THE ROLE OF MONETARY POLICY IN MODERATING THE EFFECT OF INTERNATIONAL TRADE PRICE ON ECONOMIC PERFORMANCE IN NON-WAEMU COUNTRIES

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Abstract

Purpose – The present study complements the extant studies by empirically assessing the relevance of monetary policy in moderating the effect of oil price and terms of trade (TOT) on economic performance in non-UEMOA countries for the period 2000 to 2021.

Design/methodology/approach – Monetary policy is proxied by real interest rate (RIR), real effective exchange rate (REER) and bank credit while economic performance is understood in terms of real output, unemployment, and inflation. The adopted empirical strategy is interactive fixed effects regressions.

Findings – The following main findings are established. First, RIR can be used to effectively moderate oil price and TOT in order to positively influence real output and the maximum or avoidable RIR policy thresholds are above policy range. Second, REER can be used to effectively moderate TOT for an overall positive effect on real output and the maximum or avoidable REER threshold of 150.142 REER index is within policy range. Third, bank credit does not effectively moderate the channels (i.e., oil price and TOT) for a significant incidence on real output. Fourth, only bank credit effectively moderates oil price for an overall negative effect on unemployment. However, for this to be possible, bank credit must exceed the threshold of 11.000 of private domestic credit (%GDP). Fifth, only REER effectively moderates TOT for a negative effect on inflation. However, the corresponding policy threshold is above the REER index policy range and hence, cannot be used by policy makers because it does not make economic/statistical sense. Policy implications are discussed.

Originality/value – This study extends the extant literature on potential monetary unions by assessing how monetary policy can be employed in order to moderate the manner in which international trade prices influence economic performance.

Keywords: monetary policy; oil price; terms of trade; economic performance; non-UEMOA

JEL Classification: E51; E52; E58; E59; O55

1.Introduction

There are ongoing debates about the effectiveness of monetary policy in both developed and developing countries as apparent in a recent survey of the literature by Sedegah and Odhiambo (2021). Moreover, there is a consensus in the literature that while such concerns about the effectiveness of monetary are apparent in all spheres of the globe, the issues are more prevalent in developing countries such as those in Africa where the banking system is comparatively less developed (Starr, 2005; Asongu, 2016). The perspective is further articulated with the consensus that the effectiveness of monetary policy remains an open debate, especially in least developed countries (Nogueira, 2009; Bhaduri & Durai, 2012).

There are also growing calls for more scholarly papers focusing on the extant as well as proposed or embryonic monetary zones, especially in Africa, as apparent by recent surveys of extant literature on the subject (Asongu et al., 2017; Sedegah & Odhiambo, 2021). This is typically because, *inter alia*, growing prices expose small open economies to macroeconomic externalities and monetary policy instruments are needed to address such externalities in the face of the influence of international trade price on economic performance in such small open economies like non-UEMOA countries (Frankel et al., 2004; Gagnon & Ihrig, 2004).

As recently documented by Sedegah and Odhiambo, (2021), contemporary literature on the feasibility of the proposed West African Monetary Zone (WAMZ) which is made of non- UEMOA countries is sparse, especially as it pertains to understanding how monetary policy can be used in moderating the effect of oil prices and trade dynamics on economic development prospects. This present study builds on policy recommendations from the comprehensive survey of the extant literature by Sedegah and Odhiambo (2021) to assess how monetary policy tools (i.e., exchange rate, interest rate and bank credit) are relevant in influencing how terms of trade and oil price affect economic development (i.e., real output, unemployment and inflation).

In order to clarify the contribution of the present study to the extant literature, it is relevant to put in perspective the contribution of Twinoburyo and Odhiambo (2018) to the extant literature. Accordingly, Twinoburyo and Odhiambo (2018) is close to the present study in the extant literature. The authors have surveyed the relevant theoretical and empirical literature on the nexus between economic development and monetary policy to show that the extant literature supports the relevance of monetary policy in economic development, especially when central banks are fair and independent. The findings further recommend researchers to engage more research on the effectiveness of monetary policy. This recommendation is consistent with Sedegah and Odhiambo (2021) on the relevance of complementing recommendations from survey research with empirical studies, within the remit of non- UEMOA countries. The present

study thus complements the extant studies by empirically assessing the relevance of monetary policy in moderating the effect of oil price and terms of trade (TOT) on economic performance in non-UEMOA countries.

