

Agboola, Olayode W.; Olayeni, Olaolu Richard

Article

Is monetary integration economically viable in the Economic Community of West African States?

West African Journal of Monetary and Economic Integration

Provided in Cooperation with:

West African Monetary Institute (WAMI), Accra

Suggested Citation: Agboola, Olayode W.; Olayeni, Olaolu Richard (2022) : Is monetary integration economically viable in the Economic Community of West African States?, West African Journal of Monetary and Economic Integration, ISSN 0855-594X, West African Monetary Institute (WAMI), Accra, Vol. 22, Iss. 1, pp. 1-32

This Version is available at:

<https://hdl.handle.net/10419/310956>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

IS MONETARY INTEGRATION ECONOMICALLY VIABLE IN THE ECONOMIC COMMUNITY OF WEST AFRICAN STATES?

Olayode W. Agboola¹ and Olaolu R. Olayeni²

Abstract

The introduction of a common currency in the Economic Community of West African States (ECOWAS) has been the subject of extensive research over the past couple of decades, with extant issues ranging from viability and feasibility to sustainability of monetary integration in the region. This study explores the economic viability of a West African monetary union by investigating the effectiveness of monetary policy as the opportunity cost of integration. Using the structural vector autoregressive (SVAR) estimation technique to analyze time series data from 1981 to 2021, the study finds no evidence of effective monetary policy in Nigeria, The Gambia, and the WAEMU while there is only weak evidence of effectiveness of monetary policy in Ghana, Sierra Leone, and Cabo Verde. The study concludes that an ECOWAS monetary union may be economically viable, provided that the region can leverage opportunities to deepen inter-regional trade to further strengthen the benefits, against the already low opportunity cost of integration in terms of a mostly ineffective independent monetary policy in the region. The study also recommends the incorporation of some form of ‘monetization mechanism’ for catering to negative output shocks in the absence of independent monetary policy.

Keywords: Optimal Currency Area, Monetary Integration, Convergence Criteria, Monetary Policy Effectiveness, Business Cycle Synchronization

JEL Codes: E52, E32, E58, F33

¹Post-Doctoral Research Fellow, Lagos Business School, Pan-Atlantic University, Lagos, Nigeria
oagboola@lbs.edu.ng

²Professor of Economics, Obafemi Awolowo University, Ile-Ife, Nigeria rolayeni@oauife.edu.ng

1.0 Introduction

This paper investigates the effectiveness of independent monetary policy as an indication of the opportunity cost of monetary integration in the Economic Community of West African States (ECOWAS). While convergence in relevant macroeconomic fundamentals may indicate the feasibility of monetary integration, a more sinister but hitherto unaddressed issue is the question of potential net-benefits of monetary integration in West Africa. We refer to this question as the viability question of monetary integration. If independent monetary policy is found to have been effective in achieving macroeconomic objectives in any of the intending members of the proposed ECOWAS monetary union, then it might be an indication that remaining independent would be more economically efficient for such a country. On the other hand, monetary integration would be more economically viable for countries whose independent monetary policies have been ineffective in achieving macroeconomic objectives. This paper hypothesizes that the unanswered question of economic viability presents members with cold feet in their commitment to rigorously pursuing and meeting the convergence criteria, and hence is an unspoken cause of the delay in launching the Eco. Consequently, the paper contributes to the literature by investigating the effectiveness of monetary policy in the heterogeneous and monetarily independent ECOWAS units as an indication of the economic viability of monetary integration in the region.

Monetary integration in West Africa has attracted considerable attention over the past two decades, especially regarding the utility, economic viability, technical feasibility, and sustainability of introducing a single currency, known as the Eco, in the whole of ECOWAS. From an economic point of view, the viability question relates to the rationality of joining a monetary union in the first place and as such serves as a necessary condition that should ordinarily be settled first. However, going by Debrun et al., (2011), the issue of viability of monetary integration in Africa is still an unsettled business as the proposed unions in Africa promise a mix of net benefits, modest net gains, and net losses to different members. Going by Calvo & Reinhart (2002) and Alesina, Barro & Tenreyro (2002), the effectiveness of an independent monetary policy is the single most significant opportunity cost of giving up monetary independence. In ECOWAS, where the main goal of monetary policy is defined as an annual average inflation rate of less than 5% in the West African Economic Union (WAEMU) and generally as single digit in the non-WAEMU countries, inflation has been generally higher than single digit since 2015 (AfDB, 2018 & 2019), thereby suggesting that monetary policy may not have been effective in the region and that monetary integration might be beneficial.

Despite over four decades of efforts, however, the dream of an ECOWAS-wide monetary union remains elusive, with cross-cutting issues ranging from the role of fiscal policy (Onye & Umoh, 2023) and similarity of macroeconomic shocks (Ndongo & Diop, 2021) to those of a suitable exchange rate regime (Prasad, 2022), institutions (Okwor, 2021), and many structural factors (Debrun *et al.*, 2011). Given that the target date of introducing the Eco has been shifted six times (between the year 2000, when the fast-track approach was adopted, and the latest target year,

2027), the adoption of a common currency in West Africa raises questions of sustainability, if or when the union is eventually created. Moreover, ECOWAS members are yet to sustainably meet all the convergence criteria (Alemna, 2022), which were reduced from ten to six in 2015 to focus on monetary indicators (Okwor, 2021). The paper argues that until potential members of the proposed ECOWAS monetary union are convinced that the potential benefits of integration outweigh its opportunity cost, they are not likely to summon the required political will to achieve the convergence criteria.

The central idea of monetary integration rests on the proposition that, if the cost of altering domestic prices to attain equilibrium is lower than that of altering exchange rates, then monetary integration is better; but if otherwise, then monetary sovereignty is better. Theoretically, regions that satisfy the Optimum Currency Areas (OCA) criteria (Mundell, 1961) stand to benefit from a monetary union. However, since empirical examples of regions that pre-satisfy the OCA criteria are rare, satisfying the OCA criteria ex-post has been proposed (Frankel & Rose, 1997) on the grounds that monetary integration promotes trade and output (Frankel & Rose, 2000). Meanwhile, ex-post satisfaction of the OCA criteria depends on pre-achieving convergence in a myriad of contending economic, financial, fiscal, and institutional fundamentals. Consequently, the literature in this area has been awash with issues of convergence in certain fundamentals. The dominant views include those of feasibility of monetary integration among all ECOWAS members, conditional feasibility based on country sub-groups (Couharde, Grekou & Mignon, 2021; Yahya & Nkwatoh, 2020), and non-feasibility due to a plethora of issues such as weak and multiple institutional frameworks (Okwor, 2021).

Related to the issue of effective monetary policy is the issue of credibility. Again, countries with lower credibility in their monetary policy stand to benefit more from monetary integration. As argued by Tavlas (1993), there are somewhat fewer costs in terms of the loss of autonomy of domestic macro policies, and somewhat more benefits (e.g., gains in inflation credibility) associated with monetary integration. Furthermore, the existence of ECOWAS as an economic community of over four decades and the recent creation of the African Continental Free Trade Area (AfCFTA) are a good *prima facie* reasons to expect greater trade creation, and hence, potential benefits of monetary integration in the region. However, the literature on the effectiveness of monetary policy in West Africa has been inconclusive, even though evidence of ineffectiveness is stronger. However, there has not been an attempt to investigate the effectiveness of independent monetary policy as a condition for weighing the economic viability of monetary integration in ECOWAS. This study fills this gap for the ECOWAS monetary units intending to form a monetary union. Specifically, against the propositions of benefits of an ECOWAS monetary union, this study conducts a simple 'litmus test' of viability of monetary integration in West Africa by investigating the effectiveness of independent monetary policy as a proxy for the opportunity cost of monetary integration in the region. The rest of the paper is structured as follows: relevant literature is reviewed in Section 2; theoretical framework, models, and methods are presented in

Section 3; presentation, interpretation, and discussion of findings are the focus of Section 4 while summary, conclusion, and recommendations are presented in Section 5.

2.0 Literature

2.1 *Theoretical Considerations*

One of the earliest theories of regional economic integration was the theory of customs union, which holds that the creation of a free trade area in the form of a customs union will only be of global benefit provided there are positive production effects (Viner, 1950), consumption effects (Meade, 1955; Lipsey, 1957), location effects (Krugman, 1992), all of which may be dynamic and of long-run nature (Owen, 1983) or static and short-run in nature (Grimwade, 2013). However, much of the economic justification for creating monetary unions (for instance, the European monetary union) has been within the context of the theory of Optimum Currency Areas (OCA), which stipulates that an area may be able to eliminate both internal and external disequilibrium by adopting a common currency, provided the area is characterized by the pre-existence of free and unhindered movement of people (labour mobility; Mundell, 1961), products (McKinnon, 1963) and capital (capital mobility; Mundell, 1973) as well as the existence of product diversification (Kenen, 1969), flexible prices and wages (Corden, 1972), and trade openness (Krugman, 1992).

Essentially, the OCA theory holds that countries which trade significant proportions of their GDP with each other (and hence are economically integrated) and have similar shocks (shock symmetry) should fix their exchange rates, on the expectations that free mobility and price flexibility will help to ensure stability while product diversification helps to reduce the vulnerability of members of the union in the presence of shocks. However, given that the traditional OCA theory rely on the neoclassical assumptions of flexible prices and consequent clearing of markets, it is rare to come by an existing optimum currency area, as most regions of the world are characterized by barriers to trade and movement of resources while the mechanisms for domestic price adjustments are not only far from being flexible but also vary widely across countries. Funke (1997), also questioned the expectations of shock symmetry, arguing that the hypothesis of symmetric versus asymmetric shocks is not very operational and cannot easily be evaluated. Furthermore, Pelagides (1996) cast doubts on the ability of diversification to reduce vulnerability on the grounds that deeper market integration leads to higher product specialization. Based on the above complications, countries seeking to become a monetary union are often required to satisfy the Optimum Currency Areas (OCA) criteria, which are imposed to instill discipline in macroeconomic, monetary, and fiscal variables towards achieving shock symmetry.

The typical question, therefore, often involves investigating regions which are interested in pursuing monetary integration for convergence as determined by the achievement of the OCA criteria. However, Kenen (1969) has argued that no region in the world can satisfy the traditional OCA criteria. The monetary union literature on Europe as well as on ECOWAS also appear to buttress the view of Kenen (1969) with ample evidence that neither Europe (prior to the formation

of the European monetary union in 1999) nor ECOWAS qualifies as an optimum currency area. Meanwhile, a strand of the OCA literature, known as the endogenous OCA school, has advocated that members who do not pre-satisfy the OCA criteria may do so after integration since business cycles may converge for countries with close trade links, such that the convergence criteria become amenable to policy influence (Frankel & Rose, 1997). The endogenous OCA proposition hinges on the expectation that the very fact of integration can foster closer economic ties and encourage collaboration towards harmonizing differences among members. Several studies may have found support for the endogeneity proposition. Fidrmuc (2001) finds that the endogeneity hypothesis is supported by cross-section estimates of the correlation of business cycles and trade intensity among OECD countries between 1959 and 1993. Furthermore, a few studies (Artis & Zhang, 1997; Hochreiter & Winckler, 1995) also show that a common European business cycle has followed the creation of the European Monetary Union. The endogenous proposition also has motivated greater momentum towards the introduction of a common currency in ECOWAS.

