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WEST AFRICAN MONETARY POLICY, EXTERNAL SHOCKS AND ECONOMIC GROWTH DYNAMICS: AN S-VAR MODEL

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ABSTRACT

As a result of the West African region's continuous political and economic instability, various economies have used monetary policy changes to respond to shocks from macroeconomic causes. Scholars disagree on the mechanisms of monetary policy, external shocks, and macroeconomic activity links in an economy, according to the available literature in both inter-regional and intra-regional evaluations. This article promotes understanding and management of external shocks in monetary policy by focusing on two key goals. (1) To investigate external shocks, macroeconomic performance, and the dynamics of monetary policy in Western African countries. (2) Use the S-VAR method of estimate to investigate the impact of these economic indices on monetary policy dynamics in Nigeria, Ghana, Cameroon, and Niger. The S-VAR method was chosen because it is useful for analysing macroeconomic shocks and monetary policy transmission. The findings reveal that the West African countries are so interconnected, any change in the price of non-oil commodities would have a significant impact on the exchange rate, which will be channelled through policy rates to GDP. We recommend and emphasise the need of diversifying member countries' productive and export bases rather than continuing to rely on one or a few items as the primary source of income.

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1. INTRODUCTION

West African economies have made major efforts to strengthen economic ties among the 16 West African countries through the Economic Community of West African States (ECOWAS) and the West African Economic and Monetary Union (WAEMU) (UEMOA). After Eastern Africa, the West African (WA) sub-region is the second largest. Six British colonies (Gambia, Sierra Leone, South Cameroon, Ghana, and Nigeria), eight French colonies (Mauritania, Sudan, Mali, Equatorial Guinea, Burkina Faso, Niger, Benin, and Ivory Coast), and one American colony make up the total of 16 countries (Liberia). Three of the countries (Niger, Burkina Faso, and Mali) are landlocked, whereas Cape Verde is an island republic (World Atlas, 2020). According to an African Development Bank (ADB) report for 2021, WA countries' economic development is multifaceted, with per capita income varying from US$3,678 in Niger to US43,678 in Cape Verde (ADB, 2021). There is a clear indication of West Africa's desire for closer regional integration, which the Economic Pacific Agreement (EPA) aims to foster. The European Union (EU) has long advocated for economic integration in Africa as a driver of economic growth, job creation, and the continent's long-term development. West Africa's most major commercial partner (34.5 percent of exports and 22.1 percent of imports) is the EU; in 2014, West Africa exported €37 billion in goods and bought €31 billion in goods from the EU (European Commission, 2014). The negotiations for an EPA between WA and the EU concluded in February 2014. In 2020, West African exports to the EU are estimated to reach €22.4 billion. Between 2017 and 2018, the West African sub-region experienced at least a 5% growth rate, with Cote d'Ivoire, Guinea, Mali, and Senegal leading the way. Factors such as relative monetary policy stability have contributed to this accomplishment. However, in recent times, the West African sub-region is grappling with an extraordinary macroeconomic crisis that has threatened decades of hard-won development gains and upended the lives and livelihoods of millions in only a few years (IMF, 2020). The latest forecast for 2020–21 is much in line with the previous update, with activity in 2020 expected to decrease by an astounding –3.0%, still the lowest result on record. In this situation, authorities seeking to reignite their economy will undoubtedly confront some difficult decisions. On current trends, major financing deficits are likely to persist, and many nations will struggle to maintain an effective monetary policy that could sustain macroeconomic stability while also addressing the basic requirements of their populations. Some may be required to deal with debt loads that are manifestly unsustainable (Afesorgbor, 2019; Cavalcanti et al., 2018).

Among other things, the purpose of ECOWAS was to open the countries inside WA to outside world in terms of trade with the goal of improving people's living conditions and ensuring long-term growth (Jelilov et al., 2016). West Africa's global trade has increased by more than tenfold in the last decade, with an integrated WA economy worth more than €1 trillion in agriculture, commerce, industry, and services, among other activities. Nonetheless, the region's key development concerns are peace and security, economic instability, a growing young population in desperate need of new economic opportunities, and migration within and between neighbouring regions. WA saw high economic development from 2008 to 2013 (4.8 percent annually). Between 2007 and 2013, West Africa's trade with the rest of the world (exports plus imports) climbed by 67 percent, while its trade with the EU increased by 70 percent. Numerous studies have stressed the importance of intra-regional commerce as a significant mechanism for mitigating the effects of external shocks (Afesorgbor, 2019; Baier et al., 2014; Geda & Seid, 2015; Kahouli & Maktouf, 2013; Umulisa, 2020). In essence, the notion of the

Optimal Currency Area (OCA) as a component of economic integration might help mitigate the impact of commodity price shocks. In a research examining the benefits of commercial integration among WA member nations, Cavalcanti et al. (2018) argued that member countries should fully adopt common market protocols and customs unions to ensure the success of a shared currency. As a result, the proposed West African Monetary Union, which aims to have the region's countries adopt a common currency by 2024, may be a move in the right direction.

However, the region is mostly dependent on primary products, the prices of which are sensitive to external shocks and have previously resulted in monetary policy dynamics and macroeconomic instability (African Development Bank, 2019; Irungu & Wagura, 2019). According to Chisha et al. (2018), the global financial crisis of 2007–2009 and the subsequent booms took a toll on the macroeconomic activity of both oil- and commodity-dependent nations. Chuku & Onye (2019) further argue that macroeconomic issues such as exchange rate policy will play a significant role in reshaping the expected effects of commodity and oil price fluctuations in the region. Nigeria's top five commodity export are Crude Petroleum ($45 billion) Petroleum Gas ($8.6 billion) Refined Petroleum ($940 million) Cocoa Beans ($621 million) and Gold ($577 million). In Ghana, Gold ($6.2 Billion) Crude Petroleum oil ($5.3 billion) and Cocoa ($1.85 billion). Cameroon's top exports are crude petroleum ($1.89 billion), Cocoa beans ($647 million), Sawn wood ($518 million), Gold ($454 million), Petroleum gas ($404 million), and Bananas ($266 million). Niger's major export commodity includes Gold ($1.77 billion), Other Oily Seeds ($224 million), Refined Petroleum ($208 million), Radioactive Chemicals ($162 billion), and Uranium and Thorium Ore ($76.9 billion) (Osabuohien et al., 2019). This shows that, like other regions in Sub-Saharan Africa, the region's economic activities, including the production of goods and services, have been subjected to external shocks resulting from volatile oil and commodity prices (Addison et al., 2016; Irungu & Wagura, 2019). Furthermore, oil prices are unpredictable and fluctuating (Baumeister & Kilian, 2016). Crude oil prices plunged into what appeared to be a bottomless abyss in early 2016, reaching around $20 per barrel in February of that year. Lower oil prices usually result in currency depreciation in a number of oil-exporting west African countries. Those countries faced the risk oil-exporting Eurobond issuers, as countries like Angola, Gabon, and Nigeria struggle to service debt when oil earnings fall and their currencies depreciate, making debt denominated in US dollars more expensive leading to revenue fall, slowing down economic activities and in turn slowing down economic growth (He & Lin, 2019; Sugra et al., 2019).

Even though, price volatility caused by supply shocks and serial variations in real commodity and oil prices, combined with the resulting trade losses, have impacted the region's foreign exchange earnings, investment, indebtedness, poverty, and other macroeconomic activities (Bachmeier, 2008), resulting in monetary policy manipulations. Burkina Faso, Ivory Coast, Mali, Nigeria, Senga, Togo, and Guinea-Bissau founded the West African Economic and Monetary Union (WAEMU) in 1994 by a treaty signed in Senegal. This treaty, among other things, acknowledged the importance of increasing economic competitiveness through open markets, as well as the rationalisation and harmonisation of the legal framework. Convergence of macroeconomic policies and indicators, establishment of a common market, coordination of sectoral policies, and fiscal policy harmonisation. Additionally, the union is responsible for enforcing and monitoring the region's macroeconomic aggregates and negotiation procedures via legal, monetary, and institutional structures (Charaf-Eddine &

Strauss, 2014; Egger, 2004). The West African Monetary Zone was established in 2000 to facilitate the establishment of a unified currency. Overall, the economic growth of the region as a result of the aforementioned activities necessitates a monetary policy package that not only fosters regional integration but also ensures economic emancipation. Countries classified as lower middle income or lower income within the WA have a poor growth rate, high economic inequality, and a low rate of capital accumulation. They are impoverished countries that face persistent changes in policy design and implementation as a result of external shocks such as price fluctuations and macroeconomic instability.