The main theoretical underpinning motivating an assessment of the role of monetary policy in influencing the incidence of oil price and TOT on economic performance in a group of small open economies is the theory on the long-term neutrality of monetary policy which supports the perspective that, monetary policy is a neutral to output in the long term (Asongu, 2014). According to the theoretical exposition, monetary policy influences output in the short run and prices in the long run. In other words, monetary policy is neutral on prices in the short terms but affects inflation in the long term. Consistent with the relevant literature (Asongu, 2014), in industrial countries, monetary policy is designed to influence real economic activity in the short-run and exclusively prices in the long-term. However, the underlying theoretical underpinning may not also withstand scrutiny in developing countries, especially when these countries are characterized by financial systems that are not as developed as those in advanced or industrialized countries where a great chunk of the monetary base circulates within the formal banking sector. Hence, the considered theoretical underpinning has remained open to debate (Starr, 2005), especially in new and proposed monetary unions such as the WAMZ consistent with non-French speaking Economic Community of West African States (ECOWAS) countries (Asongu et al., 2017; Sedegah & Odhiambo, 2021).

Considering the objective of the present study and attendant theoretical underpinnings, the following testable hypotheses are examined in the empirical section of the study:

Hypothesis 1: Monetary policy variables moderate international trade price (i.e., oil price and TOT) to not affect real output in the long run.

Hypothesis 2: Monetary policy variables moderate international trade price (i.e., oil price and TOT) to affect prices in the long run.

Hypothesis 1 is related to real output whereas *Hypothesis* 2 is linked to inflation. The two hypotheses are essential for the long-term neutrality of monetary policy which as discussed prior, states that monetary policy is neutral in terms of real output in the long run, but affects prices in the long term.

2. Data and methodology

2.1 Data

The study focuses on 6 non-UEMOA countries for the period 2000 to 2021 namely: the Gambia, Ghana, Guinea, Liberia, Nigeria and Sierra Leone. The six countries constitute the proposed West African Monetary Zone (WAMZ) which embodies the Economic Community of West African States (ECOWAS) without UEMOA countries. The periodicity is motivated by data availability at the time of the study.

Consistent with the problem statement in the introduction as well as the literature review in Section 2, three main outcome variables are adopted for the study, notably: real output in terms of real gross domestic product (GDP), unemployment and inflation. The choice of these variables is consistent with the extant literature on the importance of monetary policy in economic development (Lorenzoni, 2009; Chileshe et al., 2018). For instance, Lorenzoni (2009) has specifically emphasized employment, output and inflation (used in this study to measure economic performance) as consequences from an exogenous shock.

The considered monetary policy variables are also in line with the extant monetary policy literature, namely: interest rate, exchange rage and bank credit (Asongu et al., 2017; Sedegah & Odhiambo, 2021). It is important to note that the considered monetary policy variables are used as policy or moderating variables within the remit of interactive regressions. The main channels or mechanisms are therefore oil price and TOT, in accordance with the problem statement outlined in the introduction. For instance, Chowla et al. (2014) articulate international trade as a transmission channel of external shocks.

In order to account for variable omission bias and thus have specifications that are robust to the control of variable omission, the following variables are involved in the conditioning information set, namely: total reserves, gross fixed capital formation (GFCF), domestic savings, resource rents, internet penetration, school enrolment and total debt service. The choice of the control variables is consistent the extant economic development literature (Lorenzoni, 2009; Asongu et al., 2017; Sedegah & Odhiambo, 2021). It is difficult to establish the expected signs of the control variables for two main reasons. On the one hand, the outcome variables represent both positive and negative macroeconomic signals. For instance, while real output is a positive macroeconomic signal, unemployment and inflation are negative macroeconomic signals. Moreover, given that the estimation exercise involves interactive regressions, as documented in the Brambor et al. (2006), the interaction term can be highly correlated with control variables are, hence, influence the direction of the expected signs. However, the underlying concern of multicollinearity is considered in this study because net effects and thresholds are computed after the three regressions focusing respectively on the

outcome variables. The net effects and/or thresholds entail both the conditional and unconditional effects of the channels. The full definitions of variables and corresponding sources are disclosed Appendix 1 while the summary statistics is provided in Appendix 2.

It is relevant to further clarify that, the moderating or policy variables are variables that governments of sampled countries can control while the channel or external shocks are events that the governments have little or no control over. Hence, it is logical to assess how the monetary policy variables can be used to moderate the effect of international trade price on economic performance in non-UEMOA countries. The study does not make a distinction between importers and net-exporters which is why a fixed effects estimation technique is employed in the study. Accordingly, the estimation technique is tailored such that country fixed effects do not affect the estimated parameters that are common to all sampled countries.