The pursuance of convergence endogenously implies that even though a region does not qualify as an optimum currency area, it may work towards becoming a Viable Currency Area (VCA). Nevertheless, members' convergence in key variables has continued to serve as a predictor of benefits from a monetary union. Theoretically, the status of ECOWAS as an economic community for almost half of a century is a good *prima facie* reason to assume that members are better poised to benefit from monetary integration. However, the evidence around the convergence argument is inconclusive due to the complex notion of observed convergence *viz-a-viz* limitations in statistical techniques (Haynes & Haynes, 2016). Even though the viability of monetary integration among members who do not meet the OCA criteria is no less complex as it is also fraught with economic, political, and institutional considerations, this paper reckons that viability is a more fundamental issue that may have significant implications for the formation of a monetary union as well as for convergence of key variables, and sustainability of the union. The diverse and dynamic issues of convergence are outside the scope of the present paper. Instead, this paper focuses on establishing the economic viability of monetary integration among ECOWAS countries using a cost-benefit approach.

A Cost-Benefit Analysis of Joining a Monetary Union

In principle, members of a monetary union stand to derive certain benefits from monetary integration, but they stand to incur attendant costs as well. Okafor (2012) summarized the theoretical benefits and costs of monetary integration into three broad categories each. According to him, the benefits of monetary integration are trade creation effects, financial integration effects, and gains from policy coordination while its costs are asymmetric shocks, loss of monetary independence, and fiscal policy distortion (including loss of ability to monetize fiscal deficits). However, it is more difficult to establish the afore-mentioned benefits of integration *ex-ante* than it is to determine the stated costs. This is because the benefits are only accruable *ex-post*, after forming the monetary union and contingent upon the union being feasible and sustainable. While

highlighting that the potential benefits of integration typically outweigh the cost for most countries, Corden (1972) cautions that various considerations that affect the costs of monetary integration can often be analyzed in some detail, some of which may not be high in many cases, but it is hard to find any convincing and conclusive economic arguments in support of benefits for monetary integration.

On the other hand, while the question of sustainability of integration may aggravate the costs of joining a monetary union, some of those costs can be determined ex-ante since they are inherent in the decision to integrate monetarily. In other words, some of the costs of monetary integration are incurred once the monetary union is formed, irrespective of whether the union is sustainable. In addition, the costs of joining an ECOWAS monetary union cannot be subjected to the same *prima facie* assumption as above. Meanwhile, among the stated theoretical costs of monetary integration, the most obvious and direct, and perhaps the most significant, is the opportunity cost in terms of forgoing an effective independent monetary policy (Calvo & Reinehart 2002; Alesina, Barro & Tenreyro, 2002). The loss of independent monetary policy, with the attendant loss of the ability to monetize deficits, is particularly relevant in determining the economic viability of monetary integration as it can be adjudged ex-ante based on the effectiveness of such policy. For instance, Calvo and Reinehart (2002) have pointed out that the higher will be the cost of joining a monetary union, the greater the effectiveness of independent monetary policy in mitigating the effects of macroeconomic shocks. The significance of this cost becomes more pronounced when the monetary union arrangement excludes the option of fiscal monetization for achieving macroeconomic stabilization (economic) and other objectives such as pursuing social programmes (social) and financing the cost of governance (political). This is because the exclusion of the fiscal monetization option also threatens the political viability of monetary integration among fiscally heterogeneous members.

The OCA theory has evolved into what is known as the new OCA theory, which incorporates many more germane issues relating to the benefits and costs of monetary integration, especially those relating to the effectiveness and credibility of independent monetary policy (Kunroo, 2015; Broz, 2005; Mongelli, 2002; Tavlas, 1993) in dealing with diverse issues beyond achieving the traditional price stability objective. Overall, the new OCA theory suggests that there are fewer costs in terms of the loss of autonomy of domestic macro policies, and more benefits (e.g., gains in inflation credibility) associated with monetary integration (Tavlas, 1993), especially when the diverse and dynamic nature of shocks is considered. The overarching implication of the new OCA theory is that the rationale for joining a monetary union ought to involve, as a test of economic viability of integration, investigating the independent monetary policy of intending members for effectiveness and credibility within a wide range of practical issues.

Empirical Issues

Empirical evidence on the net benefit of monetary integration is scarce. This is because the European Economic and Monetary Union is the most notable example of a well-established economic and monetary union across the globe while other EMUs exist at various developmental stages of the integration process. For instance, the West African Economic and Monetary Union (WAEMU, also known as UEMOA), was formally launched in 1994, having formerly existed as a monetary union, the West African Monetary Union (WAMU, also known as Union Monétaire Ouest Africaine, UMOA) since 1962. Other examples with clear goal of attaining an EMU are the Economic and Monetary Community of Central Africa (CEMAC), and the African Economic Community (AEC). Another reason for the scarcity of empirical evidence on the net benefits of monetary integration is that a greater chunk of the literature on monetary integration has been devoted to investigating convergence issues, which are more relevant for the sustainability of monetary integration, as opposed to its economic viability, which is the focus of this paper. However, even though there are still unresolved issues around the net benefits of monetary integration in ECOWAS (Masson & Pattilo, 2001; Ogunkola, 2005; Debrun et al., 2005; Alagidede et al., 2012), some lessons can be drawn from existing studies.

Some evidence suggests that the formation of the European EMU has reduced transaction costs in the eurozone directly and indirectly (De Grauwe, 2020) while Glick & Rose (2015) hold that estimating the trade effect of the EMU is fraught with varying outcomes, depending on the econometric method used. Furthermore, Arpaia et al., (2016) submits that while labour mobility flows have been on the upward trend in the EU and have been more responsive to asymmetric demand shocks, they are way below within-country mobility flows, and slightly lower than mobility flows expected in a fully integrated monetary union. The foregoing suggests that monetary integration has made it easier and cheaper for businesses to trade, and for labour to migrate across borders. Meanwhile, even though there is some similarity in the evidence for West Africa and Latin America (De Grauwe, 2020), Beetsma and Giuliodori (2010) has shown that the cost-benefit trade-off of monetary integration may differ substantially between industrialized and less-developed countries where differences in fiscal needs and, hence, the reliance on seigniorage revenues may dominate the scope for integration. This reliance on seigniorage suggests that countries in developing countries may be reluctant to give up independent monetary policy. Nevertheless, going by Howarth & Quaglia (2020), the overarching lesson from the monetary integration process in Europe is that the European monetary union was asymmetric and ‘incomplete’ at inception, but these are the very qualities that have pressured members towards greater interdependence and integration.

Evidence of the effectiveness of monetary policy in West Africa has been elusive, conflicting, and insufficient (Ajayi & Akutson, 2023; Asiedu et al, 2020), with evidence ranging from no effect (Ekwe et al., 2017; Ikechukwu *et al.*, 2016) to marginal effect (Nasko, 2016), there appears to be stronger support for the ineffectiveness of monetary policy in West Africa. Indeed, by identifying

the factors responsible for the weakness of monetary policy in achieving the price stability objective in Sub-Saharan Africa, many studies conceded the ineffectiveness of monetary policy in the region. For instance, IMF (2020) reports that fiscal dominance and shallow financial markets weaken the effectiveness of monetary policy in Sierra Leone. Akanbi et al., (2020) find that the lack of financial inclusion significantly weakens the effectiveness of monetary policy in Nigeria while Effiong et al., (2020) report a weak relationship between financial development and monetary policy effectiveness in Africa. Ikechukwu et al., (2016) also find that monetary policy is not effective in Nigeria due to the existence of various and uncontrolled sources of liquidity. However, Sena et al., (2021) find that financial development strengthens the effectiveness of monetary policy on economic growth in Ghana while Evans (2016) establishes that rather than financial inclusion driving monetary policy effectiveness, it is monetary policy effectiveness that drives financial inclusion in Africa.

Berg & Portillo (2018), while defending the reported evidence of weak and insignificant transmission mechanisms in low-income countries on the grounds of a lack of standard empirical approaches, admit that the existing monetary policy regimes in most Sub-Saharan countries lack clear and effective policy frameworks. Kireyev (2015) also finds that the effectiveness of monetary policy in the WAEMU remains weak due to liquidity management constraints in the transmission mechanism of monetary policy. Earlier studies in support of the foregoing include Siri (2012) who finds that monetary policy in the WAEMU reacts to domestic economic variables in a limited way, particularly to inflation, but reflects the evolution of the Bank of France's interest rates while monetary policy in Ghana and Nigeria seem to react to inflation but not really to the output gap. Ténou (2002) also appears to agree with the findings of Siri (2012) when he finds that monetary policy in the WAEMU appeared to react positively to the output gap and to the differentials of interest rates and inflation rates. Overall, the monetary union literature suggests that the feasibility of monetary integration in ECOWAS is largely an open question, as there are still numerous unresolved issues. However, there are indications that monetary integration in the region might be advantageous provided that such integration delivers net benefits. This study thus investigates the region for the effectiveness of an independent monetary policy as a test of economic viability of an ECOWAS monetary union.

3.0 Models, Methods, and Data

3.1 Models

This study is anchored on the New Keynesian (NK) theory, which incorporates the assumptions of rational expectations and market imperfections, both of which more closely describe economic realities than the economic ideal of perfect markets. The NK model (See equations 1 to 3) is used to examine the short run impact of monetary policy on real variables in ECOWAS under the assumptions of price stickiness in the interactions among rational households and monopolistically

competitive firms, and a central bank that conducts monetary policy by targeting the equilibrium real interest rate through controlling the nominal monetary policy interest rate.

$$\hat{y}_t = \alpha_{1y}E_t(\hat{y}_{t+1}) + \alpha_{1r}r_t^* + u_{yt}, \quad 1$$

$$\pi_t = \alpha_{2y}\hat{y}_t + \alpha_{2\pi}E_t(\hat{\pi}_{t+1}) + u_{\pi t}, \quad 2$$

$$R_t = \alpha_{3y}E_t(\hat{y}_{t+1}) + \alpha_{3\pi}E_t(\hat{\pi}_{t+1}) + u_{Rt}, \quad 3$$

where E_t is the expectational term, R_t is the monetary policy rate, and r_t^* is the real interest rate based on some inflation expectation, π_t is inflation or the rate of change in prices, p_t , and ‘hat’ denotes percentage deviation from steady state or some target value such that $\hat{\pi}_t$ can be interpreted as the difference between current price level (p_t) and the price level consistent with steady state (p_t^*) while \hat{y}_t is the difference between current output (y_t) and its steady state value (y_t^*).

