAMZ countries generally have limited capacity to respond to adverse shocks. This was evident in the response of these countries to adverse global developments such as 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 divergence of current account balances. However, the trends suggest some improvements in reducing divergence of fiscal deficit, inflation, and public debt. While fiscal consolidation measures pursued by WAMZ countries have contributed to reducing divergence of these indicators, fiscal and monetary policies have not been harmonised and there are dissimilarities in production and export structures which can induce fiscal divergence. Section 4 conducts a test of the fiscal convergence hypothesis to empirically determine whether WAMZ countries are fiscally converging or diverging over time.

4.0 Methods and data

This section presents the log t convergence test developed by Phillips and Sul (2007, 2009) and applied in the present paper to empirically assess the degree of fiscal convergence between countries in the WAMZ during 2001-2019. Building on the bilateral framework proposed by Tapsoba et al. (2019) on the impact of divergence of each regressor on fiscal divergence, we describe the model explaining the impact of the divergence of public debt levels, inflation rates and current account balances on fiscal divergence. This is followed by description of the data used in the study.

4.1 Model specification

4.1.1 Log t convergence test

In line with the approach by Arcabic (2018), we test the fiscal convergence hypothesis in the WAMZ by applying the log t convergence test introduced by Phillips and Sul (2007, 2009) and made applicable in Stata econometric package by Du (2017). This test is based on a nonlinear time-varying factor model that allows for country heterogeneity and it is robust to the stationarity property of the series (Du, 2017). Phillips and Sul (2007, 2009) developed a neoclassical growth model with time-heterogeneous technology. The actual transition path of log per capita real income is given by:

$$\log y_{it} = \log \tilde{y}_i^* + \log A_{i0} + [\log \tilde{y}_{i0} - \log \tilde{y}_i^*]e^{-\beta_{it}t} + g_{it}t \quad (1)$$

Where y_{it} is per capita real income, \tilde{y}_{i0} and \tilde{y}_i^* are initial and steady -state levels of output per capita, respectively, and A_{i0} denotes the initial level of technology. β_{it} is the speed of convergence parameter. This model allows for heterogeneity through the speed of convergence parameter β_{it} and the output growth rate g_{it} , since both vary across countries and over time (Arcabic, 2018). To capture the common and country-specific components, equation (1) is rewritten as:

$$\log y_{it} = \alpha_{it} + g_{it}t \quad (2)$$

where $\alpha_{it} = \log \tilde{y}_i^* + \log A_{i0} + [\log \tilde{y}_{i0} - \log \tilde{y}_i^*]e^{-\beta_{it}t}$. The growth path $g_{it}t$ is assumed to contain some elements that are common across countries μ_t . Equation (2) is further transformed to the following form:

$$\log y_{it} = \left(\frac{\alpha_{it} + g_{it}t}{\mu_t} \right) \mu_t = b_{it}\mu_t \quad (3)$$

In this paper, we consider fiscal convergence instead of convergence in per capita real income. Equation (3) is a dynamic factor model which captures the time-varying individual countries elements (b_{it}) and a common component (μ_t). b_{it} reflects the individual transition effect, which shows how individual countries relate to the common component (μ_t). It represents a share of a common trend for each country (Arcabic, 2018). One issue is that equation (3) cannot be directly estimated without imposing restrictions on b_{it} and μ_t (Du, 2017). To eliminate the common component (μ_t), Phillips and Sul (2007, 2009) proposed a scaling approach which measures the transition element for each country i relative to the panel average at time t . Thus, the coefficients b_{it} are empirically analysed using the relative transition parameter h_{it} given by:

$$h_{it} = \frac{x_{it}}{N^{-1} \sum_{i=1}^N x_{it}} = \frac{b_{it}}{N^{-1} \sum_{i=1}^N b_{it}} \quad (4)$$

where x_{it} is a measure of the fiscal positions of countries i.e., ratio of overall fiscal balance to GDP or primary balance to GDP and h_{it} traces out the transition path of individual country i relative to the panel average at time t .