2.2 Methodology

As recently argued by Asongu et al. (2020) on comparative African regional economics, when a few countries are involved in studies focusing on regions, there is argument in favour of Fixed Effects (FE) regressions in order to articulate the unobserved heterogeneity in terms of country-specific effects. Consistent with extant FE literature (Tifuh, 2022; Asongu & Odhiambo, 2023), an equation linking economic performance to monetary policy is specified, together with a set of control variables, in order to investigate the relationship of interest;

$$y_{it} = \beta_0 + \beta_1 x_{it} + u_{it} \quad (1)$$

$$with\ i = 1\dots N\ ,t = 1\dots T$$

Models with country-specific effects presume that the only difference between the estimated models by country is the constant's value. Equation (2) may therefore be used to convert Equation (1) into a fixed effects (FE) model:

$$y_{it} = \beta_i + \beta_1 x_{it} + u_{it} \quad (2)$$

With one major exception—the intercept term is now denoted by a subscript i rather than the starting subscript 0—Equation (2) is almost identical to Equation (1). Equation (2) therefore assumes that the countries in the sample have the same slope (i.e., β_1) despite the fact that they have different intercepts). Thus, when FE are evident for a country, those countries are compared across time. FE regressions are a means of evaluating changes that arise within a certain variable.

Emphasizing that Equation (2) can be extended to a multiple FE specification involving time FE and country FE, as shown in Equation (3), is also important.

$$y_{it} = \beta_i + \beta_t + \beta_1 x_{it} + u_{it} \quad (3)$$

Two FE stand out in Equation (3): (i) country fixed effects (β_i), which are intended to compare nations to themselves across time, and (ii) time FE (β_t), which are intended to compare countries to themselves at the same moment. To sum up, Equation (3) gives FE for the year and the nation. As a result, Equation (3) is intended to examine both the variation within a nation and the variation within a year at a certain moment in time. FE regressions in the current literature share the common feature of using FE for both the time period and the country (Tifuh, 2022; Asongu & Odhiambo, 2023). This type of model is called a two-way FE regression and a one-year lag is further used to control for the simultaneity dimension of endogeneity (Mlachila et al., 2017).

It is also relevant to clarify that the inclusion of oil price and TOT in separate models is to facilitate the computation of monetary policy thresholds. This is essentially because three dimensional interactions render it difficult to compute monetary policy thresholds.

3. Empirical analysis

3.1 Presentation of results

The empirical results are presented in this section in Tables 1-3. Table 1 focuses on linkages between real output, monetary policy, oil price and TOT while Table 2 is concerned with nexuses between unemployment, monetary policy, oil price and TOT. Table 3 provide corresponding results on linkages between inflation, monetary policy, oil price and TOT. Each of the tables is divided into three main sub-sections, each entailing two main specifications: one focusing on the oil price channel and the other on the TOT mechanism. Accordingly, the second and third columns of Table 1 are concerned with nexuses between real output, interest rate policy and the two channels (i.e., oil price and TOT), the fourth and fifth columns focus on linkages between real output, the exchange rate policy and the two mechanisms while the sixth and seventh columns articulate nexuses between real output, the bank credit policy and the two main mechanisms.

Two principal criteria of information are employed for the assessment of the problem statement. The first pertains to the validity of models while the second is oriented towards the significance of monetary policy moderating the channels in order to affect the macroeconomic outcomes of economic performance. For the first main criteria, the F-statistics and within coefficient of adjustment (i.e., within R^2) are used to assess the overall validity of models. The F-test should thus be statistically significant and the corresponding within R^2 should be sufficiently high. As for the second main criteria, the study is consistent with contemporary interactive regressions literature in computing net effects and thresholds in order to understand the role of monetary policy in moderating the incidence of the considered channels (i.e., oil price and TOT) on economic performance. Such a procedure for computing net effects and thresholds which is in the relevant literature on interactive regression (Nchofoung et al., 2021), is designed to avoid the documented pitfalls of interactive regressions (Brambor et al., 2006).

In the light of the above, considering the nature of the interactive regressions, thresholds of the monetary policy variables and net effects of the main channels are computed. In other words, the net effect of TOT and oil price on economic performance dynamics are computed whereas monetary thresholds (i.e., exchange rate, interest rate and bank credit policies) that influence the incidence on the considered channels on economic performance are equality computed. Hence, both the computation of net effects and thresholds are exercised in order to avoid the pitfalls of interactive regressions documented in Brambor et al. (2006), especially as it pertains to the common mistake of interpreting estimated coefficients from interactive regressions as in linear additive models.