Going by Ireland (2010, 2005), equations 1 to 3, respectively, capture the behaviour of rational households, monopolistically competitive firms, and a central bank that controls the interest rate. Equation 1 captures the expectational IS curve, a log-linearized version of the Euler equation that expresses the optimizing household’s intertemporal utility as a function of one-period future expectation of output gap, price gap, and the nominal rate of interest. Equation 2 is the New Keynesian Phillips curve, a log-linear approximation about the steady state of the aggregation of the optimizing price-setting behaviour of individual monopolistically competitive firms, relating the current price level to the sum of the output gap and one-period future expectation of the price gap. According to Clarida *et al.*, (1998), the IS relation in equation 1 differs from the traditional IS curve largely because the current output gap depends on the expected future output gap as well as the real interest rate. Similarly, equation 2 deviates from the standard Phillips curve because expected future inflation enters additively as opposed to expected current inflation, thereby making inflation dependent on current and expected future economic conditions. Equation 3 is the monetary policy reaction function of the central bank, a Taylor-type rule, which expresses the monetary policy rate as a function of expectations of output gap and the price gap. The Taylor-type monetary policy rule remains the best-known instrument rule (Walsh, 2017) and, as such, has been used by several studies in analyzing the conduct of monetary policy by central banks across the world (See Taylor, 1993; Clarida *et al.*, 1998; Verdelhan, 1999; Woodford, 2001; Tenou, 2002; Siri, 2012; Owusu, 2020, among others).

Note that the Taylor-type rule implied by equation 3, like most other formulations of the Taylor rule, assumes a closed economy. Meanwhile, a few scholars, including Clarida *et al.*, (2002), Gali and Monacelli (2005), and Clarida (2014) have proposed an open-economy new Keynesian model to accommodate the influence of the external sector on monetary policy making in the domestic economy. Indeed, Clarida (2014) posits that, given certain situations, and in specific models, inflation targeting using a Taylor rule in a regime of flexible exchange rates is the typical optimal monetary policy for a central bank with the objective of maximizing a well-specified social welfare

function in an open economy. Clarida (2014)'s open economy model incorporated a measure of the degree of openness, with the implication that equilibrium real interest rate becomes a function of both potential output and foreign output, thereby providing a basis for the incorporation of external factors that influence the equilibrium real interest rate into the Taylor rule, either endogenously or exogenously. Consequently, this study adopts a modified version of Clarida (2014)'s open-economy NK model (equations 4 to 6) by incorporating the exchange rate to capture the influence of the external sector in monetary policy making in ECOWAS.

$$\hat{y}_t = \theta_{1y}E_t(\hat{y}_{t+1}) + \theta_{1r}r_t^* + \theta_{1x}E_t(x_{t+1}) + u_{yt}, \quad 4$$

$$\pi_t = \theta_{2y}\hat{y}_t + \theta_{2\pi}E_t(\hat{\pi}_{t+1}) + \theta_{2x}E_t(x_{t+1}) + u_{\pi t}, \quad 5$$

$$R_t = \theta_{3y}E_t(\hat{y}_{t+1}) + \theta_{3\pi}E_t(\hat{\pi}_{t+1}) + \theta_{3x}E_t(x_{t+1}) + u_{Rt}, \quad 6$$

where x_t is the nominal exchange rate of the corresponding domestic currency to the US Dollar. The other variables remain as earlier defined. Equation 6 can be seen as a monetary policy rule, like the interest rate rule of Taylor (1993), used for steering fluctuations in monetary aggregates, output, and price level towards the desired targets. It is expected that θ_{3y} and $\theta_{3\pi}$ will be positive. This implies that the policy rate increases with high values of expected inflation or output gap and falls when either is low. Even though the original Taylor rule is backward-looking, Ball (1999) has argued that a more realistic instrument rule is one that incorporates micro-foundations of a forward-looking structure that also captures inertia. Studies have often dealt with the issue of policy inertia via instrumentation using the lag(s) of the policy rate. For instance, Clarida *et al.*, (1998) included the lag of the monetary policy rate to capture central banks' practice of smoothing interest rates to alleviate the fear of loss of credibility and disruption of the capital markets that may accompany large policy fluctuations. However, this procedure is fraught with both theoretical and estimation problems. On the theoretical front, even though there is some justification for past values of the policy rate to determine its current value, such justification is the subject of ongoing debate. Furthermore, it has been established that when the lag of the dependent variable is included as a regressor in a regression estimation, the lagged dependent variable can artificially 'dominate' the regression even when it adds little or no meaningful explanation to the dependent variable (Achen, 2000). This means that whether it has a great deal of explanatory power, a little, or none, the coefficient of the lagged dependent variable assumes exaggerated values and significance while the value and significance of the coefficients of the other regressors are biased downwards.

There are also controversial issues surrounding the presence, justification, and implications of monetary policy inertia for the effectiveness of monetary policy (see Goodhart 1998, Woodford, 2003; Rudebusch, 2002, 2006; Moreira & Monte, 2020). This controversy is deemed to arise from the fact that policy inertia could be viewed as a natural consequence of the ubiquity of information and operational lags due to asymmetry and bureaucratic procedures of monetary policy committees (see Riboni & Ruge-Murcia, 2018) or as a deliberate decision of policy makers

(Moreira & Monte, 2020). Nevertheless, even though our focus is not directly on it, we infer the presence or otherwise of policy inertia from the coefficient of the lag of the policy rate in the structural VAR estimation results. Furthermore, since the steady state is not directly observable, deviations from steady state values are often not pre-observed but usually assumed based on theory or formulated based on adaptive expectations (Cagan, 1956) or rational expectations (Muth, 1961; Lucas, 1976). Meanwhile, expectational (or forecast) values of the variables in the NK model are largely unavailable for developing countries such as those of ECOWAS, thereby constraining us to proxy the expectations of inflation and output gap using their contemporaneous and past values. Specifically, expectation of output gap (\hat{y}_t) is proxied by real output gap (y_t) while expectation of price gap (\hat{p}_t) is proxied by the actual rate of inflation (π_t).

3.2 *Methods*

The objective of this study is achieved within the framework of a structural VAR of the form:

$$A_{i,0}Z_{i,t} = \Gamma_{i,j} + B_{i,j}Z_{t-k} + U_{i,t}, \quad 7$$

where the subscripts i ($i = 1, \dots, 15$) and j ($j = 1, \dots, 4$) refer to the i -th country and the j -th variable, respectively; A_0 is a 4-dimensional square matrix of contemporaneous effects (the impact matrix); Z_t is a 4-dimensional vector of endogenous variables ($x_{i,t}$, $y_{i,t}$, $\pi_{i,t}$ and $R_{i,t}$); Z_{t-k} is a 4-dimensional vector of lagged endogenous variables, up to ρ lags ($k = 1, 2, \dots, \rho$) where ρ is the optimal lag length; and $U_{i,t}$ is a 4-dimensional vector of mean-zero, serially uncorrelated and unconditionally homoskedastic (Killian, 2011) error terms ($u_{i,xt}$, $u_{i,yt}$, $u_{i,\pi t}$ and $u_{i,Rt}$), also known as impulses or innovations, which capture the forecast errors in Z_t ; $\Gamma_{i,j}$ is a 4-dimensional vector of constants; $B_{i,j}$ is a 4-dimensional square matrix of historical effects.

We restricted the SVAR model in this study by recursive ordering of variables so that the model is exactly identified. While variables in the traditional New Keynesian model are ordered to reflect the typical sequence of economic decisions where the risk of inflation only exists in a situation of full employment (Nahoussé, 2019), our model is restricted to reflect the more realistic import-dependent nature of ECOWAS countries where domestic economic conditions are susceptible to external shocks (Alagidede *et al.*, 2012). Consequently, exchange rate is restricted to enter the model first. This implies that exchange rate affects all the other variables contemporaneously but is not affected contemporaneously by the other variables since it is determined exogenously. In addition, inflation, output gap, and the monetary policy rate are then restricted to enter the model in succession, implying that only exchange rate impacts inflation contemporaneously while both exchange rate and inflation impact the output gap contemporaneously; and the monetary policy rate reacts to expectations of exchange rate, inflation, and output gap contemporaneously. Restricting the model in this manner implies that exchange rate affects the other three variables via its pass-through to domestic prices and output (See Tarawalie *et al.*, 2012). Furthermore, restricting the model so that inflation enters the model before output gap implies that inflation is

predominantly cost-push in the region, with the prices of food and energy being the largest drivers, especially in the WAEMU (Fernandes, 2023). Finally, going by institutional practice of most central banks, monetary authorities observe (and in some cases expect) and react to changes in the other three variables in our model. Imposing the recursive ordering above, equation 7 above can be re-specified as the following structural VAR system:

$$x_{i,t} = \alpha_{i0,x} + \gamma_{i,1x}x_{i,t-1} + \gamma_{i,1\pi}\pi_{i,t-1} + \gamma_{i,1y}y_{i,t-1} + \gamma_{i,1R}R_{i,t-1} + u_{i,xt} \quad 8$$

$$\pi_{i,t} = \alpha_{i0,\pi} + \beta_{i,2x}x_{i,t} + \gamma_{i,2x}x_{i,t-1} + \gamma_{i,2\pi}\pi_{i,t-1} + \gamma_{i,2y}y_{i,t-1} + \gamma_{i,2R}R_{i,t-1} + u_{i,\pi t} \quad 9$$

$$y_{i,t} = \alpha_{i0,y} + \beta_{i,3x}x_{i,t} + \beta_{i,3\pi}\pi_{i,t} + \gamma_{i,3x}x_{i,t-1} + \gamma_{i,3\pi}\pi_{i,t-1} + \gamma_{i,3y}y_{i,t-1} + \gamma_{i,3R}R_{i,t-1} + u_{i,yt} \quad 10$$

$$R_{i,t} = \alpha_{i0,R} + \beta_{i,4x}x_{i,t} + \beta_{i,4\pi}\pi_{i,t} + \beta_{i,4y}y_{i,t} + \gamma_{i,4x}x_{i,t-1} + \gamma_{i,4\pi}\pi_{i,t-1} + \gamma_{i,4y}y_{i,t-1} + \gamma_{i,4R}R_{i,t-1} + u_{i,Rt} \quad 11$$

The matrix representation of equations 8-11 is as follows:

$$\begin{bmatrix} x_{i,t} \\ \pi_{i,t} \\ y_{i,t} \\ R_{i,t} \end{bmatrix} = \begin{bmatrix} \alpha_{i0,x} \\ \alpha_{i0,\pi} \\ \alpha_{i0,y} \\ \alpha_{i0,R} \end{bmatrix} + \begin{bmatrix} 1 & 0 & 0 & 0 \\ \beta_{i,2x} & 1 & 0 & 0 \\ \beta_{i,3x} & \beta_{i,3\pi} & 1 & 0 \\ \beta_{i,4x} & \beta_{i,4\pi} & \beta_{i,4y} & 1 \end{bmatrix} \begin{bmatrix} x_{i,t} \\ \pi_{i,t} \\ y_{i,t} \\ R_{i,t} \end{bmatrix} + \begin{bmatrix} \gamma_{i,1x} & \gamma_{i,1\pi} & \gamma_{i,1y} & \gamma_{i,1R} \\ \gamma_{i,2x} & \gamma_{i,2\pi} & \gamma_{i,2y} & \gamma_{i,2R} \\ \gamma_{i,3x} & \gamma_{i,3\pi} & \gamma_{i,3y} & \gamma_{i,3R} \\ \gamma_{i,4x} & \gamma_{i,4\pi} & \gamma_{i,4y} & \gamma_{i,4R} \end{bmatrix} \begin{bmatrix} x_{i,t-1} \\ \pi_{i,t-1} \\ y_{i,t-1} \\ R_{i,t-1} \end{bmatrix} + \begin{bmatrix} \mu_{i,xt} \\ \mu_{i,\pi t} \\ \mu_{i,yt} \\ \mu_{i,Rt} \end{bmatrix}$$