In testing the convergence hypothesis, Phillips, and Sul (2009) stressed the need to remove the cyclical component from the series using the Hodrick and Prescott (1977) filter. Phillips, and Sul

(2009) tested this hypothesis by applying the log t convergence test based on the relative transition curves:

$$\log \frac{H_1}{H_t} - 2 \log(\log t) = \alpha + \delta \log t + u_t \quad (5)$$

$$H_t = 1/N \sum_{t=1}^N (h_{it} - 1)^2 \rightarrow 0 \quad (6)$$

H_t is a quadratic distance measure which tends toward zero when countries converge, and the cross-section mean of h_{it} is unity. $t = T_0, \dots, T$ where T_0 denotes the first observation following the elimination of the initial 30 percent of the observations as suggested by Phillips and Sul (2009) and Du (2017). The test for fiscal convergence is conducted by considering the sign and significance of the coefficient δ . Thus, we conclude that countries are fiscally diverging when the parameter δ is negative and statistically significant.

4.1.2 The model

Our empirical specification builds on the endogenous OCA theory which suggests that there are incentives for countries forming an economic or monetary integration to foster closer fiscal convergence (Tapsoba et al., 2019). As countries stride to form or join a monetary union, they undertake economic and institutional reforms to meet and sustain compliance with the convergence criteria. To explore the effects of divergence of public debt levels, inflation rates, and current account balance on fiscal convergence, this paper follows the bilateral framework proposed by Tapsoba et al. (2019) and the following model is estimated over the period 2001-2019:

$$FD_{ijt} = \alpha_0 + \beta' X_{ijt} + \gamma' Q_{ijt} + \mu_i + \mu_j + \varepsilon_{ijt} \quad (7)$$

Where the dependent variable, FD_{ijt} is a measure of fiscal divergence between countries i and j at time t . X_{ijt} is a $k_x \times 1$ vector of the policy synchronisation variables of interest i.e., divergence of public debt levels, inflation rates, and current account positions between countries. Q_{ijt} is $k_q \times 1$ vector of control variables, capturing similarity of growth rates between countries; the quality of institutions proxied by divergence in the index of government effectiveness, rule of law and political stability; and an external shock dummy variable. μ_i and μ_j denote fixed effects associated with countries i and j , respectively and ε_{ijt} is the error term.

Appendix 1 presents the description of the variables used in the regression. Following Tapsoba et al (2019), FD_{ijt} is computed as the absolute value of the difference between the levels of overall fiscal balance expressed as a percentage of GDP between countries i and j at time t i.e., $FD_{ijt} = |F_{it} - F_{jt}|$. Thus, countries will “fully converge fiscally” when the absolute value of this difference between them is zero; and “fully fiscally divergent” if this absolute difference increases over time.

A similar approach is used to obtain divergence of the policy synchronisation indicators and other control variables. Thus, the divergence of public debt levels between countries is computed as the absolute difference between the levels of public debt (expressed as percentage of GDP) between countries. The argument is that countries which face similar debt ratios are likely to undertake similar adjustment measures, which suggests that there are incentives for these countries to run

similar fiscal deficits (Tapsoba et al, 2019). It therefore implies that increasing divergence of public debt levels would lead to divergent fiscal policies. The coefficient of divergence of public debt levels is expected to be positive.

The relationship between inflation divergence and fiscal divergence can be explained through the level of public debt of a member countries. From the fiscal theory of price level developed by Leeper (1991), fiscal deficits can be monetized by the central bank when the Fiscal Authorities dominate the policy space. This implies that the coefficient of divergence of inflation is expected to be positive.

In line with the tax-smoothing hypothesis introduced by Barro (1979), the similarity of growth rates between countries is expected to be positively associated with fiscal divergence. This argument is that a negative production shock or temporary positive shocks on government spending would be fully transmitted through fiscal deficits (Tapsoba et al., 2019). Consistent with the twin-deficit hypothesis, there is a positive linkage between the divergence of current account balance and fiscal divergence. Data on the fiscal stances, public debt levels, growth rates, inflation rate, and current account balance were sourced from the IMF's World Economic Outlook and WAMI databases.