To put the above points in more perspective, in the second column of Table 1, the net effect of oil price on real output is 0.0031 ([-0.0001 × 10.562] + [0.0042]). In the corresponding

computation, the mean value of interest rate is 10.562, the unconditional effect of oil price is 0.0042 while the conditional or interactive effect of oil price is -0.0001. The corresponding interest rate thresholds that should not be exceeded in order to maintain the positive incidence of oil price on real output is 42.000 (0.0042/0.0001). Hence, above the corresponding thresholds, interest rate no longer moderate oil prices to positively affect real output. Unfortunately, the unavoidable interest rate policy threshold is not within policy range, which is a further indication that interest rate can effectively moderate oil price to positively affect real output, not least, because the avoidable maximum interest rate policy threshold can indeed be avoided because it is above the maximum range of the interest rate documented in the summary statistics. In the same vein, in the third column of Table 1, interest rate effectively moderate terms of trade to engender an overall positive effect on real output. Moreover, the avoidable interest rate or maximum interest rate threshold is above policy range. Hence, interest rate can effectively be used to moderate TOT to induce a positive effect on real output.

Table 1: Real Output, monetary policy, oil price and TOT

	Dependent variable: Real Output					
	Interest Rate(RIR)		Exchange Rate(REER)		Bank Credit	
Constant	-33.462*** (0.001)	-58.665*** (0.000)	-34.828** (0.010)	-57.466*** (0.000)	-22.878** (0.048)	-50.556*** (0.000)
Interest (RIR)(-1)	0.0040 (0.116)	0.008 (0.120)	---	---	---	---
REER(-1)	---	---	0.0006 (0.649)	0.007*** (0.000)	---	---
Credit(-1)	---	---	---	---	-0.0005 (0.941)	-0.003 (0.613)
OilPrice (OP)(-1)	0.0042*** (0.000)	---	0.001 (0.527)	---	0.002** (0.023)	---
TOT(-1)	---	0.00279*** (0.000)	---	0.01051*** (0.000)	---	0.002*** (0.000)
RIR×OP(-1)	-0.0001** (0.016)	---	---	---	---	---
REER×OP(-1)	---	---	5.69e-06 (0.834)	---	---	---
Credit×OP(-1)	---	---	---	---	0.00005 (0.556)	---
RIR×TOT(-1)	---	-0.00008* (0.084)	---	---	---	---
REER×TOT(-1)	---	---	---	- 0.00007*** (0.000)	---	---
Credit×TOT(-1)	---	---	---	---	---	0.00004 (0.530)
Reserves(-1)	0.0003* (0.065)	0.0001 (0.446)	0.0005** (0.034)	-0.0002 (0.423)	0.0005** (0.034)	0.00004 (0.859)

GFCF(-1)	-0.0002	0.002	**-0.006****	-0.001	-0.002	-0.0001
	(0.902)	(0.205)	**(0.034)**	(0.562)	(0.251)	(0.914)
GDPg(-1)	0.0008	-0.0002	0.003	0.002	0.002	0.001
	(0.624)	(0.882)	(0.203)	(0.234)	(0.261)	(0.525)
Savings(-1)	-0.0034	-0.002	**0.006****	**0.003***	0.002	**0.002***
	(0.089)	(0.259)	**(0.010)**	**(0.076)**	(0.177)	**(0.059)**
Resource(-1)	**-0.008****	**-0.013*****	-0.006	**-0.016*****	-0.003	**-0.008****
	(0.036)	**(0.003)**	(0.204)	**(0.001)**	(0.379)	**(0.030)**
Internet(-1)	**-0.004***	**-0.011*****	0.001	**-0.007*****	0.003	-0.004
	(0.078)	**(0.000)**	(0.640)	**(0.001)**	(0.126)	(0.102)
Debt(-1)	0.001	-0.008	-0.012	**-0.017****	**-0.017****	**-0.018****
	(0.898)	(0.339)	(0.194)	**(0.026)**	**(0.041)**	**(0.020)**
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
Shock Net Effect	0.0031	0.0019	na	0.0034	na	na
MP Threshold	42.000	34.875	na	150.142	na	na
Within R²	0.844	0.821	0.788	0.854	0.787	0.821
F-test	**23.61*****	**20.13*****	**23.40*****	**36.78*****	**29.32*****	**36.48*****
Observations	63	63	84	84	103	103

*,**,***: significance at 10%, 5% and 1% respectively.

