DO INSTITUTIONS MATTER FOR OIL PRICES AND ECONOMIC GROWTH RELATIONSHIP?: A REGULATORY POLICY IMPLICATION

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Abstract

This study empirically investigates the moderating effect of institutional quality on the oil price-economic growth relationship among selected African oil-importing economies for a thirty-year period from 1990 to 2020. The study employs a panel autoregressive distributed lag (PARDL) model using a pooled mean group estimator (PMG) with oil price and institutional quality as the main variables. Results from the analyses indicate that oil price increase has a negative effect on economic growth in oil-importing countries and these results are consistent with the previous findings by Kudabayeva et al. (2024) amongst others. Moreover, the study established a positive and significant effect of institutional quality on economic growth. The positive and significant effect of the interaction term between oil price and institutional quality suggests that better quality institutions are critical for moderating the negative effects of oil price changes on economic growth, consistent with findings by Abdelsalam (2023). The findings from this study suggest that net oil importers should focus on eliminating dependency on oil energy and promote investment into alternative non-petroleum renewable energy sources for sustainable development. Policy reforms should focus on strengthening of robust institutions to mitigate the effects of oil price shocks and promote the growth prospects of African countries.

Keywords: Oil Price, Economic Growth, Institutional Quality, Panel Autoregressive Distributed Lag, Pooled Mean Group Estimator, Oil-Importing Economies

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1. INTRODUCTION

Oil gained its dominance since the 1950s and the rise in industrialisation as well as the boom in agricultural mechanisation has resulted in an unprecedented increase in oil use across the globe over the years. Despite increased calls to use alternative cleaner and renewable energy sources such as solar, geothermal, hydroelectric, and biomass, oil remains a major source of energy and most entities across world economies are being powered by fossil fuels (Alkofahi & Bousrih, 2024;

Abdelsalam, 2023). Global demand for crude oil in 2023 amounted to 102.21 million barrels per day. Given this high demand and the importance of oil as a factor input, any variations in its availability affect production and ultimately economic growth, the most important macroeconomic performance metric (Adeosun et al., 2022). Therefore, measures to deal with oil price shocks are critical, especially for developing countries with fragile and dependent economies (Sekkach & Boubrahimi, 2022).

The interest in oil price fluctuation and its effect on global economies gained the attention of researchers as far back as the oil price shocks of 1973 and 1979. Since then, there have been notable fluctuations in the price of oil such as the sharp increase in oil price in early 2000 and its sudden drop in 2008. The latest surge in oil prices is attributed to the recent Russia-Ukraine dispute (Zivkov & Duraskovic, 2023; Ozcelebi, 2021). These events have triggered renewed interest among policymakers and researchers on the significance of oil prices in shaping growth fundamentals.

Theoretically, positive oil price shocks increase oil revenues in oil-exporting countries which translates to improved balance of payment, higher consumption and investment and consequently higher economic growth. There is a plethora of empirical evidence that confirm this (Abdelsalam, 2023; Zivkov & Duraskovic, 2023; Osintseva, 2022; Norouzi, 2021). For oil-importing economies, oil price upswings result in a rise in production costs and prices of commodities from oil-intensive sectors such as manufacturing, transportation, and agriculture. Furthermore, it reduces disposable income and consumption, lowers private investments if the price increase is perceived to be permanent, and ultimately impedes economic growth. In addition, an increase in oil prices drives up expenditure on oil imports leading to exchange rate depreciation which is detrimental to economic performance (Adeosun et al., 2022). For these reasons, the heavy oscillations in the price of oil over the last few decades have been a huge concern to policymakers in oil-importing countries. Several empirical studies have confirmed the inverse relationship between oil price increases and economic growth (Kudabayeva et al., 2024; Zivkov & Duraskovic, 2023; Akinsola & Odhiambo, 2020; Musa et al., 2019).

A contrasting theoretical assertion suggests that in open economies, oil-exporting countries may still experience a decline in economic growth following oil price increases as the income of their trading partners (oil-importing countries) decreases (Ahmed et al., 2023). Afolabi et al. (2023) noted that a negative oil price-economic growth relationship confirmed the Dutch disease effect on countries majorly dependent on revenue from crude oil. Interestingly, Gershon et al. (2019) found that oil price increases result in an increase in gross domestic product (GDP) per capita in Liberia and Sierra Leone, both net oil-importing countries. Akinsola and Odhiambo (2020) noted that several studies in the literature reported an insignificant impact of oil price decreases on economic growth in oil-importing developing countries. Similarly, Kopych and Shevchuk (2024) confirmed that crude oil prices had no effect on output growth in Hungary, Poland, Croatia, and Bulgaria. Sekkach and Boubrahimi (2022) and Gershon et al. (2019) found similar results using data from Morocco, as well as Cape Verde and Sierra Leone, respectively. Thus, despite extensive research on both oil-exporting and oil-importing countries, the net effect of oil price changes on economic growth has yielded contradicting empirical results.