The α 's, β 's and γ 's are, respectively, the intercepts, the coefficients of the contemporaneous variables, and the coefficients of the lagged variables while the u 's are the structural shocks. The expected sign of $\beta_{i,2x}$ (the coefficient of exchange rate in equation 9) is positive as a depreciation of the domestic currency in terms of the dollar is known to be associated with a higher inflation. However, the expected sign of $\beta_{i,3x}$ (the coefficient of exchange rate in equation 10) is negative because a depreciation of the domestic currency against the dollar implies lower output via cost-push effects. In equation 11, $\beta_{i,4x}$ would be positive as the monetary policy authority, especially in small open economies, normally raises the monetary policy rate in anticipation of the inflationary effects of depreciation. The expected signs of $\beta_{i,3\pi}$ and $\beta_{i,4\pi}$ (the coefficients of inflation in equations 10 and 11) are negative and positive, respectively. This is because an increase in the price level raises the costs of production and reduces output while attracting an increase in the monetary policy rate as a policy measure in anticipation of inflation. Finally, the expected sign on the coefficient of output gap in equation 11, $\beta_{i,4y}$, is positive because the monetary policy rate is usually raised in anticipation of a boom in output as a way of moderating the inflationary tendency of the business cycle. While each of the structural shocks is of some importance in this study, the monetary policy shock is of greater focus. The impulse response function to examine the impact of structural shocks can then be specified as the Wold reduced form moving average of the form:

$$z_{i,t} = v_i + \sum_{j=0}^{\infty} c_{i,j} u_{i,t-j}$$

12

where the elements in v are uncorrelated and have unit variance; the elements in c are the responses of the system to an innovation or shock; and u is the matrix of white noise processes with non-singular covariance matrix Σ . The impulse response functions enable us to trace the impact of shocks on the economy through their impact on the endogenous variables over time. The lag length for the structural VAR estimation in this study is determined by first estimating a standard VAR and then selecting the criterion with the minimum value. However, where there is a conflict, preference is in favour of the Schwartz Information Criterion (SIC) (also known as Bayesian Information Criterion (BIC)).

3.3 Data

The study uses data series on monetary policy rate (MPR), inflation rate, output gap, and exchange rate. Annual time series data spanning the period 1981 - 2021 were sourced from the databases of the World Bank Development Indicator (WDI), the African Development Bank (AfDB) as well as the Statistical Bulletins published by the National Statistical Agencies of the individual countries for several years (See Table 6 in Appendix). Data on output gap is computed as the difference between actual GDP and potential GDP, measured as the residual of a regression of log of GDP on a linear time trend. Similarly, data on inflation gap was computed as the differential of actual inflation rate and inflation target. The inflation target for the WAEMU is 2% while 5% is adopted as target inflation for the remaining countries, being the average of the ‘single digit’ inflation target adopted by these countries. While the exchange rate is the same for WAEMU countries, data on inflation rate in the WAEMU was obtained by computing the average of the inflation rates for the individual countries of the bloc. On the other hand, the output gap for WAEMU was computed based on a total of the outputs of the individual countries. The study notes two data issues. One, the use of data of annual frequency as opposed to data of higher frequency such as monthly data; and two, the combination of both national and international data sources. We resorted to annual data on the grounds that data of higher frequency are largely unavailable for some of the variables of interest for many of the years and for some of the countries under investigation. Indeed, Liberia, Guinea, and Guinea-Bissau had to be excluded from our investigation owing to the absence of complete data for the countries. Similarly, we resorted to national data sources where data on certain variables were not available from international sources.

4.0 Results and Discussion

4.1 Preliminary Analyses

Theoretically, the monetary policy rate (MPR) reacts positively to inflation and output gap: MPR is increased to combat high (expected) inflation as well as positive output gaps and set low to combat low or negative (expected) inflation and negative output gaps. An observation of the graphs (See Fig. 1 in Appendix) indicates that only one MPR is operational in the WAEMU, and it

assumed an overall downward trend over the period of analysis, falling from 12.49% in 1981 to 4.0% in 2021. Similarly, there was an overall downward trend in MPR in Cabo Verde and Ghana, falling from 19.5% and 6% in 1981 to 14.5% and 0.5% in 2021, respectively. However, MPR showed an overall upward trend in Sierra Leone, The Gambia, and Nigeria, rising from 12%, 9%, and 6% in 1981 to 14.25%, 10% and 11.5% in 2021, respectively.

Going by the theoretical expectation of a positive association between the policy rate and each of the inflation and output gap, both inflation and output gap should follow a similar overall trend as the policy rate. For WAEMU countries, inflation assumed a generally downward trend for all countries. Inflation also assumed an overall downward trend in Ghana and Sierra Leone. However, inflation in The Gambia and Nigeria showed an overall downward trend, despite the overall upward trend in the policy rate in these countries. Furthermore, from the early 1990s upwards, inflation became more stable in all the other countries. Over the period of analysis, no obvious overall trend could be observed in the output gap in Cabo Verde and The Gambia, but output gap trended slightly downward, overall, in Ghana, Nigeria, and Sierra Leone and slightly upward for the WAEMU. This implies that a similar trend between monetary policy rate and output gap could only be seen in the WAEMU.

4.2 Correlation Analyses

Pairwise correlation analyses were conducted to provide preliminary information on the observed relationships between the variables. For instance, the nature and degree of association between output and inflation can give a hint on the cause of inflation in a country and, as such, bears important implications for the assessment of the effectiveness of monetary policy in such a country. Furthermore, correlation coefficients can provide preliminary information on the possible presence of multicollinearity. Going by the results of correlation tests (Table 1), the correlation coefficients indicate that there is no threat of multicollinearity as there was no coefficient higher than 80%, which is the rule-of-thumb threshold. Furthermore, a moderately negative and significant correlation was found between output gap and inflation in Cabo Verde (-0.59), The Gambia (-0.41), Ghana (-0.44), and Nigeria (-0.36). Conversely, in WAEMU, the correlation between output gap and inflation was moderately positive (0.66) and significant while the correlation between output gap and inflation was negligible (-0.09) and insignificant in Sierra Leone. The negative correlation between output and inflation in Cabo Verde, The Gambia, Ghana, and Nigeria could imply that inflation was predominantly cost-push in these countries. But it could also imply that higher prices had driven the output gap down over the period. On the other hand, the positive association between output gap and inflation in the WAEMU could imply that inflation is demand-pull in the region, or it could imply that higher prices fueled higher output gaps.

A negative correlation between the monetary policy rate and inflation would imply that higher policy rates were associated with lower inflation, thereby suggesting that monetary policy was effective. The correlation between the monetary policy rate (MPR) and inflation was negative and

significant in Cabo Verde (-0.34) and WAEMU (-0.74), but positive and significant in The Gambia (0.41), Nigeria (0.40), and Sierra Leone (0.35). The correlation between MPR and inflation in Ghana was weakly positive (0.17) but not significant. These results appear to suggest that monetary policy only succeeded in lowering inflation only in Cabo Verde and WAEMU but not in the remaining four countries. Theoretically, a negative correlation is expected between the monetary policy rate and GDP because lower policy rates are expected to stimulate higher output while higher policy rates stifle output. The correlation between MPR and GDP was found to be negative and significant in WAEMU (-0.80), Ghana (-0.33), and Nigeria (-0.34) while such correlation was found to be insignificant (using the 5% significance level) in the remaining three countries. These results indicate that monetary policy was effective in stimulating output in Ghana, Nigeria, and WAEMU, but not in the other countries. The reported associations between the policy rate and each of inflation and output gap would appear to suggest that monetary policy was effective in combating inflation and stimulating output only in the WAEMU, which is already a monetary union; and in combating inflation only in Cabo Verde while stimulating output only in Ghana and Nigeria. These outcomes would appear to suggest that monetary policy would be effective in achieving the dual objectives of combating inflation and stimulating output if ECOWAS countries integrate. However, correlation values do not imply causation. Thus, analyses to probe deeper into the effectiveness or otherwise of monetary policy in ECOWAS countries are the focus of the next sections.

Table 1: Correlation Analysis

Country	Correlation between GDP and Inflation	Correlation between MPR and inflation	Correlation between MPR and GDP
Cabo Verde	-0.5917***	-0.3355**	0.0884
Gambia	-0.4050**	0.4139***	0.2715*
Ghana	-0.4362***	0.1721	-0.3318**
Nigeria	-0.3649**	0.3984**	-0.3366**
Sierra Leone	-0.0902	0.3540**	-0.3084*
WAEMU ⁺	0.6620***	-0.7440***	-0.7981***

*, **, *** indicates significance at the 10%, 5% and 1% level, respectively.

WAEMU⁺ denotes the following eight countries: Benin, Burkina Faso, Côte d'Ivoire, Guinea, Guinea-Bissau, Mali, Niger, and Togo

Source: Author's Computation (2023)

4.3 Country-Specific Unit Root Analysis

To achieve the objective of this study, country-specific analyses are conducted. It then becomes necessary to determine the order of integration of the variables of interest by conducting individual unit root tests. The series for WAEMU, being a monetary union, alongside those of the other five independent countries (The Gambia, Ghana, Nigeria, Sierra Leone, and Cabo Verde) are investigated for their integration properties using individual unit root tests. Given that

investigating the stationarity properties of time series data is fraught with a lot of issues, ranging from the power of the test adopted to model specification, this study adopts a combination of three tests: Augmented-Dickey Fuller (ADF) and Phillip-Perron tests with the null of unit root and the Kwiatkowski-Phillip-Schmidt-Shin (KPSS) test with the null of stationarity. The KPSS stationarity test is used as a complement, such that any contradiction between the results of ADF and PP tests is resolved with the result of the KPSS test. Conclusion on the presence or otherwise of unit root in the series is aligned with the outcome common to at least two of the three tests conducted. Owing to the low power of unit root tests against a null of unit root, the most general model, with intercept and trend, is adopted in the case of exchange rate, inflation, and monetary policy rate. This is because, an observation of the trend of the series suggests the presence of a trend component. Moreover, even though the inclusion of trend and intercept weakens the power of the ADF and PP tests against a null of unit root, it is generally more reliable when these tests reject the null of unit root in the presence of trend and intercept. However, output gap, which has been detrended already, was tested with constant only.

Summary of the unit root tests results are presented in Table 2 (See Table 3 in Appendix for the full results). Exchange rate (EXR) only becomes stationary at first difference in all countries observed. on the other hand, output gap (GAP) is stationary in all countries except in Nigeria and the WAEMU where it becomes stationary only at first difference. Inflation rate (INF) is stationary at levels in Cabo Verde, Ghana, Sierra Leone, and WAEMU but I(1) in Gambia and Nigeria. Monetary policy rate (MPR) is stationary at levels only in Gambia and Sierra Leone but I(1) in Cabo Verde, Ghana, Nigeria and WAEMU. The implication of these unit root results is that for the series to be amenable to the structural vector autoregressive (SVAR) method adopted in the study, the first difference forms of the I(1) series were used along with the I(0) series. The natural logarithm of exchange rate was used for each of the countries under consideration.