Since 1980, the volume of most crops produced in WA has increased rapidly, often overtaking population growth. Aggregate agricultural production is dominated by Cotton, Cocoa, Millet, Rice, Palm oil, Peanut, sorghum yams and cassava in terms of value. With the exception of cocoa, all food commodities are consumed primarily locally and regionally. Ghana, Nigeria, and parts of Cameroon are major food-crop exporters. In West Africa, fluctuations in oil prices affect both domestic and foreign markets, as well as those of the region's major trading partners such as the European Union. Evidence suggests that goods and services cannot be produced without the use of energy resources such as oil. Nonetheless, the drop in global commodity prices, combined with the current global COVID-19 pandemic, has had a significant negative impact on the region's terms of trade. Not only that, as oil-exporting countries, the region's domestic production is also affected by oil price fluctuations. As a result, oil price fluctuations are projected to have a greater impact within the region (Dalheimer et al., 2021; Matthews, 2014). Furthermore, in reaction to shocks from some recognised macroeconomic factors, the West African sub-regional governments adopted monetary policy changes in response to the constant economic challenges created by insecurity that have bedevilled the region in recent years. The introduction of digital currency to combat inflation, 100 for 100PP in support of core private sectors, the Local currency for dollar policy in an effort to encourage diaspora remittances, and the suspension of weekly FX allocation and sale to Bureau De Change operators are all examples of such measures (Kabundi & Mlachila, 2019). However, the evidence reveals that most measures have an immediate negative impact on exchange rates, such as pressure on the parallel market, increased import prices, cheaper imports, and reduced production, which may result in job losses. If not adequately handled, these can range from short to medium term.

Although there is a wealth of economic literature on monetary policy shocks to economic growth in advanced and emerging nations, there is still a scarcity of knowledge on this topic in west Africa. This has sparked debate over the relationship between the combined impact of monetary and fiscal policy changes on macroeconomic variables (Büyükbaşaran et al., 2020; Bynoe, 2021). Furthermore, scientific studies on the impact of external shock transmission on economic growth have yet to reach an agreement. External shocks, for example, accounted for a bigger proportion of the four economic variations in emerging nations, according to empirical studies (Buckle et al., 2007). While developing nations, such as ECOWAS, are more vulnerable to external shocks due to structural characteristics, reliance on international trade, and increased reliance on foreign direct investments and foreign aids (Kausar et al., 2016), more empirical research is needed to solve their macroeconomic difficulties. As a result, proper understanding and management of external shocks is a critical problem to consider in monetary policy management. We concentrated on two primary goals in our research. (1) To investigate external shocks, macroeconomic performance, and monetary policy dynamics in the WA countries. (2) Using the S-VAR method of estimate, examine the impact of these

economic indices on monetary policy dynamics. Nigeria, Ghana, Cameroon, and Niger are the four countries chosen. Monetary policy dynamics (dependent variable), interest rate, money supply, gross domestic product growth rate, exchange rate, inflation, trade balance, and oil price are all variables to be concerned about. This type of research has become necessary and interesting for monetary and economic policymakers in WA, who need to understand the causes of monetary policy in the region as well as the influence of these factors on monetary policy.

2. THEORETICAL FRAMEWORK

An external shock is an event that occurs exogenously but modifies the economy's equilibrium position in many ways, including trade, financial, international market integration, and investment. External shocks have exacerbated due to the removal of trade barriers, increased economic interconnectedness, and faster diffusion of economic risk across national borders (Cunado et al., 2015). The basic goals of monetary policy have traditionally been to maintain price stability, control the money supply, generate economic growth, employment, and, by extension, nominal GDP (Hung, 2009) (Nkalu, 2020). The monetary transmission mechanism describes how and to what extent monetary policy affects economic activity. There are four basic avenues through which monetary policy decisions influence economic activity in an economy (Arwatchanakarn, 2019). These are the direct interest rate implications, which affect both the cost of borrowing and the flow of cash for both borrowers and lenders. This channel is still the most effective and typical way for monetary policy effects to be conveyed in an economy. The interest rate is dropped in an expansionary monetary policy stance, while investment and consumption spending are increased (Ndubusi, 2014).These will enhance overall output by increasing aggregate demand.

The exchange rate channel is the second. Because of local currency depreciation, denominated local assets are cheaper relative to foreign goods as a result of an increase in money supply resulting from a fall in the interest rate (Amusa & Fadiran, 2019). As a result, net exports and output would grow. The third is through its effects on local asset prices such as stock markets, bonds, and real estate prices. According to Tobin's q investment theory, stock prices are the most essential factor. Finally, there is access to credit through bank lending and balance sheet channels. The agency issue caused by asymmetric information distortion (Mishkin, 1995) is one of the mechanism's primary challenges. The interest rate, money supply, exchange rate manipulation, and inflation control are some of the monetary policy instruments that monetary authorities use to influence policy effects in an economy. As a result, the baseline model is the starting point for discussing the interaction between the specified monetary policy instruments. Other relevant factors, such as the currency rate, were incorporated into this model (Can et al., 2020). Accordingly, because the country under investigation is economically intertwined, which makes it vulnerable to foreign shocks via import prices, we think it vital to examine the influence of major external factors on the exchange rate and other monetary policy instruments. To do this, the Structural VAR model included commodities and oil price volatility as a way to capture their effects and interactions with the other variables.

2.1. Monetary transmission mechanisms

Maintaining price stability, controlling the money supply, promoting economic growth, job creation, and nominal GDP are the traditional goals of monetary policy (Fiorelli &

Meliciani, 2019; Moosavi & Cao, 2020). Monetary authorities' policy decisions, whether in response to deviations in macroeconomic fundamentals from their targets or as part of a systematic policy change aimed at achieving a macroeconomic outcome, may or may not produce the desired results, depending on the effectiveness of the channels of monetary policy transmission to the real economy The monetary transmission mechanism describes how and to what extent monetary policy has an impact on economic activity. Monetary policy decisions can have an impact on the economy through four main pathways (Omojolaibi & Egwaikhide, 2013). The first pathway is the direct interest rate. In the direct interest rate channel, a borrower's cost of borrowing may rise, but so will the amount of money available for borrowers and lenders to spend. This is still the most common and most successful way for monetary policy to have an impact on the economy. The interest rate is reduced while investment and consumption spending grow as a result of an expansionary monetary policy. These will enhance overall output by increasing aggregate demand. (Iddrisu & Alagidede, 2020). Second, is the exchange rate pathway which has a sensitivity to interest rate changes. Early econometric models frequently have lower estimated sensitivities, implying a small channel. however, models that impose uncovered interest parity tend to find a larger importance for this channel (Amusa & Fadiran, 2019). The exchange rate channel is critical in determining how monetary policy affects the economy. Smaller and more open economies are more likely to be affected by this channel. Local goods are cheaper than foreign goods due to the lower value of the domestic currency, resulting in expenditure shift and an increase in net exports. The third pathway affects local assets' pricing through stock market, bond, and real estate prices. Investment spending and aggregate demand grow when interest rates are lower and monetary policy is more accommodative and stock values rise. According to Tobin's q investing theory, stock prices are the most significant factor of the transmission channel (Weale & Wieladek, 2016). Last is the Balance Sheet Channel.