To account for the contradicting results on the effect of oil price changes on economic growth patterns, some studies have suggested analysing channel variables such as real interest rate, exchange rate, government expenditure and investment which have a direct relationship with economic growth (Deyshappriya et al., 2023). In addition, these studies noted the role of moderating factors that influence the transmission mechanisms between oil price changes and economic growth. Using the same framework, this study analyses the moderating role of institutions in the oil price-economic growth relationship. A few studies have assessed the role of good institutional frameworks in mitigating the adverse effects of oil price variations on economic growth (Abdelsalam, 2023; Yu et al., 2022). Notably, most research has been carried out in developing countries in Asia and Latin America. However, research focusing on oil-importing countries in Africa is scant.

Oil-importing African economies face unique vulnerabilities that distinguish them from other oil-importing nations from both developing and developed economies. Compared to other oil-importing nations, most African economies suffer from both dependence on too few export commodities and dependence on one or two sectors (Usman & Landry, 2021). This makes these countries prone to external shocks such as shocks driven by geopolitical risks as well as commodity price shocks. Furthermore, little attention has been given to the analysis of the moderating role of institutions in the relationship between oil price shocks and the economic performance of African countries. This is despite extensive evidence of the significance of institutions as catalysts for economic development in Africa (Fosu, 2022). Therefore, this study aims to fill this gap in the literature by providing empirical evidence on how augmenting the quality of institutions affects the relationship between oil price fluctuations and economic growth in oil-importing African economies.

From a policy perspective, there are several compelling reasons for the analysis of the oil price-economic development link. First, oil plays a critical role as an engine for growth in underdeveloped oil-importing African economies. The continent continues to meet its energy needs mainly through fossil fuels, exacerbating the challenges of vulnerability to oil price shocks (Akinsola & Odhiambo, 2020). In addition, African countries are currently lagging behind the rest of the world regarding the transition to renewable energies and other clean technologies amidst the region's growing and diverse energy needs (KfW Development Bank et al., 2021).

Second, economic performance evaluation is particularly relevant for African economies that are characterised by slow growth, weak institutions, less diversification, and largely dependent on other nations for energy resources. Given the importance of both export and economic diversification as well

as strong institutions for economic growth, it is critical to analyse how various dimensions of economic growth can have different implications on the menu of policy options. Knowledge of key variables responsible for driving economic growth is a critical factor for economic transformation.

Third, fiscal authorities in Africa face challenges with maintaining fiscal stability following periods of oil price volatility (Yu et al., 2022). Oil price fluctuations significantly impact the fiscal space of oil-importing economies forcing them to spend more on imports and leaving them with fewer resources for crucial areas like healthcare, education, and infrastructure development. As such, analysing the oil price-economic growth link allows policymakers to make informed decisions regarding targeted interventions. For these reasons, oil price change and its effect on the real sector is an important issue for policymakers in Africa.

This study hypothesizes that good institutional frameworks can mitigate the adverse effects of oil price variations on economic growth in oil-importing countries. This study seeks to answer the following pertinent questions.

RQ1: How does oil price change impact economic performance in oil-importing African economies?

RQ2: To what extent does institutional quality mediate the impact of oil price changes on economic growth?

Our approach uses interaction effects to analyse the transmission process and hence the channels through which oil price changes can affect economic performance. This enhances our understanding of the role of oil price changes in driving economic performance. The effect of institutional quality on the link between oil price and economic growth has been measured using a panel autoregressive distributed lag (PARDL) that uses the pooled mean group (PMG) model. This methodological framework allows data modelling with multiple integration orders. The PMG estimator permits the intercepts, short-run coefficients, and error variance to vary freely between groups while keeping the long-run coefficients constant. The results from this research are useful for making policies that will forestall the likely consequences of oil price shocks and fluctuations in oil-importing economies. Furthermore, the results will guide policy decisions on the deployment of renewable energies and the importance of energy transition efforts in Africa.

The rest of this paper is organised as follows. Section 2 provides a review of relevant literature. Section 3 presents the research methodology used in the study while Section 4 presents the empirical results and discusses the findings. Finally, Section 5 presents the summary, conclusion, policy implications and limitations of the study.

2. LITERATURE REVIEW

There has been a plethora of studies on the link between oil price and economic growth. Theoretically, this link has been analysed in history by scholars such as Darby (1982). Following the oil price crisis in the 1970s several scholars observed that oil price increases negatively affected economic growth across the globe, and this led to the movement called “limits to growth” (Deyshappriya et al., 2023). In line with this historical observation, Stern (2004) modified the growth equation to include energy in the production function. Based on the Keynesian theory of aggregate supply (AS) and aggregate demand (AD), Bohi (1991) developed a theoretical model illustrating that an increase in the price of oil reduces net output because more resources will be required to pay for either oil imports or local oil production. Similarly, the Ricardian theory of comparative advantage emphasises that an increase in oil prices leads to increased spending on oil imports, consequently reducing the purchasing power and ability to import other goods. Resultantly, the terms-of-trade deteriorates leading to reduced spending, loss in investor confidence, increased borrowing, and ultimately economic decline.