Source: Authors

Table 2: Unemployment, monetary policy, oil price and TOT

	Dependent variable: Unemployment					
	Interest Rate(RIR)		Exchange Rate(REER)		Bank Credit	
Constant	**389.095*****	**228.937***	**426.028*****	**274.833****	**282.070****	**210.308***
	(0.004)	**(0.072)**	**(0.004)**	**(0.048)**	**(0.019)**	**(0.098)**
Interest (RIR)(-1)	-0.014	0.099	---	---	---	---
	(0.671)	(0.145)				
REER(-1)	---	---	-0.014	-0.006	---	---
			(0.382)	(0.777)		
Credit(-1)	---	---	---	---	**0.299*****	0.074
					(0.000)	(0.296)
OilPrice (OP)(-1)	**0.022***	---	-0.021	---	**0.033*****	---
	(0.085)		(0.503)		**(0.000)**	
TOT(-1)	---	0.005	---	-0.021	---	**-0.012***
		(0.591)		(0.370)		**(0.087)**
RIR×OP(-1)	-0.00004	---	---	---	---	---
	(0.947)					
REER×OP(-1)	---	---	0.0003	---	---	---
			(0.187)			
Credit×OP(-1)	---	---	---	---	**-0.003*****	---
					(0.001)	

RIR×TOT(-1)	---	**-0.001*** **(0.089)**	---	---	---	---
REER×TOT(-1)	---	---	---	0.00009 (0.643)	---	---
Credit×TOT(-1)	---	---	---	---	---	0.0001 (0.856)
Reserves(-1)	**-0.004*** **(0.098)**	-0.001 (0.636)	-0.002 (0.360)	0.002 (0.506)	-0.002 (0.397)	0.0006 (0.829)
GFCF(-1)	0.002 (0.927)	-0.002 (0.927)	0.035 (0.197)	0.001 (0.951)	0.015 (0.437)	0.014 (0.502)
GDPg(-1)	**-0.050**** **(0.033)**	**-0.053**** **(0.042)**	**-0.073***** **(0.006)**	**-0.049*** **(0.071)**	**-0.049**** **(0.027)**	-0.036 (0.124)
Savings(-1)	-0.014 (0.579)	-0.013 (0.644)	-0.022 (0.382)	-0.008 (0.751)	-0.021 (0.190)	-0.018 (0.283)
Resource(-1)	**-0.110**** **(0.045)**	**-0.130**** **(0.029)**	-0.128 (0.029)	**-0.117*** **(0.061)**	**-0.088**** **(0.033)**	**-0.091**** **(0.041)**
Internet(-1)	0.037 (0.257)	0.002 (0.951)	0.028 (0.373)	0.011 (0.721)	0.012 (0.638)	0.007 (0.817)
Debt(-1)	**-0.221**** **(0.049)**	**-0.271**** **(0.018)**	0.046 (0.656)	-0.015 (0.886)	0.019 (0.820)	-0.004 (0.959)
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
Shock Net Effect	na	na	na	na	0.0086	na
MP Threshold	na	na	na	na	11.000	na
Within R²	0.443	0.382	0.416	0.370	0.361	0.285
F-test	**3.48***	**2.70***	**4.48***	3.69	**4.48***	**3.16***
Observations	63	63	84	84	103	103

*,**,***: significance at 10%, 5% and 1% respectively.

Source: Authors

In the light of the above information criteria, the following findings can be established in Tables 1-3. First, real interest rate (RIR) can be used to effectively moderate oil price and TOT in order to positively influence real output and the maximum or avoidable interest rate policy threshold are above policy range. Second, REER can be used to effectively moderate TOT for an overall positive effect on real output and the maximum or avoidable REER threshold of 150.142 REER index is within policy range (i.e., 68.181 to 183.536 disclosed in the summary statistics). Third, bank credit does not effectively moderate the channels (i.e., oil price and TOT) for a significant incidence on real output.