In credit markets, there are asymmetric information difficulties, which gives rise to the channel. In credit markets, adverse selection and moral hazard problems develop when an agent's net worth decreases. Lower net worth indicates the agent has less collateral, which leads to more adverse selection and an increased incentive to increase risk-taking, compounding the moral hazard problem. As a result, lenders will be less willing to offer loans (either by demanding greater risk premia or limiting the amount loaned), causing spending and aggregate demand to fall. (Mishkin, 1995; Ramlogan, 2004). Moreover, due to the fact that the countries under investigation are economically integrated, making them vulnerable to external shocks through import prices, we believe it is necessary to examine the explanatory power of the main external variables in addition to the exchange rate and other monetary policy instruments. In order to capture the impacts of commodities and oil price volatility on other variables and their interactions with other variables, the Structural VAR model was extended to include them.

3. LITERATURE REVIEW

The impact of economic shocks and energy price volatility on commodity-dependent economies has been extensively researched (Addison et al., 2016; Alavi et al., 2016; Nimanted et al., 2016). From early research on oil price fluctuations in different parts of the world to more contemporary studies on the transmission of external or internal shocks, research methods have evolved, and intriguing conclusions have been reached. However, similar literatures have caused less concern in the West African region. Using the Structural Variance Auto-Regressive approach, the goal of this paper is to expand the

boundaries of knowledge regarding the interactions in the dynamism of monetary policy, external shocks, and macroeconomic performance of the West African Oil producing countries. Alavi et al. (2016) demonstrated that macroeconomic responses to commodity price shocks in Africa are heterogeneous in terms of magnitude and direction. (Ramlogan, 2004) investigates the transmission mechanism of monetary policy in developing countries in general and the Caribbean in particular. He argues that because developing country financial markets are relatively unsophisticated, monetary policy is more likely to affect the real sector by changing the quantity and availability of credit rather than the price of credit. Other research in Africa looked into monetary policy, external shocks, and economic growth dynamics. Among such are (Chisha et al., 2018) for Zambia, (Arwatchanakarn, 2019) for Thailand, (Antwi et al., 2020) for Ghana, and (Hassan & Meyer, 2020) for South Africa. They all overlook the impact of price shocks on oil and commodities prices on macroeconomic dynamics.

An analysis of Ghana's exchange rates was conducted by (Antwi et al., 2014). They used co-integration and error-correction modelling techniques to look into the possible determinants of currency rates. Long-run connections between exchange rates and the CPI, nominal GDP, domestic credit and government expenditure were discovered. In the literature, distinct degrees of commodity shocks to production and business cycles/terms of trade have been identified, and changes in model application explain for the different conclusions from those studies (Gabriel, 2019; Schmitt-Grohé & Uribe, 2015). In a research into how shocks in commodity terms of trade affect those countries' business cycles, Roch (2019) used the Panel-SVAR on 22 commodity-exporting countries. The study, which covered the years 1980–2017, found that commodity price shocks had a significant impact on the economic cycles of the nations studied, as well as a greater proportion of 30% in terms of how commodity terms of trade influence the business cycles of those countries. A study by Schmitt-Grohé and Uribe (2018) found that trade terms have less than a 10% influence on output in their study of how trade terms interact with economic activity using S-VAR for 38 countries. This was a significant departure from previous studies, which had found an effect of at least 10% (Ezeaku et al., 2018). Authors such as Cioran (2014) explored interest rates as an effective technique for controlling inflation in Romania. According to (Hatmanu et al., 2020), currency and interest rates served as an effective monetary device in maintaining Romania's GDP. Overall, these monetary variables interact to achieve one or more policy objectives. A similar study, although with different variables, was reported by Hoang and van Anh-Nguyen (2020) for Vietnam, which found that some monetary policy factors, such as interest rate, money supply, and domestic credit, had key roles in limiting inflation in that nation. Domestic credit and money supply, in particular, have a higher influence on inflationary pressures during the study period. The study, which lasted from 2005 to 2017, also indicated that monetary policy shocks fluctuate over time, depending on the combination of tools deployed and the influence of global financial disturbances. Thanh et al. (2000) used data from 1992 to 1999 in the VAR model with the VECM correction error to examine the relationship between monetary, CPI, exchange rate and actual industrial output values. The authors concluded that the growth rate of nominal money supply, the deviation between the rate of domestic currency devaluation and interest rate had highly significant for forecasting inflation.

The relationships between inflation, exchange rate, output, rate of interest, and money supply in Ghana were investigated by Akosah et al. (2020), who concluded that the apex bank's reactions to these economic variables are dependent on the perceived policy aims.

Antwi et al. (2020) found that money supply, inflation, and interest rate indirectly influenced the exchange rate in their study of the impacts of certain macroeconomic variables on the exchange rate in Ghana. Asongu (2016) discovered that in CEMAC and the UEMOA CFA zone, monetary policy tools affect GDP in the near term but not in the long run. The studies argued for reductions in the money supply and interest rates as a method to encourage investment if inflation is to be kept to a minimal minimum. Because of disruptions in the region's GDP growth rate, Famoroti and Tipoy (2019) posit that it has become critical to jealously guide monetary policy instruments in the sake of ECOWAS monetary integration. IMF (2007) used SVAR to look at how emerging economies can decouple from the US economy. Sato et al. (2011) looked at the effects of US monetary policy shocks on the East Asian region. Starr (2004) found that interest rates have a large impact on production growth in Russia.

Furthermore, the conclusions regarding the influence of oil price shocks on economic activities differ between studies. Addison et al. (2016) suggests that the impact of an oil price shock on macroeconomic variables differs among oil-producing African countries. In their research of the nexus between shocks from the price of oil and some selected macroeconomic variables for Ghana, Berument and Basak (2015) used the restricted VAR technique and found a nonlinear connection between shocks from the price of oil and those variables. They conclude that the magnitude of the percentage impact is minimal in this study, but it does not suggest that the consequences of the oil shock on the Ghanaian economy are insignificant. In South Africa, the results of the S-VAR by Chiweza and Aye (2018) and Ilyas et al, (2021) revealed a tendency of negative consequences from changes in oil prices on the country's economic activities. Commodity price fluctuations pose a significant threat to African countries' macroeconomic stability (including East Africa), although the impact is highly dependent on each country's structural characteristics and policy implementation response. In essence, the effects are a function of procyclical or countercyclical consequences, rather than being uniform. The result of the structured VAR and descriptive analysis by Chuku and Simpasa (2018) revealed a heterogeneous relationship between commodity product shocks and economic activities of the countries under investigation, while shedding more light on the nexus between commodity price fluctuations in some commodity-dependent African countries. The work by Olamide et al. (2022) in Nigeria, which used the S-VAR estimate technique, was in line with this. The study found that oil price shocks had a large and negative impact on output and growth. Panel-VAR was also used by Omojolaibi and Egwaikhide (2013) to investigate the extent to which variations in the price of oil can affect economic activities in five African oil-producing countries, and they discovered that gross investment is the channel through which oil price variations affect macroeconomic activities in those countries. Variables like real GDP, money supply, and fiscal policy, on the other hand, have no effect on oil price volatility. Using threshold regression model of agricultural growth in South Africa, Aye and Odhiambo (2021) showed that prices of Real WTI crude oil in Dollars, Real Brent crude oil in Dollars, Real WTI crude oil in Rands, and Real Brent crude oil in Rands, above the threshold values of 12.99 percent, 15.68 percent, 15.69 percent, and 15.70 percent, will have significant negative effects on agricultural growth in South Africa.