The empirical literature provides evidence of the link between oil prices and economic growth in terms of both oil-importing and oil-exporting countries. Scholars such as Abdelsalam (2023), Zivkov and Duraskovic (2023), Osintseva (2022), and Norouzi (2021) reported that oil price increases bear a positive effect on economic growth of oil-exporting countries. On the contrary, some scholars find evidence that oil price hikes negatively impact the economic growth of oil-importing nations (Kudabayeva et al., 2024; Zivkov & Duraskovic, 2023).

Akinsola and Odhiambo (2020) reviewed the literature on the effect of oil prices on economic growth in oil-importing countries. From the studies reviewed, they observed that most developed countries reported a negative relationship between oil price increase and economic growth, while a decrease in oil price had an insignificant impact on growth for developing countries. This concurs with the results by van Dinh (2022) who found a negative long-term relationship between oil prices and economic growth in Vietnam, China, and South Korea. Kopych and Shevchuk (2024) used quarterly data from eight Eastern European countries for the 2002–2022 period and found that higher crude oil prices contributed to slower output growth in Slovakia.

De Michelis et al. (2019) studied the effects of oil prices on consumption across 55 countries and the US. The study showed that decreases in oil price generate positive effects on consumption in oil-importing economies while depressing consumption in oil-exporting economies. Similarly, Norouzi (2021) employed a vector autoregression (VAR) model and reported that oil price shocks have a positive effect on oil-exporting countries and a negative effect on oil-importing Organisation for Economic Co-operation and Development (OECD) countries. Interestingly, de Michelis et al. (2019) results assert that an increase in oil prices does more harm than good afforded by the oil price reductions in the study countries.

Incongruent to the studies above, van Dinh (2022) revealed a weak positive relationship between oil prices and the economic activity of net oil importers in Indonesia. Similar observation was made by Alkofahi and Bousrih (2024) for Saudi Arabia. These findings support the neo-classical theory that there is no dependency between real and nominal variables. Other studies find little or no evidence of the effect of oil price on economic growth in different countries (Gbatu et al., 2017; Yu et al., 2022). The study by Kopych and Shevchuk

(2024) confirmed that crude oil prices had no effect on output growth in Czechia, Hungary, and Poland. Sekkach and Boubrahimi (2022) employed the autoregressive distributed lag (ARDL) model of co-integration on data from Morocco for the 1990 to 2020 period. Their result shows no significant relationship between oil prices and economic growth.

Another strand of the literature reveals that the exact effect of oil price changes on economic growth varies from country to country and depends on the methodology and dataset employed (Akinsola & Odhiambo, 2020). For instance, Kopych and Shevchuk (2024) used Kalman filter estimates to analyse the effect of commodity prices on output growth and inflation for eight Eastern European countries and ascertained that the crude oil price effect on output growth is a country-specific phenomenon. The results confirmed that crude oil prices had no effect on output growth in four of the eight countries, had an expansionary effect on three other countries Croatia, Slovenia, and Romania, as well as a contractionary effect in Slovakia.

Deyshappriya (2023) employed a dynamic panel data analysis based on the generalized method of moment and reported mixed results for 38 OECD countries. The results indicate that an increase in oil price negatively impacts economic growth through the exchange rate, government expenditure and investment channels. On the contrary, increases in oil prices enhances the growth of OECD countries through the interest rate channel. Oteng-Abaye et al. (2023) measured the effect of oil price changes on the economic output of Ghana and found a positive relationship in the short run and a negative relationship in the long run.

Other studies focused on factors that moderate the effect of oil prices on economic growth. These studies found that different economic policies can absorb the effect of oil price shocks on real products (Mukhtarov et al., 2021; Jarrett et al., 2019). For instance, a robust financial institution can respond to oil price shocks by adjusting interest rates such that the effect of oil price changes is not detrimental to the economy. Qiang and Jian (2020) investigated the relationship between institutional quality and resource development and reported that institutions moderated the effect of resource development on economic development. Khan et al. (2020) analysed the role of institutional quality in 87 developing and emerging economies from 1984 to 2018. The results of this study revealed that resources positively and significantly impact economic growth only in countries with robust institutional arrangements. On the other hand, Su et al. (2021) analysed the importance of institutional quality in the remittance inflow-private investment nexus. After interacting remittances inflow with institutional quality, Su et al. (2021) concluded that the Dutch disease, caused by increased remittances, was nullified by high-quality institutions in emerging seven economies using data covering 1990 to 2019.