To control for the quality of institutions, we include divergence in the index of rule of law, government effectiveness and political stability between countries, which are measured in a similar way as the policy synchronisation variables above. These institutional variables are expected to be positively associated with fiscal convergence, implying that strengthening of institutions will improve public financial management and promote fiscal convergence between countries. Data on the indicators of institutional quality were obtained from the World Bank's Governance indicators. We also include an external shock dummy variable, coded 1 in periods of external shocks and 0 otherwise. The external shocks dummy variable captures external factors such as the terrorist attack in the United States and associated commodity price shocks in 2001/2002, the global financial crisis in 2007/2008 and commodity price shock in 2014/2015. It is anticipated that member states may undertake similar policy adjustment measures to improve fiscal positions in response to common external shocks.

4.2 Estimation techniques

To explore the effects of the divergence of public debt, inflation, and current account positions on fiscal divergence, this paper uses four alternative estimation techniques to test the robustness of the results obtained from the estimation of equation (7). Drawing from the OCA endogeneity theory, joining a monetary union would enhance macroeconomic policy convergence because it encourages the adoption of policy reform measures to meet the convergence criteria. Considering equation 7, there are potential endogeneity problems associated with assessing the effects of policy synchronisation on fiscal divergence. During the study period 2001-2019, WAMZ countries adopted adjustment measures to reduce public debt to sustainable levels, including policy reforms implemented under the HIPC initiative and recent fiscal consolidation measures pursued to reduce public debt levels. The implementation of these corrective measures contributed to countries achieving relatively lower fiscal deficits, reducing fiscal divergence between countries, and

simultaneously reducing public debt levels and improving current account balances. At the same time, countries were able to attain low to moderate inflation due to reduced pressures from the Fiscal Authorities for central banks to finance fiscal deficits. Equally, through the adoption of these adjustment measures, WAMZ countries were able to provide additional resources to support economic growth. By implication, the divergence of public debt, inflation rates, growth rates and current account balances are endogenous to fiscal divergence through the correlation between the idiosyncratic term ε_{ijt} in equation (7) and these divergence indicators. Similarly, the twin-deficit hypothesis suggests that there is endogeneity of divergence of current account balances on fiscal divergence between countries.

In trying to mitigate the problem of endogeneity, equation (7) is estimated using the fixed effects model. However, this model addresses only a limited form of endogeneity through the individual country-fixed effects (μ_i and μ_j). To enable us draw inferences from the effects of divergence of public debt, inflation, and current account positions on fiscal convergence, we further address the problem of potential endogeneity by estimating the panel fixed effects two-stage least squares (FE-2SLS) model. An advantage of this model is that it addresses this problem by treating endogeneity bias due to the correlation between the regressors and the disturbances (including the unobserved individual effects μ_i and μ_j). However, there is dearth of literature on the appropriate instruments to identify the causal effects of the policy synchronisation variables on fiscal convergence. To overcome this problem, we utilise 3-5 lags of divergence of public debt, inflation rates, current account balances and growth rates as instruments for these endogenous variables.

One limitation of the FE-2SLS is that it does not capture the dynamic effects of fiscal divergence, which are extremely important given the lagged effects of the adjustment measures to improve fiscal stances. To capture the persistence of fiscal divergence, the First Differenced Generalised method of moments (FD-GMM) is estimated. However, this model does not provide a formal test to determine whether there is a nonlinear response of fiscal divergence to divergence of public debt, inflation, and current account balances between countries. As previously mentioned, a nonlinear relationship between policy synchronisation and fiscal divergence is expected in the WAMZ, owing to the presence of heterogeneous fiscal and monetary policies and the associated differences in the intensity of policy adjustments undertaken in response to rising public debt, inflation rate, and weak external sector performance. To allow for such nonlinearity, we employ the dynamic panel threshold model proposed by Seo and Shin (2016) and applied by Seo, Kim and Kim (2019). This model provides for the estimation of both static and dynamic panel threshold models, allowing for the transition or threshold variable and other regressors to be endogenous.