A systematic adjustment by monetary policy to deviations in fiscal policy from sustainable long-run economic development was postulated in a research by (Ng'ang'a et al., 2019) on the implications of monetary and fiscal policies on GDP. In another study on the relative effectiveness of both strategies in Ethiopia, Olamide et al. (2022) found

that monetary policy is more potent on economic growth than fiscal policy. This was in contrast to Moller and Wacker (2017), who found that in Ethiopia, fiscal policy has a greater impact on growth than monetary policy. Interest rates are a weak instrument of monetary policy in Kenya, Tanzania, and Uganda. Tight monetary policy not only caused banks in Uganda to reject loan applications, but also restricted credit availability to borrowers. This backed with an earlier recommendation by (Abuka et al., 2019), which cautioned Uganda against being overly reliant on monetary policy to achieve macroeconomic goals. Dillon and Barrett (2016) enumerated three ways in which external shocks can affect the price of commodity maize and concluded that global oil price shocks affect maize outputs more than changes in global maize prices. Furthermore, Odhiambo (2017) acknowledged that various macroeconomic variables have a significant impact on the direction and success of the proposed East African Monetary Union. For five countries in the EAC zone, the study used both static and dynamic estimate approaches and found that exogenous variables caused inflation to rise and GDP growth to slow.

The rate of interest in Kenya was discovered to be the principal channel via which the influence of monetary policy may be conveyed to inflation (Srithilat et al., 2022). Nonetheless, in a research that looked into the importance of the monetarists' assumption about what money does during an inflationary time in Tanzania, Ayubu (2013) confirmed inflation as a real phenomenon rather than a monetary one. Taking Maize is a staple product in the West African economic zone, according to Dillon and Barrett, (2016), and its price is frequently affected by oil price movements and transportation expenses. They went on to say that the region's macroeconomic activities are likely to be unstable due to the region's undeveloped transportation system, as well as shocks from oil price input. For both country-by-country analysis and regional assessments, the extant literature clearly reveals that opinions disagree on the relationship between monetary policy dynamics, external shocks, and macroeconomic activities. Not only that, but it was also established that the significant variables of concern are the interest rate, money supply, net domestic credit, exchange rate, GDP growth rate, and volatility in oil and commodity prices; consequently, the model parameters in this study were based on these. These variables have been recognised as determinants influencing the evolution of monetary policy, particularly at regional levels (Abuka et al., 2019; Ayubu, 2013; Omojolaibi & Egwaikhide, 2013).

4. METHODOLOGY

4.1. Definition of the variables and sources

For the 1990–2020 time span, the research relies on unbalanced panel data mostly from the World Development Indicators (WDI). Table 1 provides details on the relevant variables, including descriptions and measurements.

Table 1: Variables descriptions, measurement and sources of data.

Variable	Description	Measurement	Data Source
Real GDP Growth rate	The annual worth of growth in the value of the total annual output of goods and services produced in the economy is represented by this rate of growth. In economics, it is used as a proxy for growth (Gabriel, 2019).	It is expressed as a percentage of the value of all productive resources used by countries in a given year, adjusted for inflation. This means that in the SSA nations studied, real	WDI

		GDP is the value of nominal GDP that has been adjusted for inflation.	
Oil Price	The price of oil, sometimes known as the oil price, is the current spot price of a barrel (159 litres) of benchmark crude oil. It serves as a benchmark for buyers and sellers of crude oil, such as West Texas Intermediate (WTI).	The value of changes in production and consumption of crude oil.	IFS
Money supply	The total amount of money in the economy at any particular time is referred to as the money supply.	Known as broad money or quasi-money, it is used to measure money in circulation and bank deposits are both included in the M2 metric. The rate of money supply is calculated by dividing M2 by GDP.	WDI
Interest rate	The lending rate to bank customers who borrowed funds from banks.	Nominal and real interest rates can be used to calculate interest rates. The rates quoted in loan and deposit agreements are known as nominal interest rates. It is calculated by adding the actual interest rate to the inflation rate. Deflating nominal interest rates yields the real interest rate. To put it another way, nominal interest rates minus inflation.	WDI
Inflation rate	The inflation rate is the change in consumer prices expressed as a percentage.	The annual percentage change in consumer prices is employed. The Retail Price Index (RPI) and the Consumer Price Index (CPI) are two indicators (CPI). The CPI measure was employed in this investigation.	WDI
Exchange rate	It is the price of one unit of one country's currency in terms of another country's currency.	It is defined as the rate at which one currency is exchanged for one dollar. The nominal and real exchange rates are used to calculate it. The nominal exchange rate is the amount of one currency required to obtain one unit of another. The purchasing power of a currency in relation to another	WDI

		currency at current exchange rates and prices is known as the real exchange rate.	
Commodity Prices.	The value of all goods and other market services provided to the rest of the world by developing countries. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services.	Prices of all commodity export in various country.	WDI
Balance of payment	This is the net trade in goods. is the difference between exports and imports of goods. Trade in services is not included.	The transfers of import and export of goods over time	WDI

4.2 Unit root test

Table 2: IPS and ADF-Fisher Chi-square unit root tests.

	IPS Unit Root test			ADF-Fisher Chi^2 Unit Root Test		
Variables	t* Statistics	p ^{values}	Order of Integration	t* Statistics	p ^{values}	Order of Integration
Bop	38.5228	0.000***	I(1)	10.9654	0.000***	I(1)
Com Pri	33.0793	0.000***	I(1)	11.7578	0.000***	I(1)
Cpi	38.5233	0.000***	I(1)	38.5233	0.000***	I(1)
Exc Rt	38.5252	0.000***	I(1)	38.5233	0.000***	I(1)
GDP Gr	6.683	0.000***	I(O)	4.5846	0.000***	I(1)
Int Rt	4.2735	0.000***	I(O)	11.6684	0.000***	I(1)
M2	38.8273	0.000***	I(1)	38.5222	0.000***	I(1)
Oil Prc	25.2704	0.000***	I(1)	10.0442	0.000***	I(1)

"***", "**" and "*" represent statistical significance at the 1%, 5% and 10% level, respectively. Trend and constant terms are included in each model. GDP Gr is the GDP growth rate; Int Rt is the interest rate proxy for monetary policy rate. The exchange rate is Exc Rt; the inflation rate is Cpi; the money supply M2; and the Bop is the Balance of payment. Oil Prc is the price of oil, while Com Pri is the price of commodities.

We believed that the panel data would have cross sectional dependency, thus we ran a panel cross sectional dependency test, the results of which are provided in Table 3.

Table 3: Correlation matrix of the residuals.

Variables	GDP Rt	Int Rt	M2	Bop	Com Prc	Cpi	Exc Rt
GDP Rt	1						
Int Rt	-0.0251	1					
M2	0.1216	0.3027	1				
Bop	0.1953	0.2125	0.0347	1			
Com Prc	0.3216	-0.1526	0.4159	0.1734	1		
Cpi	0.02541	-0.0620	0.3514	0.0183	0.6371	1	
Exc Rt	-0.1255	0.1303	-0.1157	-0.0907	0.0907	0.1684	1

Breusch–Pagan LM test of independence: chi2 (21476) = 0.3034, Pr = 0.3010 H0: There is no cross-sectional dependence.

Because the results in Table 3 reveal that there is no common component, the null hypothesis of no cross-sectional reliance is accepted, and the alternative hypothesis of cross-sectional dependency is rejected. The inference is that the West African countries chosen share features that allow them to be grouped together in the panel (Baltagi et al., 2015). Apart from that, accounted for cross-sectional dependency, and the influence of cross-sectional dependence on our results has been reduced with the Augmented DF test (Breitung & Das, 2008; Im et al., 2003; Moon & Perron, 2004).

4.3 Stability test

After the unit root tests were completed, a VAR model was used to calculate the number of optimum lags to incorporate in the model before the long-run test. All the variables tested fall under the Alkaike Information Criterion. Six of the variables allows for lag 1, while the other two favoured lag 8, as seen in the table 4 below. As a result, lag 8 was chosen as the maximum lag in the model's construction.

Table 4: Optimal lag selection.