Studies on how good institutional frameworks can mitigate the adverse effects of oil price variations on economic growth are very scant (Abdelsalam, 2023; Yu et al., 2022). Musikavanhu et al. (2021) employed a PARDL to data from African economies and the results indicated that institutional quality has a positive and significant effect on the oil price-economic growth relationship.

The reviewed literature sheds light on the effect of oil price and economic growth in both developed and developing countries. However, there is still a lack of research on how institutional quality affects the oil price-economic growth nexus in oil importing economies more especially in Africa. This paper seeks to fully understand the complex interplay between oil price fluctuations, economic growth, and institutional quality in African oil-importing economies.

3. RESEARCH METHODOLOGY

3.1. Theoretical framework

The theoretical literature reviewed earlier provides the framework from which we draw the hypothesis:

H1: Good institutional frameworks can mitigate the adverse effects of oil price variations on economic growth in oil-importing countries.

From the growth paradigms, oil's inclusion in the Solow Growth model underlines the fact that energy, like labour and capital, plays an equally important role in the production process. Since the amount of energy consumed is significantly influenced by its price, oil price emerges as a critical determinant of production, and consequently, economic growth. Furthermore, the role of institutional quality in mediating the impact of oil prices on economic growth is deduced through its effects on domestic and international investment. Institutions are essential in buffering the exogenous effect of energy prices through subsidies, providing the private sector with a cheaper cost of production, and stimulating economic growth due to the reduced cost (Robinson et al., 2006). Furthermore, robust institutions will theoretically lower such agency costs, thereby enhancing production inside economic units.

A simple theoretical model of economic growth as a function of oil prices, institutional quality, and other determinants as reviewed in the literature is specified as follows:

$$RGDP = f\,(Op, Inst, Inf, Di, Ge, UnE, Er) \qquad (1)$$

where, *RGDP* is real GDP, *Op* represents international oil prices, *Inst* is a measure of institutional quality, *Inf* represents the inflation rate, *Di* is domestic investment, *UnE* is unemployment, *Ge* is government expenditure as a percentage of real GDP, and *Er* is the local currency exchange rate.

3.2. Empirical model

To investigate how good institutional frameworks might lessen the negative impact of oil price fluctuations on economic growth in oil-importing countries, various methodologies were explored. First, the study considered panel vector autoregression (PVAR) which is a frequently employed method for such analysis. However, this method is constrained to analysing variables exhibiting similar integration levels. Secondly, structural vector autoregression (SVAR) could also be employed for analysing the oil price-economic growth relationship. The method offers more

flexibility, but it might give misleading results because it relies on assumptions that restrict the natural connection between oil prices and economic growth (Abiona, 2014). Beyond these traditional methods, there are other models that could be employed. For instance, the error correction model (ECM) is applicable in analysing long-term equilibrium relationships between variables. However, their intricate specification can obscure short-term dynamics that we may be interested in dynamic ordinary least squares (DOLS) addresses some of these limitations by incorporating short-run dynamics. However, DOLS can be less efficient than other methods if the long-run equilibrium is weak. Finally, agent-based models (ABMs) deviate from traditional models entirely. Instead of relying on equations, ABMs simulate the behaviour of individual actors within an economy. This approach proves powerful for understanding how institutions influence economic decision-making under varying oil price scenarios, but it necessitates significant computational power and meticulous calibration to ensure realistic outcomes (Tesfatsion, 2006).

This study employed the PARDL model because it offers a distinct advantage over other models by allowing for variables integrated at different orders. The specific PARDL model used in this study is presented below.

$$RGDP_{it} = \alpha Y_{it-1} + \beta' X_{it} + \eta_i + \varepsilon_{it}, \quad i = 1 \ldots N;\ t = 1, \ldots . T \tag{2}$$

where, $RGDP_{it}$, the dependent variable, is a measure of economic growth, X_{it} is a set of explanatory variables, η_i denotes unobserved country-specific effects, and ε_{it} denotes the error term. Subscripts i and t denote country and time in years, respectively. Specifically, X_{it} includes oil price as well as other determinants of economic growth such as inflation, domestic investment, unemployment, government expenditure, exchange rate and institutional quality. This model is generalized to reflect the equations that are estimated in the paper and applies to equations with interacted terms as well. This is a common practice in literature (Busse & Groizard, 2006).