Fourth, in Table 2 on nexuses between monetary policy, considered channels and unemployment, only bank credit effectively moderates oil price for an overall negative effect on unemployment. However, for this to be possible, bank credit must exceed the threshold of 11.000 (0.033/0.003) domestic loans provided to the private sector (%GDP). Accordingly, consistent with the computational insights discussed previously, when the bank credit from the

private sector is above 11.000 (% of GDP), bank credit moderates oil price to reduce unemployment. For instance, let bank credit to the private sector be 12.00 (% of GDP). The corresponding net effect on unemployment is -0.003 ([-0.003 × 12.00] + [0.033]). In the corresponding computation, the targeted threshold of bank credit is 12.00, the unconditional effect of oil price is 0.033 while the conditional or interactive effect of oil price is -0.003.

Fifth, in Table 3 on linkages between monetary policy, engaged mechanisms and inflation, only REER effectively moderates TOT for a negative effect on inflation. However, for this to be possible, the REER index must exceed the threshold of 208.000 (0.00416/0.00002) REER index. Moreover, the corresponding policy threshold is above the REER policy range (68.181 to 183.536) and hence, cannot be used by policy makers because it does not make economic/statistical sense.

Table 3: Inflation, monetary policy, oil price and TOT

	Dependent variable: Inflation					
	Interest Rate(RIR)		Exchange Rate(REER)		Bank Credit	
Constant	**-48.210***** **(0.000)**	**-47.315***** **(0.000)**	**-64.024***** **(0.000)**	**-60.056***** **(0.000)**	**-61.837***** **(0.000)**	**-66.870***** **(0.000)**
Interest (RIR)(-1)	0.001 (0.582)	-0.001 (0.551)	---	---	---	---
REER(-1)	---	---	**0.001**** **(0.035)**	**0.003***** **(0.003)**	---	---
Credit(-1)	---	---	---	---	**0.012**** **(0.029)**	**0.011***** **(0.006)**
OilPrice (OP)(-1)	**0.001*** **(0.088)**	---	**0.00344**** **(0.034)**	---	0.0006 (0.315)	---
TOT(-1)	---	0.0004 (0.218)	---	**0.00416***** **(0.000)**	---	**0.001**** **(0.020)**
RIR×OP(-1)	-0.00005 (0.114)	---	---	---	---	---
REER×OP(-1)		---	-0.00003 (0.029)	---	---	---
Credit×OP(-1)	---	---	---	---	-0.00006 (0.371)	---
RIR×TOT(-1)	---	2.05e-06 (0.939)	---	---	---	---
REER×TOT(-1)	---	---	---	**-0.00002***** **(0.003)**	---	---
Credit×TOT(-1)	---	---	---	---	---	-0.00005 (0.239)
Reserves(-1)	-5.14e-06	-3.32e-06	-0.00009	**-0.0004*****	-0.0001	**-0.0003***

	(0.968)	(0.981)	(0.517)	**(0.008)**	(0.365)	**(0.063)**
GFCF(-1)	**-0.003****	-0.001	**-0.004***	**-0.002***	-0.002	-0.001
	(0.017)	(0.149)	**(0.000)**	**(0.061)**	(0.105)	(0.369)
GDPg(-1)	-0.001	-0.0009	0.0004	-0.0007	0.0001	0.00003
	(0.324)	(0.390)	(0.762)	(0.576)	(0.920)	(0.983)
Savings(-1)	-0.0008	-0.001	**0.003****	0.001	0.00009	-0.00008
	(0.531)	(0.448)	**(0.014)**	(0.177)	(0.930)	(0.940)
Resource(-1)	**-0.005****	**-0.006****	**-0.006****	**-0.008***	0.001	-0.0004
	(0.036)	**(0.019)**	**(0.036)**	**(0.002)**	(0.644)	(0.882)
Internet(-1)	**0.005***	**0.005***	**0.003****	**0.002***	**0.005***	0.003
	(0.001)	**(0.001)**	**(0.025)**	**(0.062)**	**(0.007)**	(0.107)
Debt(-1)	0.003	0.004	**-0.013****	**-0.011****	**-0.020***	**-0.019***
	(0.605)	(0.514)	**(0.031)**	**(0.042)**	**(0.003)**	**(0.004)**
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
Shock Net Effect	na	na	na	0.0021	na	na
MP Threshold	na	na	na	208.000	na	na
Within R²	0.974	0.974	0.963	0.968	0.947	0.950
F-test	**147.54***	**145.99***	**152.21***	**180.25***	**130.51***	**138.47***
Observations	56	56	79	79	95	95

*,**,***: significance at 10%, 5% and 1% respectively.