Table 2: Summary of Country-Specific Unit Root and Stationarity Tests

Country	Exchange Rate	Output Gap	Inflation	Monetary Policy Rate
Cabo Verde	I(1)	I(0)	I(0)	I(1)
Gambia	I(1)	I(0)	I(1)	I(0)
Ghana	I(1)	I(0)	I(0)	I(1)
Nigeria	I(1)	I(1)	I(1)	I(1)
Sierra Leone	I(1)	I(0)	I(0)	I(0)
WAEMU	I(1)	I(1)	I(0)	I(1)

Source: Author's Computation (2023)

4.4 *Lag Length Selection and Diagnostic Checks*

Theoretically, the suitable lag length for the structural VAR estimations in this study is lag one because lags higher than one are not economically sensible for a study using annual data. Nevertheless, the optimal lag selected for each regression was subjected to tests based on several information criteria, including the Akaike Information Criterion (AIC), Schwarz Information

Criterion (SIC), and Hanan-Quin Information Criterion (HQ). However, preference was given to SIC. As expected, the SIC favoured a lag length of one in five out of the six regressions while the AIC and HQ were chosen in the regression for Ghana where the SIC favoured a lag length of zero, which is not valid for a VAR analysis. To determine the model stability, the inverse roots of the autoregressive characteristic polynomial of each of the VAR estimations were observed. Results (see Fig. 4 in the Appendix) indicate that all six models are stable at the lag length selected, as all the roots lie inside the unit circle. This implies that the VAR models are reliable at the chosen lag length. Results of serial correlation LM and the Breusch-Pagan-Godfrey Heteroscedasticity tests (Table 5; Appendix) also indicate that there was no evidence of serial correlation or heteroscedasticity in the errors of any of the six models estimated.

4.5 *Results and Discussions*

Estimation of the structural VAR equations 8 to 11 were conducted to investigate the effectiveness of monetary policy in ECOWAS. The regression results were diagnosed to be free from serial correlation, heteroskedasticity, and residual instability, as confirmed by results from the VAR residual serial correlation LM, the Breusch-Pagan-Godfrey heteroskedasticity tests, and the residual stability tests (See Appendix). Regression estimates show that the estimated sign and magnitude of the coefficient on exchange rate in equation 9 provide information on the impact of exchange rate on inflation in each country. A positive (negative) sign suggests that appreciation or positive changes (depreciation or negative changes) in the exchange rate would result in higher (lower) inflation, thereby suggesting the predominance of cost-push inflation. On the other hand, a positive (negative) sign on the coefficient of inflation in equation 10 would suggest that inflation is pro-cyclical (counter-cyclical). The estimated signs and magnitudes of the coefficients of exchange rate, inflation, and output gap in equation 11 provide information about the effectiveness of monetary policy. A negative sign on the coefficients of exchange rate, inflation, and output gap suggests that monetary policy is effective in influencing the exchange rate, inflation, and output gap. For our purpose, monetary policy in any of the investigated countries is deemed to have been fully effective if the central bank policy rate in the respective country is found to react significantly to each of inflation, output gap, and exchange rate with the correct sign.

From the results presented in Table 4, the monetary policy rate reacts negatively and significantly to inflation in Cabo Verde, Ghana, and Sierra Leone but not in Nigeria, The Gambia and the WEAMU. Given that price stability is the primary mandate of the Central Banks of ECOWAS countries, our results suggest that monetary policy is only effective in achieving its primary mandate in Cabo Verde, Ghana and Seirra Leone. However, given that exchange rate is also an important driver of inflation in the ECOWAS region, the foregoing findings suggest that the evidence only supports partially effective monetary policy in ECOWAS. This is because, even though our results show that exchange rate drives inflation in The Gambia and WAEMU (as indicated by the negative and statistically significant coefficient of exchange rate, β_{2x} , in the two countries), the policy rate does not react significantly to the two variables in The Gambia and

WAEMU nor in the other countries except in Ghana where the policy rate reacts negatively and significantly to exchange rate expectations. Furthermore, despite the significant impact of exchange rate (β_{3x}) and inflation ($\beta_{3\pi}$) in influencing the output gap in Nigeria, the policy rate does not react significantly to either of the two variables in the country. In addition, the policy rate reacts significantly to the output gap only in the WAEMU but not in the remaining ECOWAS countries investigated.

Overall, there is no evidence of the effectiveness of monetary policy in influencing all of inflation, exchange rate, and output gap in any of the ECOWAS countries investigated. Thus, our results only support partially effective monetary policy in Ghana (due to its impact on inflation and exchange rate only but not output gap), and much less so in Sierra Leone and Cabo Verde (due to its impact on inflation only but not on exchange rate and output gap). Given the role of exchange rate in driving inflation as well as the consequential inflationary effects on output gap in the region (as shown in the case of Nigeria which controls about 70% of the region's GDP), it is expected that monetary policy would react significantly to fluctuations in exchange rate. This is because the value of the inflation coefficient is less than unity in all the five independent countries investigated and the WAEMU, thereby suggesting that inflation was not aggressively targeted.

Table 4: SVAR Estimation of the Effectiveness of Monetary Policy in ECOWAS

Coefficient	Cabo Verde	Gambia	Ghana	Nigeria	Sierra Leone	WAEMU
β_{2x}	0.5292 (9.9438)	-29.5339*** (5.9764)	6.1056 (8.3191)	-0.5546 (7.4087)	0.0017 (0.020989)	-0.0217** (0.0088)
β_{3x}	-0.0537 (0.0726)	0.1607* (0.0889)	0.0283 (0.0369)	0.0495*** (0.0148)	-0.00001 (0.809035)	-0.0007 (0.0005)
$\beta_{3\pi}$	0.0013 (0.0012)	-0.0018 (0.0019)	0.0131* (0.0007)	0.0007** (0.0003)	-0.0003 (0.000354)	0.0082 (0.0075)
β_{4x}	0.5155 (2.2938)	-8.9672 (5.6416)	-8.3902** (3.9308)	-2.0647 (2.1989)	-0.0067 (0.0079)	0.0051 (0.0046)
$\beta_{4\pi}$	-0.0888** (0.0378)	-0.0109 (0.1168)	-0.2671*** (0.0788)	0.0447 (0.0451)	-0.1356** (0.0606)	-0.1263* (0.0745)
β_{4y}	-5.5116 (5.1003)	-0.2474 (9.9982)	-1.0886 (17.1611)	-6.6574 (21.4459)	25.7373 (27.5549)	-3.1589** (1.5863)
Standard errors in parentheses; *, **, and *** indicates significance at 10%, 5% and 1%, respectively						

Source: Author's Computation (2023)

Results of structural impulse response estimations (Fig. 2; Appendix) show that, overall, by the tenth year, the magnitude of the impact of monetary policy on exchange rate, inflation, and output gap gradually approaches zero (the steady state) in the five countries and WAEMU. For instance, impulse response reports for Cabo Verde indicate that the impact of one standard deviation

innovation to MPR on exchange rate dropped from zero in the first year to -0.01% in the second year, and then rose steadily to 0.012% in the fifth year before falling to -0.0001% in the tenth year. On the other hand, the impact of one standard deviation innovation to MPR on inflation is zero in the first year but rose to 0.5% in the second year before dropping to zero by the tenth year. For output gap, impact of shocks dropped from zero in the first year to -0.01% in the 3rd year, rising to about 0.001% by the tenth year. The implication of these results is that the impact of MPR on exchange rate, inflation, and output gap in Cabo Verde declined and gradually approaches zero by the tenth year. Similar evidence was reported for all the other countries and WAEMU, as the response of exchange rate, inflation, and output gap to one standard deviation shock to the policy rate fizzles out by the tenth year. These results show that the impact of structural shocks from MPR on output gap and inflation declined and approached zero over the forecast horizon. In addition, results of forecast error variance decomposition (Fig. 3; Appendix) show that, in the first year, shocks due to monetary policy made no contribution to the variations in exchange rate, inflation, and output gap in the five countries and in the WAEMU. Indeed, over the ten-year horizon, the highest contributions of monetary policy shocks to variations in inflation, output gap, and exchange rate were recorded in the WAEMU while such contributions were quite low in the remaining countries. Thus, our results suggest only weak evidence of effectiveness of monetary policy in Ghana, Sierra Leone, and Cabo Verde while there is no evidence of effectiveness of monetary policy in the remaining ECOWAS countries and WAEMU.

The findings above align largely with Ajayi & Akutson (2023) who establish that changes in the monetary policy rate did not explain changes in the general price level in the WAMZ in the short run but exert a negative and significant effect on price stability in Ghana. However, contrary to Ajayi & Akutson (2023), the present study also finds support that the policy rate exerts a negative impact on inflation in Sierra Leone. The foregoing findings equally align with Kireyev (2015) who noted that the effectiveness of monetary policy in the WAEMU is low and can improve with greater proactivity in determining the stance of fiscal policies, in addition to the development of financial markets and liberalization of controlled interest rates. For instance, it has been argued that monetary policy in the WAEMU reacts to domestic economic variables in a limited way but rather reflects the evolution of the Bank of France's interest rates. Several other studies highlighted in the literature section also support the weakness of monetary policy in achieving the objectives in the other ECOWAS countries as monetary policy reacts only to inflation only in Ghana but not Nigeria nor any of the remaining independent units in ECOWAS.

It is worthy of note that all the coefficients of inflation in the Taylor-type monetary policy rules estimated in this study have values less than one, thereby suggesting that the countries in focus did not aggressively target inflation during the period of investigation. While this scenario deviates from expectations based on the original Taylor principle, it is not surprising. The original Taylor rule is often analysed based on the principle that the coefficient of inflation ought to be greater than one, which implies that the central bank often raises the interest rate by more than the proportionate increase in expected inflation. However, rather than being universal, the original

Taylor rule is only a guide, and empirical estimates of the inflation coefficient do differ from one another to reflect variations in model specification, time, and countries. For instance, as noted in the model development section, the policy rules estimated in this study depart from the traditional Taylor rule in the sense that they incorporate exchange rates. Generally, estimates of the expected inflation coefficient in Taylor rules are often assessed based on the degree to which other variables such as the actual inflation rate, real output, employment, the interest rate, and unanticipated inflation fluctuate around the target given the weight in the objective functions (Taylor, 1999). Furthermore, the size of this policy parameter may differ over time. For instance, the estimate of the inflation parameter in Taylor (1999) is about 0.8 for the early period and about 1.5 in the later period. Given the roles that exchange rate and output gap play in driving inflation in these countries, it appears that monetary policy rates were not solely targeted at inflation alone.