The PARDL is applied to give the following:

$$\begin{aligned} lnRGDP_{it} = {} & \beta_2 + \alpha_{ij} \sum_{j=1}^{p} ln\, RGDP_{it-j} + \sum_{j=0}^{q} \beta_{ij}\, ln\, op_{t-j} + \sum_{j=0}^{q} \omega_{ij}\, ln\, inst_{it-j} \\ & + \sum_{j=0}^{q} \varphi_{ij}\, ln\, op - inst_{it-j} + \tau_{ij} \sum_{j=0}^{q} ln\, ir_{it-j} + \rho_{ij} \sum_{j=0}^{q} ln\, di_{it-j} + \vartheta_{i,j} \sum_{j=0}^{q} ln\, une_{i,t-j} \\ & + \pi_{ij} \sum_{j=0}^{q} ln\, ge_{it-j} + e_{it2} \end{aligned} \tag{3}$$

where, ln represents natural logarithms and subscript j represents time lag. Taking the first difference:

$$\begin{aligned} \Delta lnRGDP_{3it} = {} & \beta_3 + \sum_{j=1}^{p-1} \Delta\alpha_{ij}\, ln\, RGDP_{it-j} + \sum_{j=1}^{q-1} \Delta\beta_{ij}\, ln\, op_{t-j} + \sum_{j=0}^{q} \Delta\omega_{ij}\, ln\, instqlty_{it-j} \\ & + \sum_{j=0}^{q} \Delta\varphi_{ij}\, ln\, op - instqlty_{it-j} + \sum_{j=0}^{q-1} \Delta\tau_{ij}\, ln\, ir_{it-j} + \sum_{j=0}^{q-1} \Delta\rho_{ij}\, ln\, di_{it-j} \\ & + \sum_{j=0}^{q-1} \Delta\vartheta_{ij}\, ln\, une_{it-j} + \sum_{j=0}^{q-1} \Delta\pi_{ij}\, ln\, ge_{it-j} + \sum_{j=0}^{q-1} \Delta\sigma_{ij}\, ln\, er_{it-j} + \gamma_i ECT_{3it-j} + e_{it3} \end{aligned} \tag{4}$$

where:

- γ_i is the short-run adjustment to the long-term relationship and is an essential indicator of the existence of the long-run relationship.
- ECT_{it} is the error correction term that directly estimates the speed at which a dependent variable returns to equilibrium after a change in other variables.

The following are the respective ECTs for the above equations:

$$\begin{aligned} ECT_{3it} = {} & ln\, RGDP_{it} - \beta_2 - \alpha_{ij} \sum_{j=1}^{p} ln\, RGDP_{it-j} - \sum_{j=0}^{q} \beta_{ij}\, ln\, op_{t-j} - \sum_{j=0}^{q} \omega_{ij}\, ln\, instqlty_{it-j} \\ & - \sum_{j=0}^{q} \varphi_{ij}\, ln\, op - instqlty_{it-j} - \sum_{j=0}^{q} \tau_{ij}\, ln\, ir_{it-j} - \sum_{j=0}^{q} \rho_{ij}\, ln\, di_{it-j} \\ & - \sum_{j=0}^{q} \vartheta_{ij}\, ln\, une_{it-j} - \sum_{j=0}^{q} \pi_{ij}\, ln\, ge_{it-j} - \sum_{j=0}^{q} \sigma_{ij}\, ln\, er_{it-j} \end{aligned} \tag{5}$$

3.3. Data and variable description

This study focuses on the impact of oil prices and institutional quality on economic growth. The study uses annual time series data of 22 oil-importing countries in Africa for the period 1990 to 2020. The choice of the study period is based on the availability of data on key variables such as oil price and macroeconomic variables. Table A.1 in the Appendix presents the summary statistics of the data. A list of the study countries is provided in Table A.3 in the Appendix. Oil price data was obtained from the Organization of the Petroleum Exporting Countries (OPEC) global primary energy dataset, while data on institutional variables was obtained from the International Country Risk Guide

(ICRG). Data on macroeconomic indicators (real GDP, consumer price index [CPI], unemployment, government expenditure, domestic investment and real exchange rate) are from the World Bank's World Development Indicators (WDI). To ensure reliable results, we use the logarithmic form of all variables which helps to address any data skewness issues.

The dependent variable is *real gross domestic product* (*RGDP*), a measure of an economy's performance, which represents the total value of goods and services produced in a country. The institutional quality index (*Inst*) is constructed using the principal component analysis and consists of political stability and the absence of violence, the rule of law, corruption control, voice and accountability, regulatory quality, government effectiveness, and ease of doing business. These constructs primarily affect macroeconomic variables within the African region. We use the price of oil per barrel (*Op*) in United States dollars (USD). This study used the price of Brent crude as a constant in 2010. Inflation (*Inf*) is represented by the consumer price index (*CPI*), while the percentage of unemployed in the labour force is used as a proxy for unemployment (*UnE*). To capture the influence of domestic investment (*Di*) on economic growth, we use gross fixed capital formation as a percentage of real GDP. Government expenditure (*Ge*) is predicted to have a positive impact on economic activity. We use total government spending that comprise government consumption expenditure (recurrent expenditure) as well as public investment expenditure to capture this effect. We use the exchange rate (*Er*) of a country's local currency to the USD. The exchange rate affects international trade, improves a country's international competitiveness, and ultimately improves economic output.