Source: Authors

3.2 Further discussions and implications

The findings can be further discussed in the light of the extant theoretical underpinnings and testable hypotheses outlined in Section 2. Accordingly, the premise that the monetary policy instrument of interest rate can be employed to effectively moderate international prices in order positively affect real output is contrary to the traditional monetary policy perspective given that fixed effects estimates can also be considered as long-term estimates. Hence, on the basis of the RIR as a monetary policy instrument and fixed effects as long term estimates, monetary policy is not neutral in the long run and hence Hypothesis 1 is rejected. The rejection of Hypothesis 1 extends to the findings that REER can be used moderate the incidence of TOT on real economic output. Second, the perspective that only bank credit effectively moderates the channels (i.e., oil price and TOT) for a significant incidence on real unemployment broadly validates Hypothesis 1 granting that unemployment is closely associated with real output in the long term. Accordingly, on the premise of the close association between unemployment and real economic activity in the long term, it can be established that monetary policy in the perspective of interest rate and REER is neutral in the long term within the remit of unemployment.

It follows that while the monetary policy instruments of interest and REER broadly reject Hypothesis 1 within the perspective of real output but validate Hypothesis 1 on the basis of unemployment, the monetary policy instrument of bank credit rejects Hypothesis 1 in the perspective of unemployment. Moreover, the underlying rejection of Hypothesis 1 is only valid when bank credit is above the established threshold of 11.000 domestic loans provided to the private sector (%GDP). Below the 11.000 domestic loans (% GDP) thresholds, Hypothesis 1 is not rejected.

Looking at Hypothesis 2, it apparent that the hypothesis is not validated because, only REER effectively moderates TOT for a negative effect on inflation in the long run. Moreover, for the moderation effect to withstand empirical scrutiny, the corresponding REER threshold must be within policy range, which is not the case. Hence, Hypothesis 2 is also invalidated. In summary, assuming that fixed effects regressions are long term effects, the tested hypotheses on the neutrality of monetary policy are broadly rejected.

A reason for the invalidity of the tested hypotheses correspond to the following implications. First, on the premise of the long run neutrality of monetary policy, it is apparent that the engaged monetary policy instruments can be used to influence economic activity in the long term, especially as it pertains to some of the considered measurements of economic performance, granting that fixed effects can be assimilated to long run impacts. It follows that the findings do not support the traditional perspective as well as the consensus on the long-term neutrality of monetary policy. By extension, some expansionary and contractionary monetary policies can thus be employed to influence some economic activity in the long term. It follows that the findings from a broad perspective are contrary to studies supporting the theoretical and empirical consensus on the long-term neutrality of monetary policy as well as Agenor et al. (2000) who have established there are no causality between monetary policy and output.

Second, with respect to the relevance of credit expansion as an instrument of monetary policy, we have established that enhanced financial access is key to reducing unemployment when a certain threshold of financial access has been reached. The established threshold is within policy/statistical range and hence, it is an actionable critical mass that policy makers can actually build upon in order to fight unemployment by means of enhanced financial access. By extension, the documented concerns of surplus liquidity in African financial institutions (Asongu & Odhiambo, 2020), if properly addressed by means if information sharing offices, can lead to unemployment reduction in the continent.

Third, in terms of the relevance of monetary policy in fighting long term inflation, it is apparent that the considered instruments of monetary policy are not effective, not least, because the established threshold of the REER index is above policy range and hence, does not make statistical sense. It follows that other monetary policy instruments should be considered in view of fighting long term inflation. Such alternative instruments for inflation targeting should be considered with knowledge that findings of the present study are contingent on the relevance of the considered instrument affecting inflation through international trade prices in the perspective of oil price and TOT. In the same, contingent on the fixed effects regressions considered as long-term incidence, the findings cannot be understood within the remit of countercyclical monetary policy instruments in inflation targeting, as apparent in the extant literature (Ghironi & Rebucci, 2000; Mishkin, 2002).

4.Conclusion, caveats and future research directions

The present study has complemented the extant studies by empirically assessing the relevance of monetary policy in moderating the effect of oil price and terms of trade (TOT) on economic performance in non-UEMOA countries for the period 2000 to 2021. Monetary policy is proxied by real interest rate (RIR), real effective exchange rate (REER) and bank credit while economic performance is understood in terms of real output, unemployment and inflation. The empirical evidence is based on interactive fixed effects regressions. The following main findings are established. First, RIR can be used to effectively moderate oil price and TOT in order to positively influence real output and the maximum or avoidable RIR policy thresholds are above policy range. Second, REER can be used to effectively moderate TOT for an overall positive effect on real output and the maximum or avoidable REER threshold of 150.142 REER index is within policy range. Third, bank credit does not effectively moderate the channels (i.e., oil price and TOT) for a significant incidence on real output. Fourth, only bank credit effectively moderates oil price for an overall negative effect on unemployment. However, for this to be possible, bank credit must exceed the threshold of 11.000 of private domestic credit (% GDP). Fifth, only REER effectively moderates TOT for a negative effect on inflation. However, the corresponding policy threshold is above the REER index policy range and hence, cannot be used by policy makers because it does not make economic/statistical sense.