Lag	LogL	LR	FPE	AIC	SC	HQ
1	-2137.942	3528.010	1.055418*	5.838187*	2.898976	2.894484
1	-2477.23	4606.369	1.669350*	3.350311	3.357473	3.352981
1	-33395.37	5596.092	$2.33x10^{18}$*	7.562446*	45.13875	45.13426
1	-6548.474	7095.415	409.1635	8.851992*	8.859154	8.854662
8	-3970.328	5.129109*	12.67452	5.377471*	5.409699	5.389485

Note: * is the lag order selected by each criterion; LR is sequential modified LR test statistics (5% level each); FPE is the Final Prediction Error; AIC is the Akaike Information Criterion; SC is the Schwarz Information Criterion; and HQ is the Hannan–Quinn Information Criterion.

The AR root table was also used to fulfil the stability test (the stationary property of the variable). Table 5 below shows that all of the roots of the characteristic polynomial are smaller than one. This indicates that the VAR model is variance and covariance stationary, indicating that it meets the stationary condition.

Table 5: Stability and AR root.

Root		Modules
0.996326		0.996326
0.993432		0.993432
0.986441		0.986441
0.984517	- 0.006309i	0.984537
0.984517	+ 0.006309i	0.984537
0.953695		0.953695
0.933015		0.933015
0.915031		0.915031
0.325845	+ 0.478384i	0.578819
0.325845	- 0. 478384i	0.578819

4.4 Structural vector autoregressive model (S-VAR)

The S-VAR technique is still one of the most effective approaches in any research of monetary policy transmission (E. Svensson, 2014). According to Famoroti and Tipoy (2019) , the S-VAR is a better method for identifying the impact of shocks in monetary instruments therefore this study considers S-Var as appropriate. As a result, we divided the S-VAR into two pieces to account for the model's variables. The first portion covers the fluctuations in commodities and oil price coefficients (Dritsakis, 2011), while the second section contains the balance of payment (BOP), GDP growth rate (GDP GR), inflation (CPI), money supply (M2), exchange rate (ECH RT), and interest rate (INT RT). Most African countries whose main source of revenue is related to one or a few commodities, according to [67], find it difficult to manage their economies due to the effects of fluctuating commodity prices price on macroeconomic inputs such as balance of payment and exchange rate. This demonstrates that these factors are intertwined to the point where any external shock will have an impact on economic activity (Famoroti & Tipoy, 2019; L. Svensson, 2014). Therefore, the conventional method of S-VAR equation is,

$$\Upsilon_t = A_1\Upsilon_{t-1} + \cdots + A_2\Upsilon_{t-2} + \cdots + A_p\Upsilon_{t-p} + \mu_t \ldots\ldots\ldots \quad \text{Eq (1)}$$

Where Υ_t is the m by 1 time series of endogenous variables for the vector; $A_i(t = 1.2. \ldots\ldots p)$ represent the m by 1 matrix coefficient; μ_t stands for vector containing white noise; and μ_t~ iid N (O, Ω) is the error term. The possibility that errors will correlate contemporaneously in all the equations is assume in this studies; pm^2 parameters also exist in the matrices.

Eq….1 can be re-written in the Lag operator (L) as

$$A(L)_{yt} = \mu_t \ldots\ldots\ldots\ldots \quad \text{Eq (2)}$$

Therefore, A(L) = $A_0L^0 - A_1L^1 - A_2L^2 \ldots A_pL^p$

A_0 means a 1 (identity matrix) and the condition for stationarity is that A(L) should not be within the circle. Since the lag operator (L) selection was through $L^k\ x_t = x_{t-k}$ and x represents collections of external factors such that k is the lag length.

4.5 Variance decomposition and impulse/response functions

The process of Impulse Response Functions and Variance Error Decompositions ia to respecify the auto regressive functions as give below.

$$A(L)\ \mu_t = \Upsilon_t \ldots\ldots\ldots\ldots \quad \text{Eq(3)}$$

where Υ_t is the stochastic stationary procedure within the system and L is the polynomial finite order lag, while μ_t is the error term of the white noise.

The S-VAR condition demand for the expression *det(1 - A(z)) = 0* to be greater than 1 with a module before *det(1 – A(z))* can be invertible matrix. Therefore, the moving average vector for interpreting VAR is as follow:

$\Upsilon_t = \Phi_t + \sigma(L)\ \mu_t E(\mu_t) = 0$…….. Eq(4)
$E(\mu_t\mu_{t-k}) = \mathbb{Q} \ \mid k \mid = 0$……. Eq(5)
$E(\mu_t\mu_{t-k}) = \mathbb{Q} \ \mid k \mid \neq 0$ …… Eq(6)

Where $\mathbb{Q}$ is the matrix sample covariance while the predictability of perfection of the matric coefficient ($\sigma(L)$) employing 1 lag in the identity is represented by Φ_t. Equation (5) by normalization, the impulse response functions can e generated along with the forecast error decomposition. Note, the variance decomposition adopted is important to moving average.

4.6 Identification of the model

Before the elements of the orthogonal structure of the error terms in the shock can be recognised, there must be enough limits on the S-VAR. As a result, the results of the non-recursive orthogonal for the error components would be used to generate our Impulse Response Function and Variance Decomposition. The assumption is that the vector's endogenous variables are represented by Υ_t and the model is thus.

$Av_t = B\mu_t$ …….. Eq(7)

From Equation 7, v_t and μ_t are the vector with lag length k; v_t represents observation residual; μ_t are the structural innovation that cannot be observed, while A and B are the measurable K by k matrix. $\mu_t$is naturally orthogonalized.

This means that the covariance of the matrix with an identity 1- $E[\mu_t\mu_t^t]$. From the orthogonal assumption of μ_t restriction can be imposed on A and B hence the equation

$A\sum A' = BB'$……. Eq(8)

Therefore, the link between reduced and the structural form of VAR takes the following form.

$B(L) = AB_0 + B^+(L)$ …….. Eq(9)
$A(L) = -B_0^{-1}B^+(L)$…….. Eq(10)
$\sum B_0^{-1} AB_0^{-1}$ ……. Eq(11)

The left-hand side of the equation enabled the simultaneous character of the structural form in Equation (10). The former denotes correlations at lag zero, while the latter denotes rigorous lag correlations. Not only that, but Equation 11 separates each of the reduced form coefficients into its structural counterpart B0, which is identified by the reduced form of $[\mu_t\mu_t^t] = \sum$, while the diagonal covariance matrix of the structural form of $E\left[v_t v_t'\right] = A$, as shown in Equation (11).

Short run and medium response of the variable are the focal point of this work therefore, the contemporaneously limitation is imposed on B_0 to show disturbances. This is done because log run limitations are vulnerable to serious misspecification challenge and the resultant equation is given below (Roch, 2019).

$$B_0^* X_t = \begin{bmatrix} v_t^{oip} \\ v_t^{comp} \\ v_t^{bop} \\ v_t^{gdper} \\ v_t^{inf} \\ v_t^{m2} \\ v_t^{exc} \\ v_t^{int\ rt} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ b_{21}^0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ b_{31}^0 & 0 & 1 & 0 & 0 & 0 & 0 & b_{38}^0 \\ b_{41}^0 & 0 & b_{43}^0 & 1 & 0 & 0 & 0 & 0 \\ b_{51}^0 & 0 & b_{53}^0 & b_{54}^0 & 1 & b_{56}^0 & 0 & 0 \\ b_{61}^0 & b_{62}^0 & 0 & 0 & b_{65}^0 & 1 & b_{67}^0 & 0 \\ b_{71}^0 & b_{72}^0 & b_{73}^0 & f & b_{75}^0 & b_{76}^0 & 1 & 0 \\ 0 & 0 & 0 & 0 & b_{85}^0 & b_{86}^0 & 0 & 1 \end{bmatrix} \begin{bmatrix} oil\ Prc \\ com\ pr \\ Balace\ of\ payment \\ GDP\ Growth\ Rate \\ Inflation \\ Money\ supply \\ Exchange\ Rate \\ Interest\ Rate \end{bmatrix} \text{...Eq(12)}$$