4. EMPIRICAL RESULTS

4.1. Descriptive statistics

Table A.1 in the Appendix reveals that oil-importing countries' average log *RGDP* is 9.99, whereas the average *Op* is 1.5. High government spending, high domestic investment, and high exchange rates characterise the oil-importing countries. However, institutional quality is generally deficient, with an average of 0.05 implying weak *Inst* within the selected oil importing African countries.

4.2. Correlation analysis

Table A.2 in the Appendix shows the correlation matrix for African oil-importing countries. *RGDP* is negatively correlated with oil price changes and unemployment while it is positively correlated with institutional quality and, government expenditure and inflation. The highest correlation of 0.367 is noted between government spending and unemployment and this suggests the absence of multicollinearity from the variables as the correlation coefficients are below an acceptable value of 0.8. The results give confidence in declaring the significance of the independent variables on the dependent variable.

4.3. Diagnostic test results

The results in Table 1 reveal an absence of autocorrelation. The findings indicate that the predicted coefficients on the variables in this study will be efficient.

Table 1. Autocorrelation test results

Test	*Test-stat.*	*P-value*
Breusch-Godfrey LM test	0.637	0.425
Shapiro-Wilk test for normality	0.626	0
Log-likelihood	597.139	AIC = -1166.278 BIC = -1105.415

Source: Authors' computation from World Bank's WDI.

4.4. Bound test for cointegration

Table 2 represents the Pesaran, Shin and Smith (PSS) bound test results. It shows an F-statistic value of 3.019, higher than the I (1) critical value at a 5% significance level. This implies that the I (1) variables and the dependent variable, *RGDP*, have no co-integration.

Table 2. PSS bound test

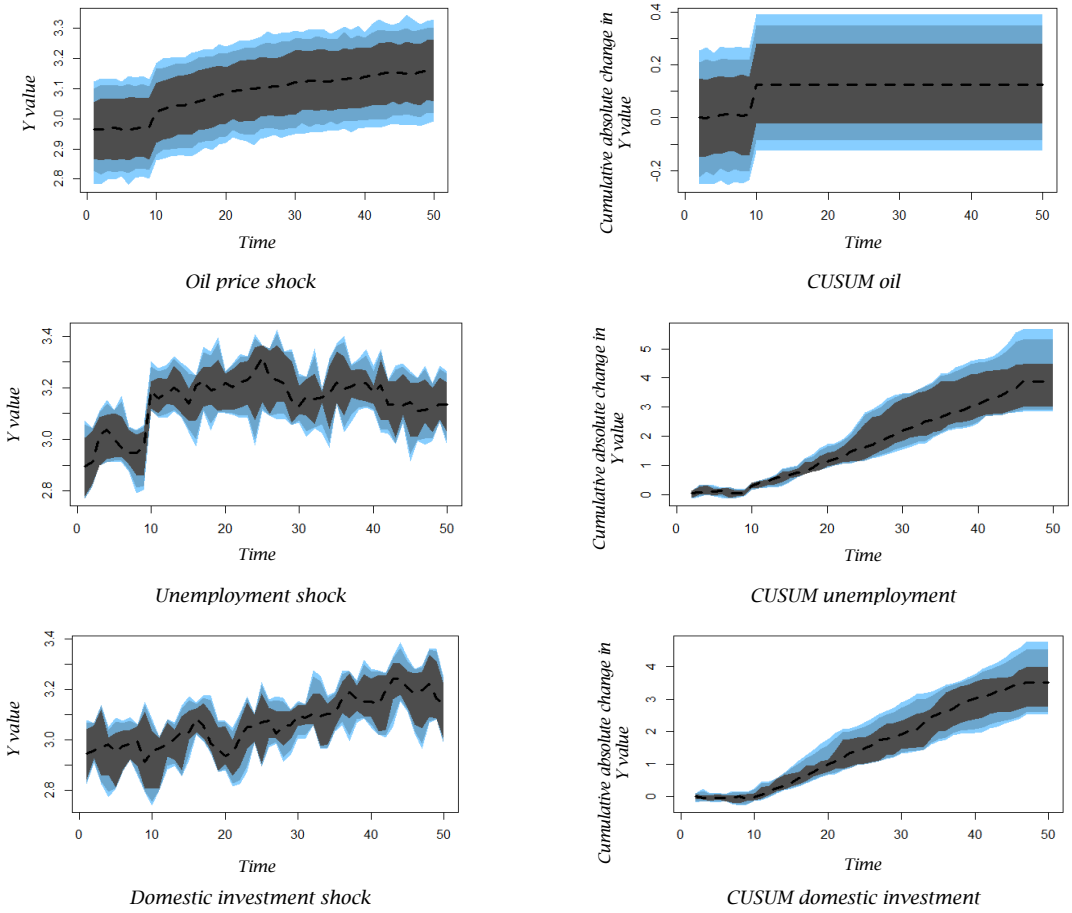
Significance level	*F-test*	
	I (0)	*I (1)*
10% critical values	2.72	3.77
5% critical value	3.23	4.35
1% critical value	4.29	5.61
F-statistic	3.019	
Significance level	*T-test*	
	I (0)	*I (1)*
10% critical value	-2.57	-3.46
5% critical value	-2.86	-3.78
1% critical value	-3.43	-4.37
t-statistic	-3.592	

Source: Authors' computation.