Following Seo et al. (2019), the dynamic panel threshold model takes the following form:

$$y_{it} = x'_{it}\beta + (1, x'_{it}) \delta 1\{q_{it} > \gamma\} + \mu_i + \varepsilon_{it}, \quad i = 1, \dots, n; t = 1, \dots, T, \quad (8)$$

where x_{it} is $k_I \times 1$ vector of explanatory variables which may include lagged dependent variables, $1\{\cdot\}$ is an indicator function, q_{it} is the threshold variable, γ is the threshold value and μ_i is the incidental parameter. This model is based on the first-differenced GMM transformation to eliminate μ_i and testing for nonlinearity is performed through a linearity test based on bootstrap algorithm. Building on the literature on the non-linear fiscal fatigue behaviour (Ghosh et al., 2013)

and recent research showing that WAMZ countries exhibit fiscal fatigue after a certain public debt threshold (Egbuna et al., 2019), we treat divergence of public debt as the threshold variable. As noted, this literature suggests that beyond a certain public debt threshold, the country may not generate sufficient primary balances to preserve debt sustainability. To implement the first-differenced GMM nonlinear estimation, we treat the second lag of fiscal divergence as instrument of the first lagged divergence term introduced in the dynamic model as an additional regressor. Similarly, the second lags of divergence of public debt levels, inflation rates, current account balances and output growth are treated as instruments for these endogenous variables.

5.0 Results and Discussions

This section discusses the results of the log t convergence tests applied to test the hypothesis of fiscal convergence in the WAMZ. Following this analysis, the paper discusses the estimation results showing how policy synchronisation factors influence fiscal convergence in the WAMZ.

5.1 Log t fiscal convergence test

The assessment in section 3 points to potential fiscal divergence among WAMZ countries over the period 2001-2019. The analysis is complemented by the summary statistics reported in Table 4, which shows significant fiscal heterogeneity across countries. This is evident in considerable differences in the indicators of divergence of fiscal policy between country-pairs. As shown, there is remarkable divergence of public debt ratio between country-pairs, ranging from 0.1 percent to 472.8 percent. Overall, the divergence of the ratio of fiscal balance to GDP between countries is significant, ranging from 0.01 percent between The Gambia and Liberia in 2012 to 25.4 percent between Ghana and Sierra Leone in 2007.

The existence of such heterogeneity suggests that it is appropriate to apply the log t convergence framework to exploit such heterogeneity in empirically testing the fiscal convergence hypothesis in the WAMZ. The results estimated using this approach are presented in Table 5. For all the different time periods considered, the coefficient δ from the log t regression is negative and statistically significant, showing remarkably strong evidence of fiscal divergence among WAMZ countries over the period 2001-2019. As discussed above, fiscal policies are not harmonised across WAMZ countries. These countries are characterised by undiversified production and export structures, and public debt levels are on an increasing trend in most WAMZ countries. The results are qualitatively similar to Arcabic (2018), who found evidence of fiscal divergence among EU member states.

Table 4: Descriptive statistics

Variable	Obs.	Mean	Std.Dev.	Min	Max
fb_ijt	570	3.317	3.370	0.0120	25.37
debt_ijt	570	72.22	107.3	0.104	472.8
inf_ijt	570	6.891	6.045	0.0238	32.65
cab_ijt	570	10.70	9.823	0.0410	67.61
dgdg_ijt	570	5.650	6.547	0.0130	38.48

Source: WAMI Staff computation. Note: “fb_ijt”-divergence of the ratio of fiscal balance to GDP between countries; “inf_ijt” -divergence of inflation rates; “ggdp_ijt”-divergence of growth rates; “cab_ijt”-divergence of current account balances; and “debt_ijt”-divergence of public debt to GDP ratio.

Table 5: Log t convergence results

Log (t)	Coeff.(std. error)	Period
δ	-3.4317*** (0.3273)	2001-2019
δ	-0.1313* (0.0721)	2001-2010
δ	-3.0110*** (0.1038)	2011-2019

Note: ***, * ** and ** denote significant at 1%, 5% and 10 % respectively.

5.2 Policy synchronisation and fiscal divergence

Having established empirically that WAMZ countries are fiscally diverging over time, a key question is whether policy synchronization would reduce the degree of divergence in fiscal stances between countries. To explore this issue, four alternative estimation techniques are used, starting with the baseline estimation of equation (7) using the linear panel fixed effects model.