5.0 Conclusion and Recommendations

Several studies have examined the issue of monetary integration in West Africa with overwhelming evidence supporting the absence of shock symmetry. However, other studies have provided valuable insights into the economic viability of an ECOWAS monetary union by highlighting numerous potential benefits against fewer costs. Some studies suggest that the introduction of the convergence criteria is already promoting economic stability. This paper contributes to this growing literature by investigating the economic viability of monetary integration in West Africa from the perspective of effectiveness of independent monetary policy as the most significant opportunity cost of integration. The study reveals that independent monetary policy is mostly ineffective in ECOWAS, with only Ghana, Sierra Leone, and Cabo Verde showing weak signs of effectiveness in their independent monetary policy. Our evidence lends support to the position that the economic viability of monetary integration in West Africa appears promising. Further support for this position derives from the observation that, even though there is no evidence of the effectiveness of monetary policy in the WAEMU, the region, being an existing monetary union for decades, has experienced greater price stability compared to the non-WAEMU members over the period of this study.

In conclusion, there is an indication that an independent monetary policy has not been effective across ECOWAS states, thereby suggesting that monetary integration may be economically viable in the region despite the absence of macroeconomic convergence. A *prima facie* support for this conclusion is that the process of monetary integration in Europe was equally asymmetric and incomplete at the time of the commencement of the European EMU. However, the asymmetry and incompleteness created spill-over effects that led to greater interdependence among members, which promoted further integration. For instance, the Banking Union that was created over twenty years after the formation of the European monetary union is an indication of further integration among members of the European EMU. Also prominent in moving the European monetary integration forward are the critical role of supranational actors such as the European Commission and compromises by member states. The overarching implication of the findings in this study is

that, despite the ‘asymmetry and incompleteness’ that characterize the monetary integration efforts among ECOWAS members, a monetary union in the whole of West Africa can indeed be economically viable.

The study recommends further collaboration among potential members to strengthen inter-African trade ties by leveraging the recently formed African Continental Free Trade Area (AfCFTA) with a view to intensifying the gains of monetary integration, especially for Ghana, Sierra Leone, and Cabo Verde where monetary policy was found to be weakly effective, and hence face relatively higher costs of integration. In addition, given that the perceived high cost of monetary integration due to the loss of opportunity for seigniorage and fiscal monetization as a bailout tool to deal with transient fiscal shocks such as the need to liquidate growing debts or to finance some urgent and important social or environmental projects or programmes, it is recommended that some form of fiscal adjustment mechanism be incorporated in an ECOWAS monetary union arrangement to confer a ‘special monetization right’ on qualifying members subject to ‘monetization criteria’ such as a benchmark of real debt per head relative to that of the entire union (in the case of a debt crisis) and a vote of confidence in the decision to monetize by the country’s Parliament.

References

- Achen, C. H. (2000). Why lagged dependent variables can suppress the explanatory power of other independent variables.
- AfDB (2018). *West Africa Economic Outlook 2018*. African Development Bank Group. ISBN 978-9938-882-67-4 (electronic)
- AfDB (2019). *West Africa Economic Outlook 2019*. African Development Bank Group. ISBN 978-9938-882-96-4 (electronic)
- Ajayi, O. I., & Akutson, S. (2023). Monetary policy regimes and price stability in the West African monetary zone. *Journal of Global Economics and Business*, 4(12), 39-58.
- Akanbi, S. A. B., Dauda, R. O., Yusuf, H. A., & Abdulrahman, A. I. (2020). Financial inclusion and monetary policy in West Africa. *Journal of Emerging Economies & Islamic Research*, 8(2), 1-12.
- Alagidede, P., Coleman, S., & Cuestas, J. C. (2012). Inflationary shocks and common economic trends: Implications for West African Monetary Union membership. *Journal of Policy Modelling*, 34(3), 460-475.
- Alemna, D. (2022). Monetary Convergence Across the Economic Community of West African States: Lessons for the Envisioned West African Monetary Union. *Complexity, Governance & Networks*, 7(1), 50-78.
- Alesina, A., Barro, R., & Tenreyro, S. (2002). Optimum currency area. *NBER Working Paper* 9072: 1-27.
- Arpaia, A., Kiss, A., Palvolgyi, B., & Turrini, A. (2016). Labour mobility and labour market adjustment in the EU. *IZA Journal of Migration*, 5, 1-21.
- Artis, M. J., & Zhang, W. (1997). Identifying the core of EMU: an exploration of some empirical criteria.

- Asiedu, M., Oppong, E. O., & Gulnabat, O. (2020). Effects of monetary policy on stock market performance in Africa evidence from ten (10) African countries from 1980 to 2019. *Journal of Financial Risk Management*, 9(3), 252-267.
- Ball, L. (1999). Efficient rules for monetary policy. *International Finance*, 2(1), 63-83.
- Beetsma, R., & Giuliodori, M. (2010). The macroeconomic costs and benefits of the EMU and other monetary unions: an overview of recent research. *Journal of Economic literature*, 48(3), 603-641.
- Berg, A., & Portillo, R. (Eds.). (2018). *Monetary policy in Sub-Saharan Africa*. Oxford University Press.
- Broz, T. (2005). The theory of optimum currency areas: A literature review. *Privredna Ktetanja I Ekonomska Politika*. January 2005
- Cagan, P. (1956). The monetary dynamics of hyperinflation. *Studies in the Quantity Theory of Money*.
- Calvo, A. G., & Reinhart, C. M. (2002). Fear of Floating. *The Quarterly Journal of Economics*, 117(2), 379-408
- Clarida, R. H. (2014). Monetary Policy in Open Economies: Practical Perspectives for Pragmatic Central Bankers. *Journal of Economic Dynamics and Control* 49 (2014): 21-30
- Clarida, R., Gall, J., & Gertler, M. (1998). Monetary policy rules in practice. *European Economic Review*, 42(6), 1033-1067.
- Clarida, R., Galí, J., Gertler, M., (2002). A simple framework for international monetary policy analysis. *Journal of Monetary Economics*, 49, 879–904.
- Corden, W. M. (1972). Monetary Integration. *Essays in International Finance* No. 93, Princeton University, April.
- Couharde, C., Grekou, C., & Mignon, V. (2021). *On the Desirability of the West African Monetary Union*. EconomiX-UMR7235, Université Paris Nanterre.
- De Grauwe, P. (2020). *Economics of the monetary union*. Oxford University Press, USA.
- Debrun, X., Masson, P. R., & Pattillo, C. (2011). Should African monetary unions be expanded? An empirical investigation of the scope for monetary integration in Sub-Saharan Africa. *Journal of African Economies*, 20(suppl_2), ii104-ii150.
- Debrun, X., Masson, P., & Pattillo, C. (2005). Monetary union in West Africa: Who might gain, who might lose and why? *Canadian Journal of Economics*, 38(2), 454-481.
- Effiong, E. L., Esu, G. E., & Chuku, C. (2020). Financial development and monetary policy effectiveness in Africa. *Journal of Social and Economic Development*, 22, 160-181.
- Ekwe, M. C., Ogbonnaya, A. K., & Omodero, C. O. (2017). Monetary policy and Nigeria's economy: An impact investigation. *International journal of economics and finance*, 9(11), 218-222.
- Evans, O. (2016). The effectiveness of monetary policy in Africa: modeling the impact of financial inclusion. *Iranian Economic Review*, 20(3), 327-337.
- Fernandes, C. M. (2023). Inflation Dynamics in the West African Economic and Monetary Union: WAEMU. *Selected Issues Papers*, 2023(038).

- Fidrmuc, J. (2001). The Endogeneity of optimum currency area criteria, intra-industry trade and EMU enlargement. *BOFIT Discussion Papers* 2001. No. 8.
- Frankel, J. A., & Rose, A. K. (2000). Estimating the effect of currency unions on trade and output. *NBER Working Paper Series* 7857
- Frankel, J., & Rose, A. (1997). The endogeneity of the optimum currency area criteria. *The Economic Journal*. 108(449), 1009-1025.
- Funke, M. (1997). The Nature of Shocks in Europe and in Germany. *Economica*, 64(255), 461–469. <https://doi.org/10.1111/1468-0335.00090>
- Gali, J., & Monacelli, T. (2005). Monetary policy and exchange rate volatility in a small open economy. *The Review of Economic Studies*, 72(3), 707-734.
- Glick, R., & Rose, A. K. (2015). *Currency unions and trade: A post-EMU MEA CULPA* (No. w21535). National Bureau of Economic Research.
- Goodhart, C.A.E. (1998). The Two Concepts of Money: Implications for the Analysis of Optimal Currency Areas. *European Journal of Political Economy*, 14, 407-32.
- Grimwade, N. (2013). Theory of Economic Integration: A Review. *The New Palgrave Dictionary of Economics*.
- Haynes, P., & Haynes, J. (2016). Convergence and Heterogeneity in Euro Based Economies: stability and dynamics. *Economies*, 4(3), 16.
- Hochreiter, E., & Winckler, G. (1995). The Advantages of Tying Austria's Hands: The Success of the Hard Currency Strategy. *European Journal of Political Economy* 11, 83-111.
- Howarth, D., & Quaglia, L. (2020). Theoretical Lessons from EMU and Banking Union: Plus ça change. *The Difficult Construction of European Banking Union*, 38-50.
- Ikechukwu, A., Itoro, I., & Christiana, N. (2016). The efficacy of Nigeria monetary policy: A comparative analysis. *Scholedge International Journal of Business Policy and Governance*, 3(4), 51-52.
- IMF (2020). Sierra Leone: Selected Issues, *IMF Staff Country Reports*, 2020(117), A003. Retrieved
- Ireland, P. (2005). The Monetary Transmission Mechanism. *Federal Reserve Bank of Boston Working Paper* 6(1).
- Ireland, P. N. (2010). Monetary transmission mechanism. In *Monetary economics* (pp. 216-223). London: Palgrave Macmillan UK. May 10, 2023, from <https://www.elibrary.imf.org/view/journals/002/2020/117/article-A003-en.xml>
- Kenen, P. (1969). The Theory of Optimum Currency Areas: An Eclectic View. In R. Mundell and A. Swoboda eds., *Monetary Problems of the International Economy*, The University of Chicago Press, Chicago, 1969. 41-60.
- Killian, L. (2011). Structural Vector Autoregressions. *CEPR Discussion Paper* No. DP8515