Policy implications have been discussed. Accordingly, policy implications have been discussed concurrently with the discussion of results. Moreover, in the conclusion section, the policy thresholds also double as policy implications. This is essentially because the provided monetary policy thresholds are actionable critical levels of the policy variables that policy makers can act upon in order to influence how international prices affect economic performance in the sampled countries.

The findings in the study evidently allow space for future research, especially in the light of using the relevant statistical techniques to provide more in-depth country specific analyses and corresponding country-specific policy implications. This caveat builds on the premise that the findings in the study are relevant to the proposed WAMZ (i.e., consisting of non- UEMOA countries) which is not yet operational. Hence, because the proposed monetary union is still at an embryonic stage, these findings and corresponding implications are very informative. The empirical analysis could also be revisited within the prism of economic performance outcomes that are relevant to sustainable development goals (SDGs), in the light of the 2030 United Nations' agenda of sustainable development.

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Appendices

Appendix 1: Definitions and sources of variables

Variables	Signs	Definitions	Sources
Panel A: Dependent variables (Economic Performance)			
Real Output	GDPpc	Logarithm of GPD per capita	World Bank (WDI)
Unemployment	Ump	Unemployment, total (% of total labor force)	
Inflation	CPI	Consumer Price Index	
Panel B: External policy syndromes (Oil price and terms of trade)			
Oil price	Oprice	Crude oil price (dollars per barrel)	EIA WDI
Terms of Trade	TOT	Commodity terms of trade (i.e., batter terms of trade): ratio of exports to import of commodity prices	
Panel C: Monetary policy moderators			
Interest rate	RIR	Real interest rate (%) Real interest rate is the lending interest rate adjusted for inflation as measured by the GDP deflator	World Bank (WDI)
Exchange rate	REER	Real effective exchange rate index (2010=100): Real effective exchange rate is the nominal effective exchange rate (a measure of the value of a currency against a weighted average of several foreign currencies) divided by a price deflator or index of costs	
Domestic credit	Credit	domestic loans provided to the private sector (%GDP)	
Panel D: Control variables			
Total reserves	Reserves	Total reserves (% of total external debt): International reserves to total external debt stocks	World Bank (WDI)
Domestic Investment	GFCF	Gross Fixed Capital Formation (%DGP)	
Economic growth	GDPg	growth rate of GDP	
Domestic Savings	Savings	Gross domestic savings (% of GDP)	
Resource Rents	Resource	Total natural resource rents (%GDP)	
Internet	Internet	percentage of population with access to the internet	

Total Debt Service	Debt	Total debt service (%GNI) is the sum of principal repayments and interest actually paid in currency, goods, or services on long-term debt, interest paid on short-term

WDI: World Development Indicators. EIA: Energy information Administration.
Source: Authors

Appendix 2: Summary statistics

	Mean	S.D	Min	Max	Obs
Real Output	2.860	0.291	2.344	3.505	120
Unemployment	4.702	1.976	2.080	9.607	120
Inflation	124.345	68.503	27.181	305.983	110
Oil Price	62.254	23.992	25.980	99.670	120
Terms of Trade	121.864	40.935	42.843	224.354	120
Interest rate	10.562	10.450	-29.708	29.585	80
Exchange rate	100.552	20.414	68.181	183.536	80
Domestic credit	8.113	5.366	0.001	19.603	118
Total reserves	48.335	61.245	0.015	335.122	120
Domestic investment	19.756	7.232	7.278	52.669	100
Economic growth	4.414	5.980	-30.415	26.524	120
Domestic savings	8.669	12.568	-16.437	44.331	100
Resource rents	12.376	6.268	2.489	34.177	120
Internet	10.752	12.505	0.031	56.682	118
Total Debt Service	2.737	7.183	0.100	59.671	120

S.D: Standard Deviation. Min : Minimim. Max : Maximum. Obs : Observations
Source: Authors