4.5. CUSUM square stability test

To check the stability and accuracy of the estimated model, we used the cumulative sum (CUSUM) test. Figure 1 confirms that the estimated model satisfies the stability condition. The regression coefficients remain stable over the entire study period, even if there are external shocks. This implies that the relationships between the independent variables and the dependent variable, economic growth, are consistent despite fluctuations in the independent variables. This finding complements the results of the weak correlation matrix presented in Table A.2.

Figure 1. Stability test results



Source: Authors' computation from World Bank's WDI.

4.6. Granger causality

To test for causality, we employ the Dumitrescu and Hurlin Granger non-causality test. Results in Table 3 shows the existence of a causal relationship between rising oil prices and economic growth (measured by *RGDP*). The results indicate that oil price increases can be used to predict economic growth changes. The standardized Z and approximated standardized Z values are higher than the critical values represented by W, and the significance level is below 5%. This result suggests that oil price has been significantly affecting African economies over the study period consistent with previous findings (Abdelsalam, 2023; van Dinh, 2022; Norouzi, 2021).

Table 3. Dumitrescu and Hurlin Granger's non-causality test

Test statistic	***Value***
Wald test	3.282
Z	7.567
Z	6.09
P-values	0.000
Test statistic	***Value***
Wald test	0.931
Z	-0.229
Z	-0.472
p-values	0.819

4.7. Econometric estimation results

This study employed the PARDL estimation technique, and the error correction results are presented in Table 4. The results indicate that oil price increases have a significant and negative short-run impact on the economic growth of oil-importing African economies. This result confirms the hypothesis of an inverse relationship between oil price and economic growth for net oil importers (Kudabayeva et al., 2024; Zivkov & Duraskovic, 2023). The results are also consistent with those reported by Norouzi (2021) who found that oil price hikes lead to increased production costs and inflation, ultimately hindering economic growth in oil-importing OECD countries. The results have serious implications on African economies' growth prospects. The critical role of oil in economic growth, and Africa's dependency on fossil fuels imports combined with volatility in oil prices should shape the policy direction of oil-importing African countries. Authorities should consider public policies to eliminate dependency on oil energy and promote diversification into alternative non-petroleum energy sources for sustainable development.

These results suggest that policymakers need to actively engage in targeted interventions to cushion African economies from the adverse effects of oil price shocks. Governments in oil-importing developing countries could consider seeking official

development assistance (ODA) from the international community given that most of these countries are highly indebted. Policies to reduce the cost of imports such as hedging, interventions in the retail market for gasoline to limit the pass-through of international oil prices, legislation to control the price of gasoline, and subsidising the retail price of gasoline are some of the options available to policymakers in Africa.

Table 4. PARDL estimation results

Long run			*Short run*		
Variables	***Estimates***		***Variables***	***Estimates***	
Op	-0.359*	(0.202)	*ECT*	-0.071**	(0.002)
Inst	0.104*	(0.958)	*Op*	-0.008*	(0.007)
Op_Inst	0.689**	(0.603)	*Inst*	0.029**	(0.013)
Inf	0.754	(0.75)	*Op_Inst*	0.012*	(0.008)
UnE	0.641	(0.743)	*Inf*	-0.001	(0.002)
Ge	10.545	(9.604)	*UnE*	-0.067**	(0.032)
Di	1.192	(1.212)	*Ge*	0.557	(1.004)
Er	1.964	(1.674)	*Di*	0.028	(0.02)
			Er	-0.01	(0.026)
Constant	0.017		(0.018)		
Observations	525				

*Note: *, **, and ***, indicate the significance of statistics at 1%, 5%, and 10% significance level, respectively. The standard errors are in parentheses.*

The coefficient on the institutional quality variable is positive and significant implying that oil-importing economies benefit from improving the state of their institutions. Intuitively, high institutional quality, including the rule of law, civil rights participation, political stability, and good corporate governance, have a beneficial impact on economic growth. Therefore, net oil importers would benefit by enhancing their institutions to boost economic growth. These results are similar to findings by Alkofahi and Bousrih (2024) and Abdelsalam (2023) who confirm that institutional quality is crucial in enhancing GDP growth in Middle East and North Africa (MENA) countries.