- Kireyev, A. (2015). How to Improve the Effectiveness of Monetary Policy in the West African Economic and Monetary Union. *IMF Working Papers*, 15(99), 1. <https://doi.org/10.5089/9781484366646.001>
- Krugman, P. (1992). *Geography and trade*. Cambridge, MA: MIT Press.
- Kunroo, M. H. (2015). Theory of Optimum Currency Areas. *Review of Market Integration*, 7(2), 87–116. <https://doi.org/10.1177/0974929216631381>
- Lipsey, R.G. (1957). The theory of customs unions: trade diversion and welfare. *Economica* 24: 40–46.
- Lucas, R. E. (1976). Econometric policy evaluation: A critique. *Carnegie-Rochester Conference Series on Public Policy*, 1, 19–46. [https://doi.org/10.1016/s0167-2231\(76\)80003-6](https://doi.org/10.1016/s0167-2231(76)80003-6)
- Masson, P., & Pattillo, C. (2001). Monetary union in West Africa: An agency of restraint for fiscal policies. *IMF Working Paper*, 34: 22.
- McKinnon, R. (1963). Optimum currency areas. *American Economic Review* 53. 4: 717-25.
- Meade, J. E. (1955). *The theory of customs unions*. Amsterdam: North-Holland.
- Mongelli, F. P. (2002). "New" Views on the Optimum Currency Area Theory: What is EMU Telling US? *Royal Economic Society Annual Conference 2002* 140, Royal Economic Society. <https://ideas.repec.org/p/ecj/ac2002/140.html>
- Moreira, R. R., & Monte, E.Z. (2020). Reviewing monetary policy inertia and its effects: The fractional integration approach for an emerging economy. *The Quarterly Review of Economics and Finance* (2020), <https://doi.org/10.1016/j.qref.2020.05.006>
- Mundell, R. A. (1961). A theory of optimum currency areas. *American Economic Review*, 51 (4), 657–665.
- Mundell, R. A. (1973). Uncommon arguments for common currencies. *The economics of common currencies*, 114-132.
- Muth, J. F. (1961). Rational Expectations and the Theory of Price Movements. *Econometrica*, 29(3), 315. <https://doi.org/10.2307/1909635>
- Nasko, A. M. (2016). Impact of monetary policy on the economy of Nigeria. *Pyrex Journal of Business and Finance Management Research*, 2(10), 163-179.
- Ndongo, A., & Diop, I. T. (2021). Economic and Monetary Integration in ECOWAS Countries: A Panel VAR Approach to Identify Macroeconomic Shocks. *World Journal of Applied Economics*, 7(2), 61-87.
- Nahoussé, D. (2019). The determinants of inflation in West Africa. *International Journal of Economics and Financial Research*, 5(55), 100-105.
- Ogunkola, O. (2005). An evaluation of the viability of a single monetary zone in ECOWAS. *AERC Research Paper No. 147*, African Economic Research Consortium, Kenya.
- Okafor, O. H. (2012). *Analysis of the Costs and Benefits of a Common Currency for the Second West African Monetary Zone* (Unpublished doctoral dissertation). Department of Economics, Faculty of the Social Sciences, University of Ibadan, Nigeria. <http://ir.library.ui.edu.ng/123456789/4254>

- Okwor, K. O. (2021). Legal and institutional framework for monetary integration in West Africa. Working Paper, <https://scholar.harvard.edu/kenneth-okwor/publications/legal-and-institutional-framework-monetary-integration-west-africa>
- Onye, K., & Umoh, O. J. (2023). Fiscal Policy and Monetary Integration in the ECOWAS. *The Review of Black Political Economy*, 50(2), 119-166.
- Owen, N. (1983). Economies of scale, competitiveness and trade patterns within the European community. Oxford: Oxford University Press.
- Owusu, B. K. (2020). Estimating Monetary Policy Reaction Functions: Comparison between the European Central Bank and Swedish Central Bank. *Journal of Economic Integration* 35(3). <https://doi.org/10.11130/jei.2020.35.3.396>
- Pelagidis, T. (1996). Optimum currency area approach and the third stage of EMU: A review of recent evidence. *International Journal of Economic and Commercial Sciences*, 43(4) 1996, 759-789.
- Prasad, A. A. (2022). *Financial Markets Integration and the Role of Monetary Policy: Evidence from India* (Doctoral dissertation).
- Riboni, A., & Ruge-Murcia, F. (2018). Monetary Policy Committees: Voting and Deliberation. *Hawks and Doves: Deeds and Words*, 75.
- Rudebusch, G. D. (2002). Term structure evidence on interest rate smoothing and monetary policy inertia. *Journal of monetary economics*, 49(6), 1161-1187.
- Sena, P. M., Asante, G. N., & Brafu-Insaidoo, W. G. (2021). Monetary policy and economic growth in Ghana: Does financial development matter? *Cogent Economics & Finance*, 9(1), 1966918.
- Siri, A. (2012). Monetary Policy Rules: Lessons Learned from ECOWAS Countries. *African Economic Research Consortium, Research Paper 244*, Nairobi, September 2012.
- Stock, J. H., & Watson, M. W. (2007) *Introduction to Econometrics*. Pearson International 2nd edition. Pearson Education Inc., Boston, MA.
- Tarawalie, A. B., Sissoho, M., Conte, M., & Ahortor, C. R. (2012). *Exchange rate, inflation and macroeconomic performance in the West African Monetary Zone (WAMZ)* (No. 2). WAMI Occasional Paper Series.
- Tavlas, G. S. (1993), "The 'New' Theory of Optimum Currency Areas", *The World Economy*, pp 663-685.
- Taylor, J. B. (1993). Discretion versus policy rules in practice. *Carnegie Rochester Conference Series on Public Policy*, 39(1), 195-214.
- Taylor, J. B. (1999). The robustness and efficiency of monetary policy rules as guidelines for interest rate setting by the European Central Bank. *Journal of Monetary Economics*, 43(3), 655-679.
- Tenou, K (2002). The Taylor rule: an example of a policy rule applied to the case of the BCEAO. *Notes Information and Statistics of the BCEAO*. 523: 1-21. Dakar, Senegal
- Verdelhan A (1999). Taylor Rate and Eurozone Market Rate. *Banque de France, Monetary Policy Study Service*, SEPM, 98-973

- Viner, J. (1950). The customs union issue. New York: Carnegie Endowment for International Peace.
- Walsh, C. E. (2017). *Monetary Theory and Policy (4th ed.)*. Cambridge, MA: The MIT Press.
- Woodford, M. (2001). Fiscal Requirements for Price Stability. *Journal of Money, Credit and Banking*, 33(3), 669. <https://doi.org/10.2307/2673890>
- Woodford, M. (2003). *Interest and Prices: Foundations of a Theory of Monetary Policy*. Princeton University Press, Princeton, NJ.
- Yahya, A. Z., & Nkwatoh, L. S. (2020). Viability of a Stable West African Monetary Union. *Empirical Economic Review*, 3(1), 1-20.

Appendix

Trend Graphs

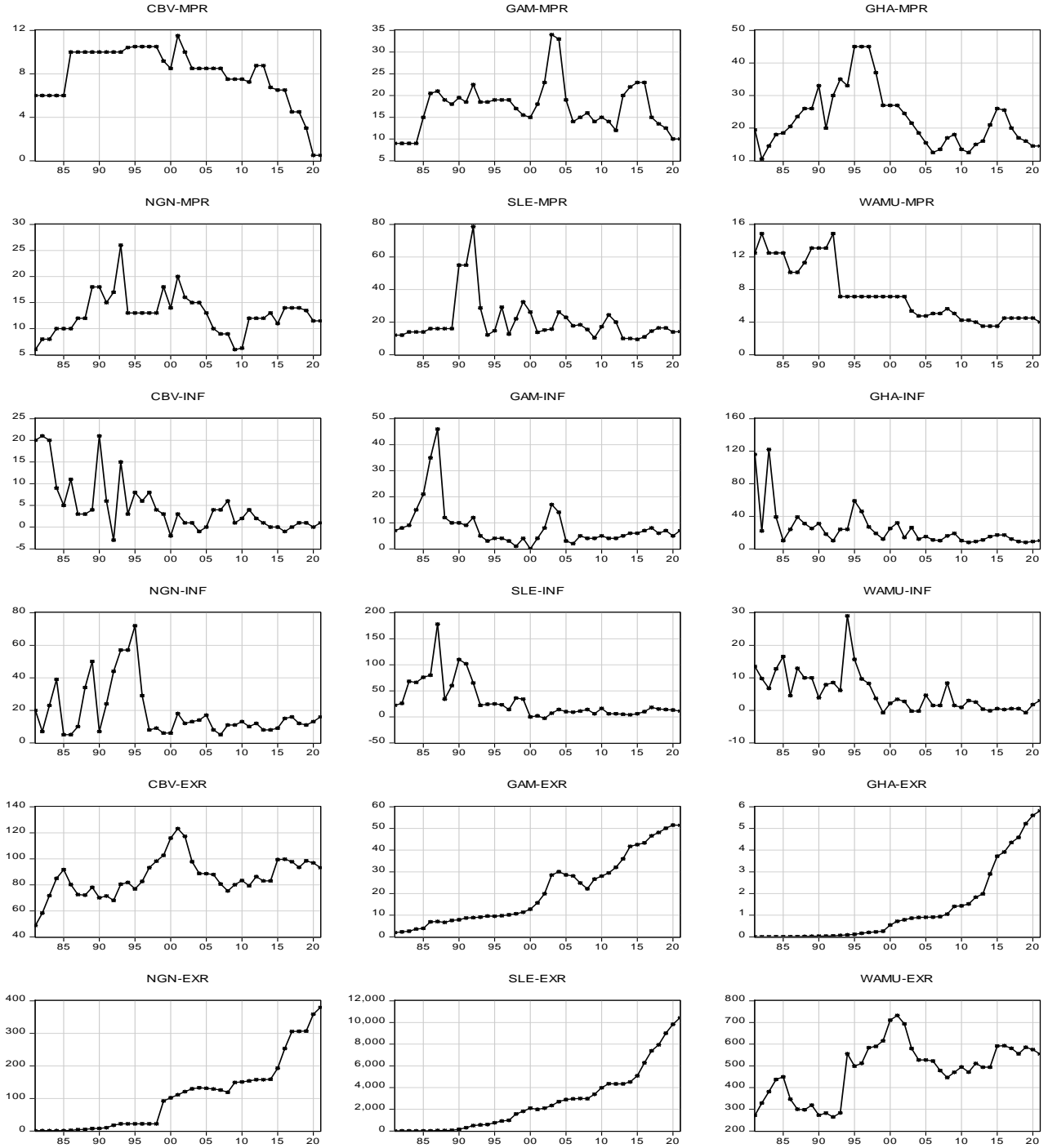


Fig. 1: Trends of Variables

CBV = Cabo Verde, GAM = The Gambia, GHA = Ghana, NGN = Nigeria, SLE = Sierra Leone, WAM = WAEMU, WAZ = WAMZ, and ECO = ECOWAS.