The eight variables of the S-VAR model are accommodated in the matrix B0 above. Here, b_{ij} are the components of the ith row and the jth column for the B0 matrix. The first two rows contain the external variables (oil and commodity price). Expectedly, these variables will pressurize any country operating in an open economy such as the countries under investigation (Rotimi & Ngalawa, 2017). This is so because these countries are agricultural primary goods producers and import dependent (Chuku & Simpasa, 2018; Hatmanu et al., 2020); hence, commodity prices are a function of oil price variations. Furthermore, the equation of the oil price reveals its responsiveness to self-lagged values, while Equation (2), which stands for the price of a commodity, reveals its contemporaneous response to fluctuations in the price of oil as represented in b_{21}^0. The third and fourth equations capture the VAR residuals of the gross domestic product growth rate (GDP GR) and Balance of payment (BOP). Not only that, but it also reveals how delay in planning, information and perhaps policy makers' lags expectation were responsible for the slow response to shocks in monetary policy (Addison et al., 2016; Chuku & Simpasa, 2018). The zeros explained the rigid normality (Nkalu, 2020). In b_{31}^0 and b_{38}^0 was the contemporaneous response of the balance of payment (BOP) to the interest rate with oil prices, whereas b_{41}^0 and b_{43}^0 explained how the balance of payment (BOP) contemporaneously responded to the price of oil and the growth rate of money supply. Respectively, Equations (5) and (6) explained the rate of inflation and growth in the supply of money. The existing association balance of payment (BOP), growth rate of gross domestic product (GDP GR), supply of money and inflationary rate were also explained contemporaneously in coefficients b_{53}^0, b_{54}^0 and b_{56}^0.

The assumption that inflation responded contemporaneously to shocks in output adhered to the studies by (Olamide et al., 2022). The instantaneous response to oil and commodity prices, exchange rates and the rate of inflation by supply of money was explained in the sixth equation. Finally, the exchange rate and rate of interest are contained in the seventh and eight equations. They explained the contemporaneous response of the exchange rate to other variables in a market that was competitively set (Hatmanu et al., 2020). However, b_{85}^0, which stands for inflation, and b_{86}^0, which represents the supply of money, would get a response from the rate of interest as government policy varies.

5. RESULTS DISCUSSION

5.1 Analysis of the impulse and response functions

The Impulse Response Functions are the thick black lines in Figure 1 and 2, whereas the one standard deviation (sd) confidence intervals are the red dotted lines. The responses of macroeconomic indicators, such as MPR, M2, EXV RT, INF, GDPGR, and COM PR, to oil price and exchange rate shocks are shown in Figure 1.

Response to Oil Price; A one sd shock (innovation) oil price initially has a notable increase impact on bop in period 1 and 2. From the 2nd period, the response sharply declines until the 4th period where it hits steady state value. Beyond the 5th period, bop maintained its steady value and remains in the neutral (0) region. It means shocks in oil positive will have a positive impact on bop in short (SR) and long run (LR). Response to Exchange rate; A one sd shock (innovation) to Exchange rate initially has no impact on bop. At the 2nd period, the response sharply declines until the 3rd period when it gradually increases to its steady state value from where it remains neutral from 5th period to about 8th period. It means shocks to exchange will have asymmetric impacts on bop in SR and LR.

A one sd shock (innovation) oil price initially has a notable decerebrising impact cpi in period 1 and 2. Beyond the 2nd period, the response sharply increases through the 4th and 5th period where it hits steady state value. Beyond the 6th period, cpi maintained its steady value and remains in the neutral (0) region. It means shocks in oil positive will have a negative impact on cpi in SR and a positive impact in the LR. A one sd shock (innovation) to Exchange rate initially has a negative impact on cpi. At the 2nd period, the response sharply increases until the 4th period when it gradually increases to its steady state value from where it remains neutral from 5th period to about 8th period. It means shocks to exchange will have asymmetric impacts on bop in SR and LR.

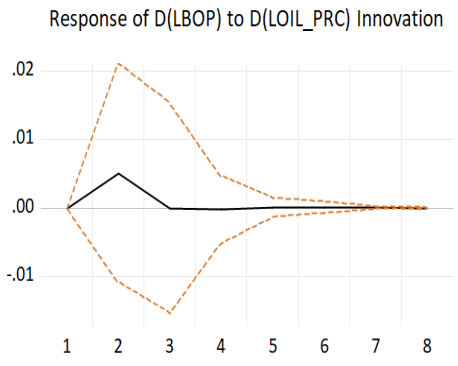
A one sd shock (innovation) oil price initially has a sharp and decerebrising impact on interest rate in period 1 and 2. Beyond the 2nd period, the response sharply increases through the 3rd and remains steady positive in the 4th, 5th and 6th period. Beyond the 6th period, interest rates maintained its steady value and remains in the neutral (0) region. It means shocks in oil positive will have an initial negative impact on interest rate in SR and a positive impact in the LR. A one sd shock (innovation) to Exchange rate initially has a negative impact on interest rate. From the 2nd period, the response becomes neutral throughout the remaining periods. It means shocks to exchange will have asymmetric impacts on interest rate in SR and LR.

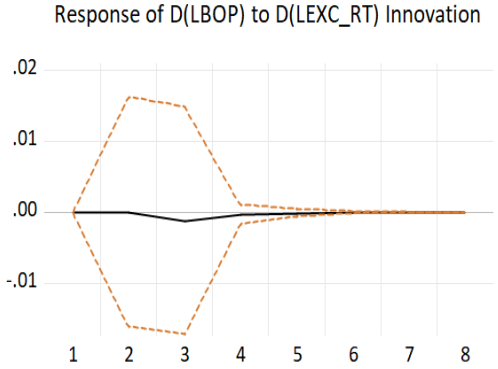
A one sd shock (innovation) oil price initially has an initial negative impact on commodity prices within the 1st and 2nd periods. Beyond the 2nd period, the response sharply increases through the 3rd and remains steady positive in the 4th, 5th and 6th period. Beyond the 6th period, commodity prices maintained its steady value and remains in the neutral (0) region. It means shocks in oil positive will have an initial negative impact on commodity prices in SR and a positive impact in the LR. A one sd shock (innovation) to Exchange rate also has a negative impact on commodity prices. From the 2nd period, the response began to increase positively through the 4th, 5th, and 6th periods. It means shocks to exchange will have asymmetric impacts on interest rate in SR and LR.

Looking at the response of GDP growth rate to oil price shocks, a one sd shock (innovation) oil price initially has a positive influence on the GDP growth rate from the 1st to 2nd periods. The 3rd and 4th periods witnessed a steady increase as a result of the oil price shocks before a slow decline in 5 and 6 while the impact remains constant on the zero margined in the remaining period. It means shocks in oil positive will have an initial positive impact on GDP growth rate in SR and a negative impact in the LR. A one sd shock (innovation) to Exchange rate also has a negative impact on GDP growth rate. From the 1st to the 2nd periods. The response began to increase positively through the 3rd 4th period where the impact become positive and a steady state in the 6th to the 7th period. It

means shocks to exchange rate on GDP growth rate will have asymmetric impacts on interest rate in SR and LR.

For the response of supply of money to oil price shocks, a one sd shock (innovation) oil price initially has a negative influence on the supply of money (M2) from the 1st to 2nd periods. The 3rd 4th and 5th periods witnessed an increasing impact as a result of the oil price shocks and the 5th periods witnessed a steady positive impact. It also means that shocks in oil positive will have an initial negative impact on the supply of money in SR and a positive impact in the LR. A one sd shock (innovation) to Exchange rate also has a positive impact on M2 from the 1st to the 2nd periods. The response became steady at other periods. It means shocks to exchange rate on GDP growth rate will have asymmetric impacts on interest rate in SR and LR.