5.2.1 Fixed effects model

The results estimated using the fixed effects model are presented in Table 6, showing the effects of the policy synchronisation on fiscal convergence over the period 2001-2019. Considering column (1) shows that the coefficient of divergence of current account balances (0.031) is positive and statistically significant at the 1 percent significance level. The magnitude of the coefficient implies that one standard deviation reduction in divergence of current account deficits would reduce fiscal divergence by 0.30. This positive outcome is consistent with the twin-deficit hypothesis and in line with the findings by Tapsoba et al. (2019). However, the coefficients of divergence of public debt levels and inflation rates show unexpected negative sign. The negative association between these factors and fiscal divergence is surprising, which may be driven by endogeneity bias not addressed by the fixed effects model. As noted, policy adjustments that contribute to reducing divergence of public debt levels, inflation rates and current account balances simultaneously reduce divergence of fiscal stances between countries.

Table 6: Divergence of fiscal balance model estimation results

	(1)	(2)	(3)
Variable	FE	FE-2SLS	FD-GMM
Lagged divergence of fiscal balance			0.387*** (0.095)
Divergence of public debt levels	-0.000 (0.002)	0.028*** (0.007)	0.009*** (0.003)
Divergence of inflation rates	-0.045** (0.021)	0.323 (0.210)	0.133** (0.053)
Divergence of current account balances	0.031*** (0.011)	0.348*** (0.108)	0.098*** (0.029)
Divergence of growth rates	0.039** (0.014)	-0.073 (0.071)	-0.044* (0.024)
Divergence of govt. effectiveness index	-1.440 (1.094)	-1.264 (2.049)	-0.466 (1.366)
Divergence of rule of law index	1.219** (0.572)	-2.994 (3.308)	-5.852*** (1.559)
Divergence of political stability index	-0.553* (0.273)	0.793** (0.393)	0.997 (0.866)
External shocks dummy	-1.079*** (0.254)	1.553* (0.926)	0.730* (0.407)
Constant	2.544*** (0.524)	-2.236 (2.380)	
Observations	570	420	510
R-squared	0.302		
Number of country-pairs	30	30	30
Year effect	Yes	No	No
Hansen test of over-identifying restrictions			29.87
Hansen p-value			0.229
First-order serial correlation [AR (1) test]			-3.625
AR (1)_P-value			0.000289
Second-order serial correlation [AR (2) test]			0.690
AR (2)_P-value			0.490

Dependent variable is measured as divergence of fiscal balance to GDP ratio. FE-panel fixed effects model; FD-2SLS-fixed effects panel two-stage least squares; and FD-GMM-first differenced generalised method of moments. The null hypothesis of Hansen's test H_0 : the instruments are valid; null hypothesis of the second order [AR (2)] test H_0 : absence of second-order serial correlation. Standard errors are reported in parenthesis and clustered at the country-pair level (columns 1-2). Robust standard errors are reported in column 3. '***', '**' and '*' denote significant at 1%, 5% and 10 % respectively.

5.2.2 Fixed effects (FE-2SLS) and First Differenced (FD) GMM estimation

To address the endogeneity problem that characterises the fixed effects estimation, equation (7) is estimated using the fixed effects panel two-stage least squares (FE-2SLS) approach. As discussed, instrumental variables are required to identify the causal effects of divergence of public debt levels, inflation rate and current account positions on fiscal divergence. However, the literature on the potential instruments to estimate the effects of these potentially endogenous variables is less developed. We treat the divergence indicators of public debt ratio, inflation rates, current account balances and growth rates between countries as endogenous variables, while all remaining regressors as defined above were treated as exogenous variables. To overcome the endogeneity problem, we utilize 3-5 lagged variables of divergence indicators of public debt ratio, inflation rates, current account balances and growth rates between countries as instruments for these

endogenous variables.⁶ The probability value of the Sargan-Hansen test statistic shows that these instruments are valid. The standard errors are clustered at the country-pair level to mitigate the problems of heteroscedasticity, serial-correlation, and cross-sectional dependence.