Table 3: Unit Root Test Results

UNIT ROOT TEST RESULTS										
Series	Level	ADF 1 ST Diff	I(-)	Level	PP 1 ST Diff	I(-)	Level	KPSS 1 ST Diff	I(-)	Conclusion I(-)
Cabo Verde										
EXR	-3.0412	-4.4294***	I(1)	-2.6676	-4.1898**	I(1)	0.1046	0.0614	I(0)	I(1)
GAP	-3.4526*	-5.8379***	I(0)	-3.6446**	-5.8216***	I(0)	0.057	0.0758	I(0)	I(0)
INF	-5.422***	-8.1695***	I(0)	-5.3985***	-14.1603***	I(0)	0.148**	0.1494**	I(1)	I(0)
MPR	-1.1185	-6.5242***	I(1)	-0.7112	-8.0613***	I(1)	0.2115**	0.0782	I(1)	I(1)
Gambia										
EXR	-2.3727	-4.0784**	I(1)	-1.8645	-4.0784**	I(1)	0.1766**	0.0429	I(1)	I(1)
GAP	-4.2704***	-8.5217***	I(0)	-4.3036***	-13.5847***	I(0)	0.0565	0.1762**	I(0)	I(0)
INF	-3.4339*	-6.0425***	I(1)	-3.1163	-7.1037***	I(1)	0.0974	0.1362*	I(0)	I(1)
MPR	-3.7763**	-5.1842***	I(0)	-1.8763	-5.572***	I(1)	0.1336*	0.1722**	I(0)	I(0)
Ghana										
EXR	1.0072	-4.5986***	I(1)	0.8197	-4.6003***	I(1)	0.1914**	0.1274*	I(1)	I(1)
GAP	-3.7419**	-6.4896***	I(0)	-3.8614**	-8.9922***	I(0)	0.0585	0.1094	I(0)	I(0)
INF	-8.0028***	-5.702***	I(0)	-8.7209***	-39.8895***	I(0)	0.1159	0.1147	I(0)	I(0)
MPR	-1.8777	-6.7788***	I(1)	-1.9017	-6.7554***	I(1)	0.1218*	0.0701	I(0)	I(1)
Nigeria										
EXR	-0.4192	-5.119***	I(1)	-0.5902	-5.0228***	I(1)	0.1657**	0.0781	I(1)	I(1)
GAP	-3.2381*	-5.2393***	I(1)	-3.2381*	-6.0563***	I(1)	0.0585	0.0957	I(0)	I(1)
INF	-3.2735*	-2.5944	I(1)	-3.2327*	-10.0245***	I(1)	0.0877	0.2589***	I(0)	I(1)
MPR	-3.412*	-8.7775***	I(1)	-3.3432*	-8.9036***	I(1)	0.1225*	0.0711	I(0)	I(1)
Sierra Leone										
EXR	0.1568	-3.5474**	I(1)	1.7318	-3.3259*	I(1)	0.2046**	0.1333*	I(1)	I(1)
GAP	-3.6956**	-4.4265***	I(0)	-2.6772	-4.3958***	I(1)	0.0537	0.0551	I(0)	I(0)
INF	-1.8082	-4.7413***	I(1)	-4.2744***	-10.8665***	I(0)	0.1152	0.4623***	I(0)	I(0)
MPR	-3.7345**	-5.3836***	I(0)	-2.8984	-14.4059***	I(1)	0.0986	0.5***	I(0)	I(0)
WAEMU										
EXR	-1.9918	-5.6747***	I(1)	-2.1277	-5.6747***	I(1)	0.1119	0.0561	I(0)	I(1)
GAP	-2.6526	-6.3511***	I(1)	-2.6526	-6.364***	I(1)	0.0596	0.0601	I(0)	I(1)
INF	-4.7151***	-8.9848***	I(0)	-4.7151***	-9.8549***	I(0)	0.0703	0.0428	I(0)	I(0)
MPR	-3.0212	-7.8154***	I(1)	-3.0734	-8.2006***	I(1)	0.1533**	0.057	I(1)	I(1)
*** and ** indicate significance at 1% & 5% level, respectively; 5% Critical Values: ADF (Level: -3.5366; 1st Diff: -3.5403); PP (Level: -3.5366; 1st Diff: -										

Impulse Responses



Fig. 2: Structural Impulse Response Functions

Variance Decompositions

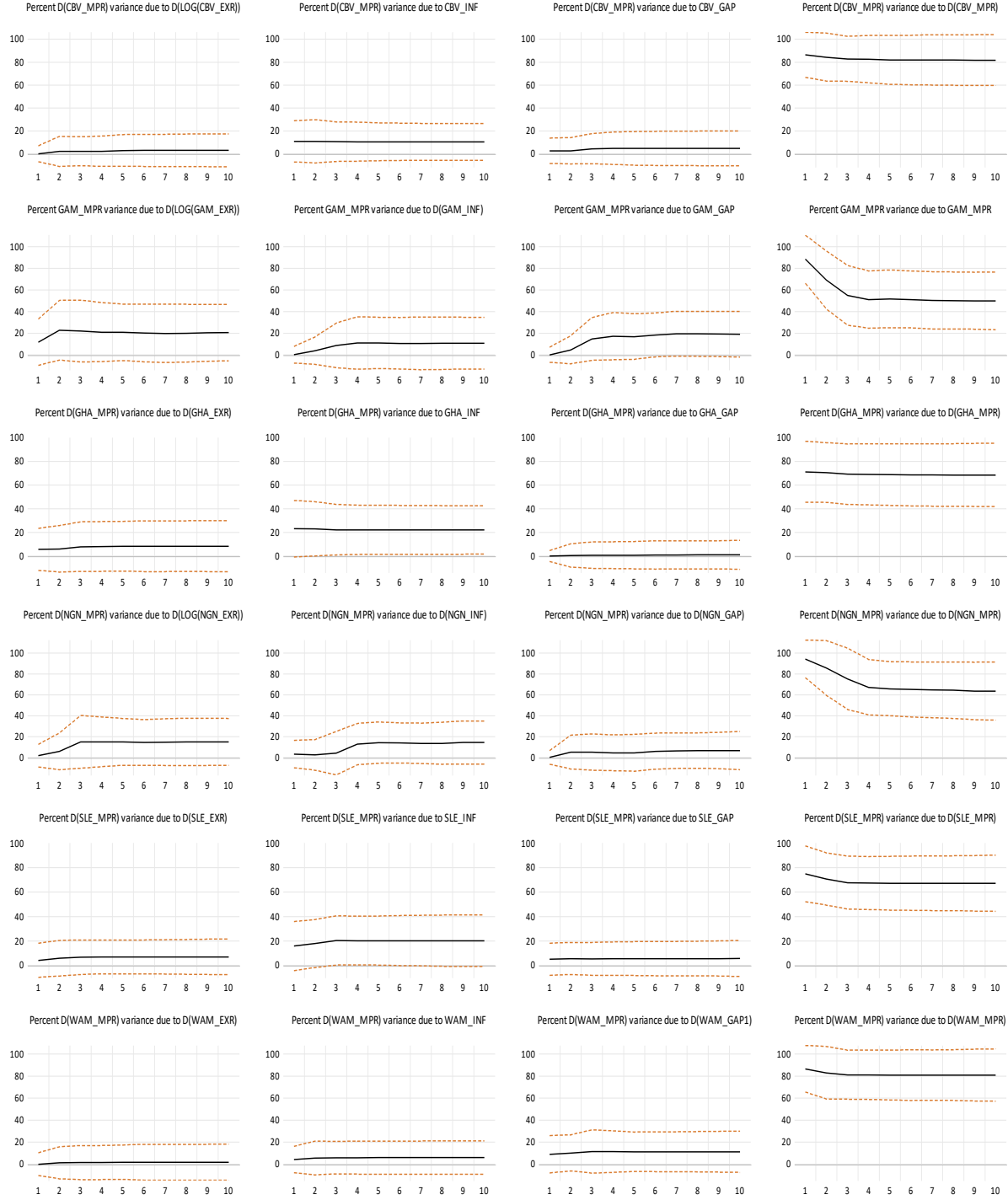


Fig. 3: Structural Forecast Error Variance Decomposition

Table 5: Serial Correlation and Heteroskedasticity Tests

Country	Diagnostics Test Statistics (Degrees of Freedom in parenthesis)	
	Serial Correlation LM Test: LRE* stat at lag h (DF)	Breusch-Pagan-Godfrey Heteroscedasticity Test: Chi-sq (DF)
Cabo Verde	22.8526 (16)	171.4646 (160)
Gambia	11.6201 (16)	262.9336 (240)
Ghana	21.0705 (16)	170.7454 (160)
Nigeria	18.6708 (16)	190.1057 (160)
Sierra Leone	22.0108 (16)	171.7266 (160)
WAEMU	13.9695 (16)	157.3711 (160)

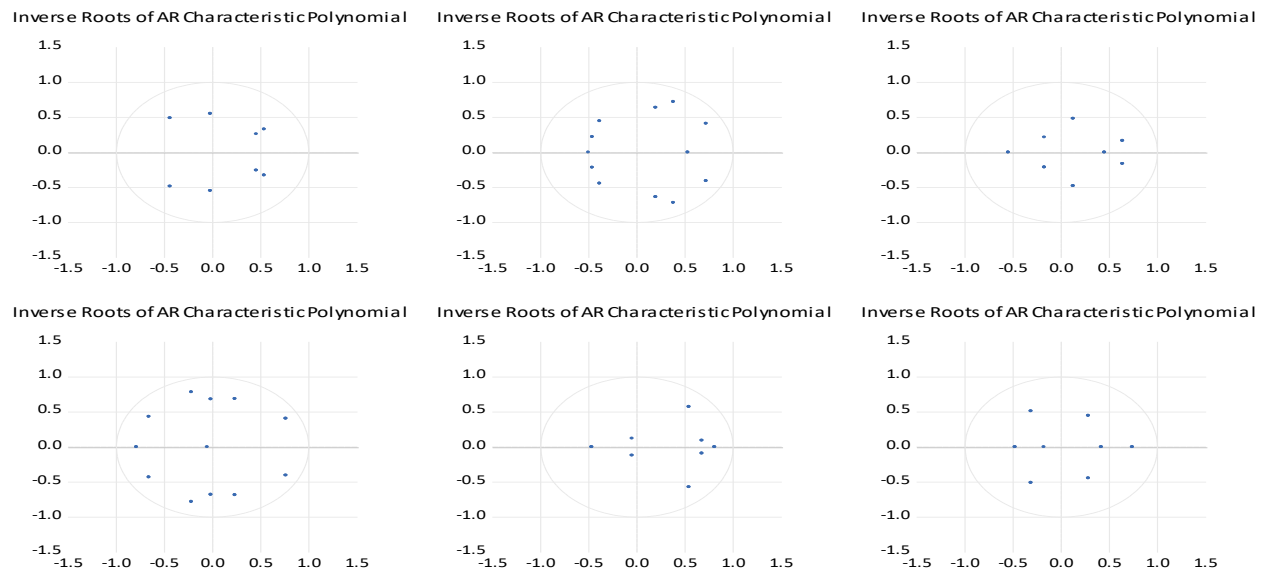
VAR Residual Stability Tests*Fig. 4: VAR Residual Stability Test Results*

Table 6: Data Definitions and Sources

	Variable	Definition	Measurement	Source	Frequency
1.	GDP	The sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products, calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.	Gross Domestic Product of ECOWAS member countries, measured in billions of constant 2000 US\$	African Development Bank (AfDB) Database	Annual
2.	Monetary Policy Rate	The baseline interest rate set by the monetary policy committee of each country or region's Central Bank	Discount Rate of ECOWAS member countries, measured in percentages (%)	African Development Bank (AfDB); International Financial Statistics (IFS); The Economist Intelligence Unit (EIU); Countries' Central Bank Bulletins	Annual
3.	Inflation	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a fixed basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is often used.	Annual percentage change in index of consumer prices in ECOWAS countries, 2000 = 100.	African Development Bank (AfDB); International Financial Statistics (IFS)	Annual
4.	Official Exchange Rate	Official exchange rate refers to the exchange rate determined by national authorities or to the rate determined in the legally sanctioned exchange market.	Local currency units of ECOWAS member countries relative to the U.S. dollar (LCU/US\$), measured as annual average.	World Development Indicator (WDI)	Annual
10	Output Gap	Transitory or cyclical component of real output that is associated with changes in inflation	Difference between actual GDP and potential GDP, measured as the residual of a regression of log of GDP on a linear time trend.	Author-generated using EViews 10.	Annual