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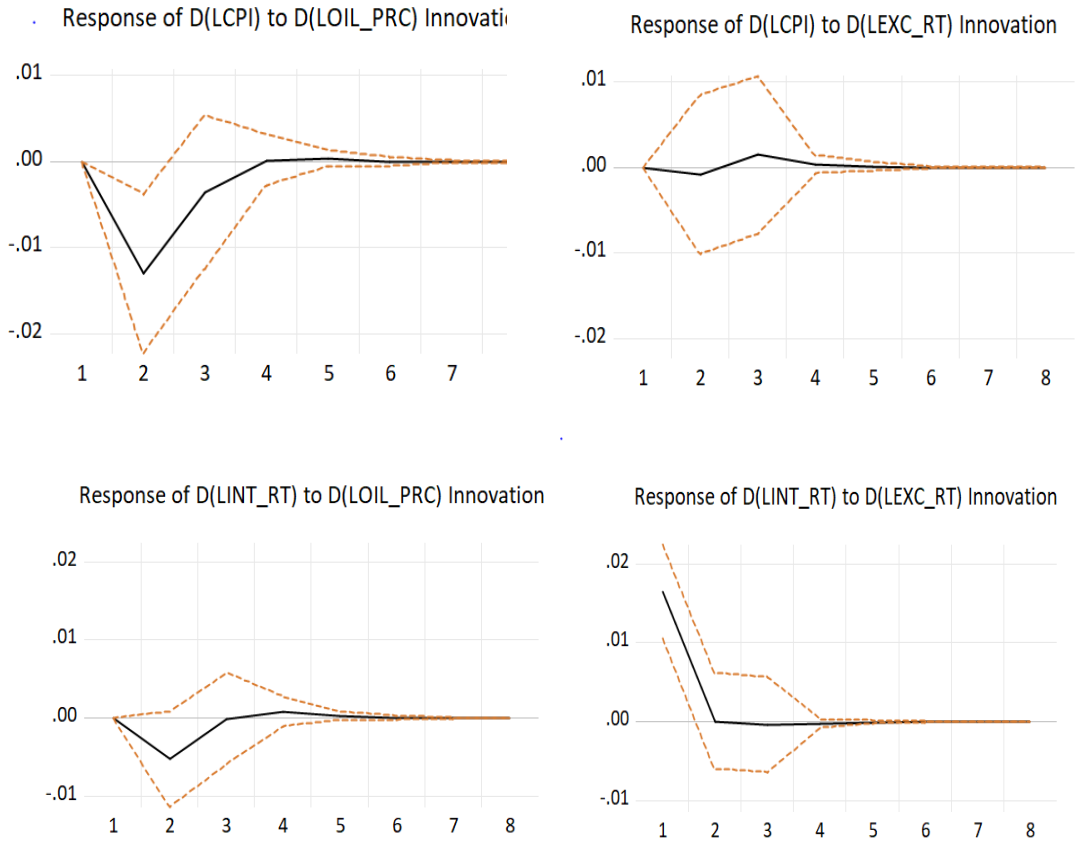
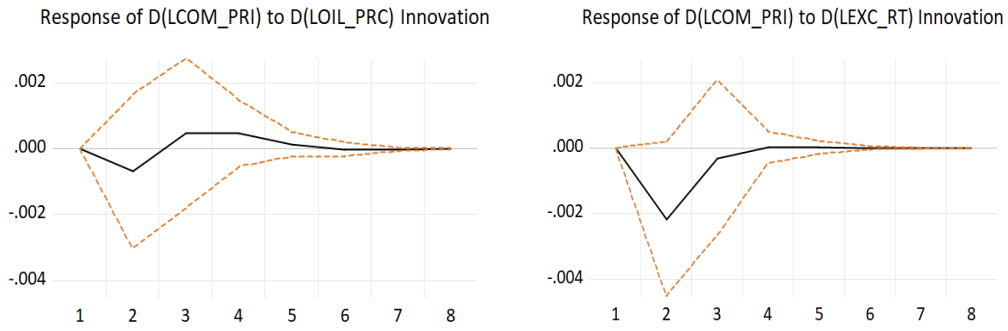


Figure 1: Impulse response function of D(LBOP).



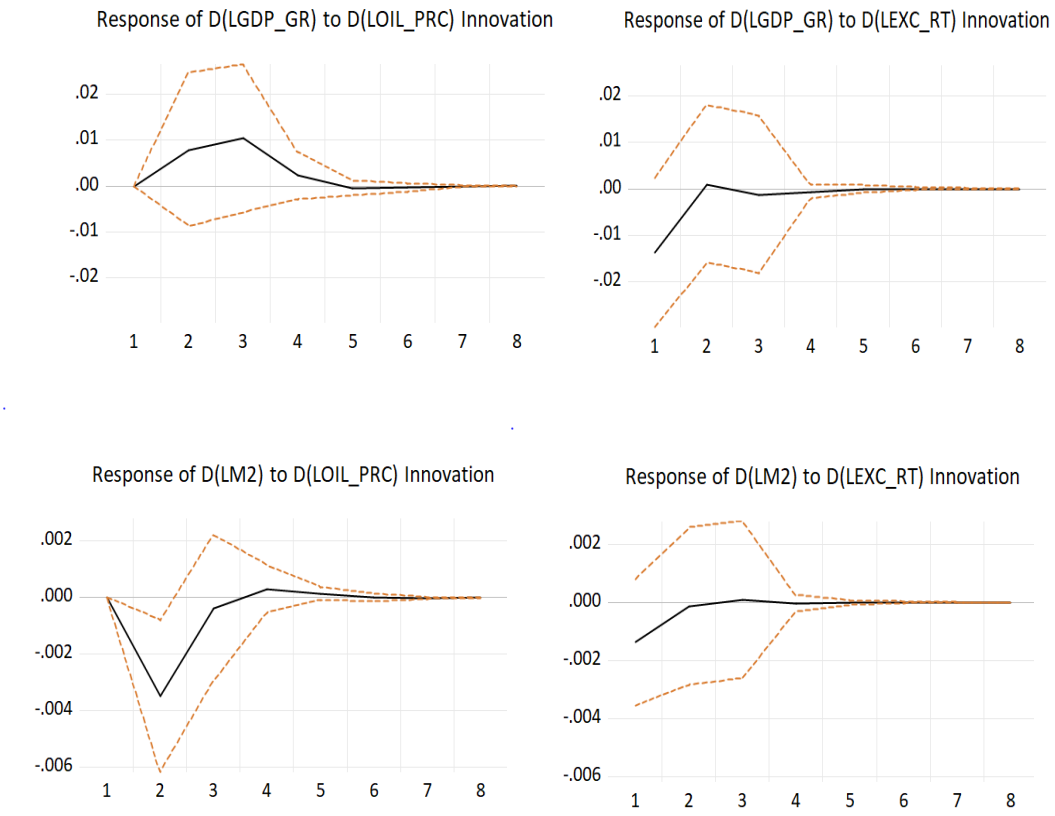


Figure 2: Impulse response function of D(LCOM_PRI).

5.2 Forecast error variance decompositions analysis

Table 6 below shows the Variance Decomposition of GDP growth rate. Going by the percentage of focal error variance and bearing in mind that the periods are splinted into short run (SR) (Periods 1 and 2) and long run (LR) (Periods 3 to 6). In the SR, 89.6% of the focal error variance is explained by the variable itself this means that other variables in the model do not have any strong influence on the GDP growth rate. Therefore, those variables (int rt, M2 and Oil Price) in the model have strong exogenous impact in the sense that they do not influence real GDP while bop, com-pri, cpi and exc-rt has 1.23%, 3.46%. 5.45% and 0.17% impact on GDP growth respectively in the SR. There is no significant changes in the values in the LR but cpi (5.45%) and com-pr (3.46%) are better predictor for the GDP in both SR and LR. In summary, the variables exhibit strong exogeneity which mean they have weak influence in prediction the GDP growth rate.

Table 6: Variance decomposition of GDP growth rate.