The results in Table 6 (column 2) show that the endogeneity bias problem significantly influences the effects of policy synchronisation factors on fiscal divergence. Unlike the results of the fixed effects model, the estimated coefficient on divergence of public debt levels (0.028) turns out to be strongly positive. It implies that one standard deviation reduction in divergence of public debt levels would significantly reduce divergence of fiscal stances among WAMZ countries by 3.0. This finding confirms that divergence of public debt level has contributed to fiscal divergence among WAMZ countries. Thus, reducing such divergence between countries through the adoption of similar adjustment mechanisms would enable WAMZ countries to move towards closer fiscal convergence. As discussed, there is considerable heterogeneity in public debt levels across WAMZ countries. This result is similar to Tapsoba (2019) for African countries. Similarly, the results show a positive and statistically significant coefficient on divergence of current account balances on fiscal divergence. This implies that improving a country's current account positions would reduce the transmission of idiosyncratic shocks across WAMZ countries and foster closer fiscal convergence. Turning to divergence of inflation rates between countries, the results show the expected positive coefficient but not statistically significant. This may be explained by potential bias in the parameter estimates induced by the absence of fiscal policy persistence (lagged fiscal divergence term) in the model. Such a bias is expected especially when large fiscal deficits have historically undermined the ability of central banks to reduce inflation to desirable levels.

To test the robustness of the results, we explore whether the results of policy synchronisation are sensitive to the inclusion of the persistence of fiscal divergence. To capture these effects and further address the problem of endogeneity, the first differenced generalised method of moments (FD-GMM) model is estimated. The results displayed in Table 6 (column 3) shows the coefficient on the lagged divergence of fiscal stances to be positive and significant at the 1 percent level of significance. This reinforces the importance of capturing persistence in fiscal divergence and the policy synchronisation factors show remarkably strong positive effect on fiscal divergence between countries. The results show that one standard deviation reduction in divergence of inflation rates, public debt levels and current account balances between countries would reduce fiscal divergence by 0.80, 1.0 and 1.0, respectively. This positive relationship between divergence of inflation rates and fiscal divergence between countries supports the arguments of the Fiscal Theory of the Price Level. The outcome implies that containing inflationary pressures, which may be induced through fiscal behaviour, would lead to reductions in fiscal divergence among WAMZ

⁶ Other important drivers of fiscal convergence not included in the model are indicators of the implementation of fiscal rules and countries' participation in IMF programmes. These variables were excluded because of absence of data on fiscal rules for The Gambia, Ghana, Guinea, and Sierra Leone from the IMF Fiscal Rules Dataset. Equally, we did not include a dummy variable to capture these countries' participation in IMF programmes because it is endogenous to divergence of fiscal stances and the absence of an appropriate instrument to address this endogeneity problem.

countries. This finding compares favourably with the study by Tapsoba et al. (2019) for African countries.

5.2.3 Static and dynamic panel threshold estimation

A key question of interest in this paper is whether there is a nonlinear response of fiscal divergence to policy synchronisation. This question is investigated considering the variation in the intensity of policy adjustments undertaken by WAMZ countries over the period under investigation. Answering this question allows us to capture the predicted nonlinear monetary and fiscal policy behaviour in explaining the effects of policy synchronisation on fiscal divergence in WAMZ countries. This is achieved through the estimation of the panel threshold model proposed by Seo and Shin (2016) and applied by Seo, Kim and Kim (2019). The model allows us to account for the presence of a kink in the estimation of divergence of fiscal stances model. Seo et al. (2019) stressed that testing for the presence of a kink is important when the threshold variable is an element of the vector of explanatory variables. Considering equation (8), the threshold variable, divergence of public debt ratio between countries (q_{it}) is included in the vector x_{it} of regressors. Our argument builds on the literature on the non-linear fiscal fatigue behaviour (Ghosh et al., 2013) in determining the choice of the indicator of divergence of public debt ratio as the threshold variable.

To estimate this panel threshold model, we utilised the second lagged variables of divergence of public debt ratio, inflation rates, current account balances and growth rates as instruments for these endogenous variables, while treating the control variables defined above as exogenous variables. In the dynamic model, the one-period lagged fiscal divergence term included as an additional regressor is instrumented by its second lagged variable. The bootstrap probability values used to test for linearity are obtained by the bootstrap algorithm with the trim rate set at the default of 0.4 using 100 bootstrap replications.

Interestingly, the results in Table 7 show that the p-value of the linearity test strongly rejects the null hypothesis of linearity in both the static and dynamic models of fiscal divergence between countries. This finding supports our arguments of nonlinear response of fiscal divergence to the policy synchronisation factors, reflecting the variation in the intensity of adjustment policies undertaken by WAMZ countries over time. It implies that the results of the panel threshold models are preferred to the FE-2SLS and FD-GMM models, since the relationship between policy synchronisation and fiscal divergence is nonlinear. Looking at the estimation results of the static panel threshold model in Table 7 (column 1) shows that they are qualitatively similar to those obtained using the FD-GMM. The findings support our arguments that WAMZ countries would reduce fiscal divergence through strengthening of policy actions to reduce divergence of public debt levels, inflation rates and current account positions. The results are robust to the inclusion of the one-period lagged fiscal divergence term in the dynamic threshold model (column 2) to capture the persistent effects of fiscal policy on fiscal convergence. The coefficients on the policy synchronisation factors remain positive and statistically significant at the 1 percent significance level. Finally, the results show that the slope of the kink is statistically significant, confirming the presence of a kink and the estimated model is well-specified. The results further show that the threshold value of divergence of public debt level is statistically significant in the presence of a kink. Overall, the analysis suggests that one useful way for WAMZ countries to move towards

closer fiscal convergence is to enhance macroeconomic convergence through reductions in divergence of public debt levels, inflation rates, and current account balances across countries.

Table 7: Static and dynamic panel threshold estimation of fiscal divergence model

Variables	(1) Static	(2) Dynamic
Lagged divergence of fiscal balance		-0.923*** (0.124)
Divergence of public debt levels	0.974*** (0.119)	0.304*** (0.101)
Divergence of inflation rates	0.027* (0.014)	0.110*** (0.019)
Divergence of current account balances	0.060*** (0.008)	0.199*** (0.026)
Divergence of growth rates	0.068*** (0.012)	-0.006 (0.020)
Divergence of govt. effectiveness index	0.360 (1.054)	5.761*** (0.714)
Divergence of rule of law index	2.250*** (0.238)	2.692*** (0.505)
Divergence of political stability index	-6.107*** (0.565)	-2.819*** (0.760)
External shocks dummy	1.355*** (0.155)	-0.262** (0.121)
kink_slope	-0.973*** (0.116)	-0.313*** (0.101)
Threshold estimate	18.211*** (0.986)	13.372*** (3.111)
Number of country-pairs	30	30
Linearity test (bootstrap p-value)	0.000	0.000

Note: Dependent variable is measured as divergence of the fiscal balance to GDP ratio.

Standard errors are reported in parenthesis and clustered at the country-pair level.

***, ** and * denote significant at 1%, 5% and 10 % respectively.

Source: Authors' estimations

6.0 Conclusion and Policy Implications

There is growing realisation that large fiscal deficits and rapid debt accumulation and associated increases in inflation rates that stem from uncoordinated fiscal policies induce macroeconomic instability across countries and undermine the credibility of a monetary union. Despite this recognition, research has neglected the role that policy synchronisation, reflected in reductions in the divergence of public debt levels, inflation rates and current account positions, plays in fostering closer fiscal convergence among participating countries. This paper has examined the effects of policy synchronisation on fiscal convergence in the WAMZ over the period 2001-2019. The key contributions of this paper to the policy debate on fiscal convergence are two-fold. First, it exploits the heterogeneity in fiscal policies to empirically determine whether WAMZ countries are fiscally converging or diverging over time. Second, it explores the neglected nonlinear response of fiscal divergence to the divergence of public debt, inflation rates, and current account balances in the Zone.

Employing the log t convergence test which allows for heterogeneous fiscal policies across countries, the results show strong evidence of fiscal divergence among WAMZ countries over the study period. By applying the FD-GMM, this paper provides strong evidence that reducing divergence of public debt levels, inflation rates and current account balances would reduce fiscal divergence among WAMZ countries. The results of the dynamic panel threshold model which allows for nonlinear policy behaviour in the response of fiscal convergence to policy synchronisation, shows remarkably similar outcome to the findings provided by the FD-GMM method.