PERIOD	SE.	BOP	COM PR	CPI	EXC RT	GDP GR	INT RT	M2	OIL PR
1	0.342883	1.232133	3.464612	5.451381	0.177730	89.67414	0.000000	0.000000	0.000000
2	0.343832	1.230802	3.461168	5.445557	0.177544	89.57705	2.65E-05	6.60E-07	0.107875

3	0.343905	1.230704	3.461715	5.445557	0.177616	89.56994	1.83E-05	3.30E-06	0.114444
4	0.343911	1.230696	3.461828	5.445627	0.177635	89.56928	1.90E-05	3.81E-06	0.114912
5	0.343912	1.230695	3.461842	5.445638	0.177637	89.56921	1.90E-05	3.99E-06	0.114952
6	0.343912	1.230695	3.461844	5.445639	0.177637	89.56921	1.90E-05	4.02E-06	0.114955

Table 7 below shows the Variance Decomposition of exchange rate. In the SR, only 44.55% of the focal error variance is explained by the variable itself this means that exchange rate is not a strong predictor of itself and other variables in the model have strong influence on exchange rate. From the table, com pr (24.37%), bop (23.33%) and cpi (7.74%) has a strong influence on exchange rate. In the LR specifically in the 3rd period, M2 (7.76%) and Int rt (8.94%) began show some slight influence on exchange rate. In summary the variable exibit a strong endogeneity which means they have strong influence in prediction of exchange rate in the SR and LR.

Table 7: Variance decomposition of exchange rate.

PERIOD	SE.	BOP	COM PR	CPI	EXC RT	GDP GR	INT RT	M2	OIL PR
1	0.051537	23.33561	24.37466	7.736763	44.55297	0.000000	0.000000	0.000000	0.000000
2	0.051650	23.20695	24.24356	7.695616	44.30728	2.66E-05	1.27E-05	4.37E-07	0.546547
3	0.051656	23.19721	24.23808	7.695026	44.28920	0.000135	8.94E-05	7.76E-06	0.580257
4	0.051657	23.19629	24.23787	7.695335	44.28754	0.000165	9.27E-05	1.10E-05	0.582694
5	0.051657	23.19619	24.23786	7.695388	44.28738	0.000169	9.28E-05	1.21E-05	0.582902
6	0.051657	23.19618	24.23786	7.695394	44.28736	0.000170	9.29E-05	1.22E-05	0.582921

In the SR, 93.56% of the focal error variance is explained by the variable itself this means that other variables in the model do not have any strong influence on int rt rate. Therefore, those variables (oil-pr and M2) in the model have strong exogenous impact meaning they do not influence int-rt while bop, com-pri, cpi and exc-rt has 2.22%, 0.89%, and1.99% impact on Int-rt respectively in the SR. There is no significant changes in the values in the LR but M2 (9.10%) began to show some significance if prediction Int-rt in the LR. In summary, the variables exhibit strong exogeneity which mean they have weak influence in prediction the Int-rt.

Table 8: Variance decomposition of interest rate rate.

PERIOD	SE.	BOP	COM PR	CPI	EXC RT	GDP GR	INT RT	M2	OIL PR
1	0.322183	0.797340	2.216249	0.892121	1.988432	0.549688	93.55617	0.000000	0.000000
2	0.322358	0.796012	2.213895	0.893224	1.985480	0.548778	93.39990	6.54E-05	0.162648
3	0.322371	0.795937	2.214185	0.893257	1.985320	0.548727	93.39098	9.10E-05	0.171503

4	0.322372	0.795931	2.214289	0.893335	1.985320	0.548726	93.39024	9.10E-05	0.172067
5	0.322372	0.795930	2.214304	0.893349	1.985321	0.548727	93.39017	9.12E-05	0.172111
6	0.322372	0.795930	2.214305	0.893350	1.985321	0.548727	93.39016	9.12E-05	0.172115

Table 9 below shows the Variance Decomposition of Money supply. In the SR, only 63.52% of the focal error variance is explained by the variable itself this means that money supply is not an absolute predictor of itself and other variables in the model have strong influence on money supply. GDP gr and bop has weak predictive power on the money supply in the LR. In summary the variable exhibits a strong endogeneity which means they have strong influence in prediction of money supply in the SR and LR

Table 9: Variance decomposition of money supply (M2).

PERIOD	SE.	BOP	COM PR	CPI	EXC RT	GDP GR	INT RT	M2	OIL PR
1	0.116188	1.490822	20.73065	12.29521	0.069216	1.896580	0.000212	63.51731	0.000000
2	0.116285	1.484297	20.64397	12.24909	0.069971	1.888290	0.000221	63.23904	0.425109
3	0.116291	1.483933	20.64009	12.24633	0.070023	1.887826	0.000296	63.22347	0.448032
4	0.116291	1.483903	20.63998	12.24629	0.070060	1.887798	0.000299	63.22219	0.449478
5	0.116291	1.483900	20.63998	12.24630	0.070067	1.887796	0.000299	63.22206	0.449591
6	0.116291	1.483900	20.63998	12.24630	0.070067	1.887795	0.000299	63.22205	0.449601

The study's summary analyses of impulse responses and forecast error-correction decompositions demonstrate that commodity price shocks have a greater impact on regional macroeconomic performance than oil price shocks, as the impact of oil price shocks remained minimal during the study period. To begin with, the study found that changes in the price of a commodity had a considerable impact on the monetary policy rate, exchange rate, and economic growth (measured as GDPgr), as opposed to the oil price, which had no influence. The impulse response and variance decomposition results demonstrated that monetary policy rate (Int rt) shocks had a more significant impact on commodity prices, exchange rates than inflation rate (CPI). This is just further evidence of the connection between exchange rate, inflation, and monetary policy (Int rt). Any measure taken by a monetary authority is usually aimed at managing the value of currency and the pace of inflation (Tevdovski et al., 2019).

The exchange rate also influences the behaviour of the economic growth rate in the 2nd period, the money supply in 2nd period, and the monetary policy rate in same period. This result is in line with (Omolade & Ngalawa, 2016). Chuku and Simpasa (2018) suggests for the region's governments a hybrid contractionary monetary policy during the boom and an expansionary policy during the recession to deal with this type of scenario. The key mechanisms of connection within the west African region are the transmission effects of shocks from commodity prices to the exchange rate to GDP gr via the lending rate (monetary policy rate) and money supply.

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5. CONCLUSION

To meet the study's objectives, we created the Structural-VAR model. The S-VAR was utilised to gain a better understanding of how monetary policy changes interact with other macroeconomic determinants in West Africa. Our main result is that non-oil commodity price shocks have a significant impact on the exchange rate, and that monetary policy changes (interest rate and money supply) are critical in translating this exchange rate effect to economic development. This demonstrates how sensitive the West African country members with an open economy are to the fluctuation in balance of payment. This research adds to the literature in two ways. First describing how many West African countries with open economies are vulnerable to huge variations in trade terms induced by the fluctuating import price of oil (stated in US dollars) and the market-determined exports product. Second explaining the benefits from expanding and diversifying their participation in international trade and global value chains to reduce poverty on a large scale send transformation of their economies.

As a result, it is argued that any drop in commodity prices, as evidenced by the impulse response result, should serve as a wake-up call to member countries to rethink their economic policies on economic diversification. It should also act as a wake-up call to policymakers about how sensitive their economies are to commodity price fluctuations. It is hereby proposed that member countries diversify their producing and export bases rather than continue to rely on one or a few products as their primary source of income.

Furthermore, increased cross-border collaboration and contingency preparation, including emergency financial assistance, would benefit in the promotion of monetary policy integration. In this regard, African policymakers might learn from the unpleasant experiences of established and emerging market countries during the global financial crisis. It is positive that African countries are actively preparing how to benefit from the agreement and developing concrete plans of action to take advantage of national, regional, and global markets within the framework of the African Continental Free Trade Zone (AfCFTA). This will have a huge impact on Africa's economic diversification and inclusion. Finally, private–public partnerships are required to promote regional collaboration among member countries. The decision of West African countries on whether to adopt a free-floating or regulated external exchange rate is critical for the future common currency's survival.

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