The findings have important implications for macroeconomic policy convergence in the WAMZ and the Zone's participation in the proposed ECOWAS Monetary Union. Recent research in the ECOWAS region shows that fiscal convergence increases business cycle synchronisation (Egbuna et al., 2020). Research has also stressed that both fiscal convergence and more synchronised business cycles make countries better candidates for currency union (Darvas et al, 2005). Our paper finds remarkably strong evidence of diverging fiscal positions of WAMZ countries; and such fiscal divergence can be reduced through reductions in divergence of public debt levels, inflation rates and current account balances between countries. This outcome suggests that policymakers should adopt a more holistic approach to strengthen macroeconomic policy convergence in the WAMZ through well-coordinated monetary and fiscal policies and improving external sector performance.

Reducing divergence of public debt levels is one of the most important channels through which policymakers in the Zone would reduce fiscal divergence between countries and ensure the sustainable participation in the proposed ECOWAS monetary union. One useful way to reduce fiscal divergence among countries is to strengthen mechanisms to ensure compliance with the convergence criterion of public debt ratio not exceeding 70 percent of GDP. Given these insights, one important policy action that WAMZ countries would need to implement is to strengthen fiscal consolidation measures to improve the primary balance which will enhance capacity to reduce public debt to sustainable levels.

The evidence suggests that reducing divergence of inflation rates would reduce fiscal divergence between countries. This finding suggests the need to ensure that Member States in the WAMZ comply with the single-digit inflation convergence criterion. For effective monitoring of compliance with this criterion, it is imperative that the single-digit inflation criterion be well-defined in line with the established inflation threshold value that minimizes the distortional effects on relative prices in the Zone. This threshold is extremely important to enable central banks anchor inflation expectations to achieve low and stable inflation and create an enabling economic environment to optimize the allocation of resources within these economies.

The results further show that reducing divergence of current account positions of Member States would reduce fiscal divergence in the WAMZ. Because WAMZ countries are characterised by undiversified production and export structures, it is important that they provide support to enhance domestic productive capacity and diversify the export sector. This will improve external sector performance and reduce the transmission of idiosyncratic shocks to foster closer fiscal convergence. Lastly, WAMZ countries should undertake additional fiscal reforms to constrain

discretion in fiscal policies to promote fiscal convergence including the implementation of fiscal rules and Fiscal Responsibility Act.

Interestingly, this paper has only explored how policy synchronisation influences fiscal convergence, considering fiscal balance to GDP ratio as indicator of fiscal stance. Given the extent of fiscal heterogeneity across WAMZ countries, it would be interesting to examine whether WAMZ countries are diverging along the lines of revenue and expenditure components to ascertain the primary source of divergence of fiscal stances between countries. As such, future research may explore the dynamics of convergence among WAMZ countries using government debt, revenues, and expenditures components.

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Appendix

Appendix 1: Variable description

Variable	Description	Source
Fiscal divergence (fb_ijt)	Absolute difference between fiscal balances as a percent of GDP in the two countries.	IMF's World Economic Outlook and WAMI databases.
Divergence of inflation rates (inf_ijt)	Absolute difference between average annual inflation rates in the two countries.	Own calculations using WEO and WAMI databases.
Divergence of growth rates (ggdp_ijt)	Absolute difference between real GDP growth rates in the two countries.	Own calculations using WEO and WAMI databases.
Divergence of current account balances (cab_ijt).	Absolute difference between current account balances as a percent of GDP in the two countries.	Own calculations using WEO and WAMI databases.
Divergence of public debt to GDP ratio (debt_ijt)	Absolute difference between public debt to GDP ratio in the two countries	Own calculations using WEO and WAMI databases.
Institutional quality indicators	Absolute differences between government effectiveness index, rule of law, and political stability index in the two countries.	Own calculations using World Bank's Governance indicators
External shocks dummy	=1, to capture external factors such as the terrorist attack in the United States and associated commodity price shocks in 2001/2002, the global financial crisis in 2007/2008 and commodity price shock in 2014/2015 and 0, otherwise.	Own