To investigate if institutional frameworks can mitigate the adverse effects of oil price variations on economic growth, we interact oil price and our measure of institutional quality. The short-run coefficient of oil price interacted with institutional quality (*Op_Inst*) is positive and statistically significant. This result confirms our assertion on the role of robust institutions in mitigating the adverse impact of oil price changes on economic growth. The result underscores the importance of good institutional frameworks in oil-importing countries to successfully absorb and mitigate the negative effects of oil price increases. In other words, the results suggest that the presence of robust institutions could give rise to a significant decline in the magnitude of the impact of oil price fluctuation on economic growth. Therefore, policymakers should ensure that effective institutions are in place to implement policy responses that can effectively transcend to economic growth. Gershon et al. (2019) noted that different countries react differently to oil price changes which reflects their macroeconomic fundamentals, independent policy, and country differences. Thus, governments should support tailor-made public policies and legislations that promote investment in renewable and green energy to minimise dependency on fossil fuels and hence the effects of oil price volatility. This result concurs with the findings by Abdelsalam (2023) and Musikavanhu et al. (2021). According to Abdelsalam (2023), accounting for institutional quality in their model led to a reduction in the impact of oil price on economic growth in MENA countries.

The model's overall findings are supported by the short-run results. The ECT's negative and significant effect confirms the long-term association between interaction terms and economic growth. The fact that the ECT is small, only 7.1%, shows that the speed of adjustment to long-term equilibrium is sluggish. Such findings are reasonable considering the environmental framework of African economies. In Africa, formulating policies is hampered by bureaucracies within the systems, as such institutions take time to properly absorb the cost implications of different policies.

Regarding other macroeconomic variables, Table 4 shows that the coefficient on *Ge* is positive, suggesting that more government expenditure in productive areas of the economy contributes positively to short-run economic growth. This result seems to suggest that well-directed government spending on infrastructure, education, and research can create a more favourable environment for businesses to operate and grow. This can lead to increased economic activity and higher GDP. The Keynesian theory asserts that increased government spending raises aggregate demand and ultimately leads to increased production and economic development. As such proactive fiscal policy should be considered as a valuable tool available to the governments to accelerate economic activity. The effect is, however, not significant.

Er has a positive and considerable effect on short-run economic growth. This result suggests that currency depreciation has a positive influence on aggregate output. While theory provides for possibilities for both contractionary and expansionary effects of currency depreciation on output, our results suggest the latter. Thus, policymakers can consider currency depreciation as a possible tool for development strategy in African countries. Such a policy would make both oil and non-oil resources competitive in the international market, enhance output for the export sector and thus stimulate growth. Furthermore, currency devaluation may improve the competitiveness of the import-competing sector, thus supporting its growth. However, policymakers should note that a significantly weak currency can also lead to

inflation, so a balanced approach is advisable. This result though not statistically significant, is consistent with findings by Benigno et al. (2015).

Inf poses a negative and significant effect on economic growth in the short run. The results indicate that when inflation goes up, the purchasing power of a currency decreases, and interest rates go up. This discourages investment, reduces consumer spending, and creates uncertainty in the market, hindering economic growth. Results in Table 4 also indicate a positive and significant effect of *Di* on economic growth. Theoretically, domestic investment leads to increased capital stock and this can improve productivity, innovation, and ultimately economic growth. However, the effect of both inflation and domestic investment is not statistically significant. The coefficient on *UnE* is negative suggesting that high unemployment levels are detrimental to an economy's growth. Intuitively, unemployed individuals have less disposable income, leading to lower consumer spending. This weakens aggregate demand, which is the total amount of goods and services that consumers, businesses, and the government purchase in an economy. Lower demand can force businesses to cut production and ultimately low GDP growth. The effect is not statistically significant.

4.8. Robustness test

The baseline results presented in Table 4 are subjected to robustness checks using the Driscoll and Kray (1998) standard errors. This estimating technique yields standard errors that are robust to general forms of cross-sectional and temporal dependence (Driscoll & Kray, 1998). The results are presented in Table 5.

Table 5. Driscoll and Kray standard errors

Variables	*Coefficient*	
Op	-0.321***	(0.031)
Inst	0.148***	(0.038)
Op_Inst	0.079***	(0.022)
Infn	-0.030**	(0.011)
UnE	0.086	(0.063)
Ge	0.087	(0.051)
Di	0.062**	(0.027)
Er	0.006	(0.012)
Constant	9.267***	(0.075)

*Note: Dependent variable: RGDP. *, **, ***, indicate significance of statistics at 1%, 5%, and 10% significance level, respectively. The standard errors are in parentheses.*

Comparing the results in Table 5 with those in Table 4 confirmed that the variables of interest maintained their significance and relationship with the dependent variable. For instance, the coefficient on oil price remains negative and significant while institutional quality positively affects economic growth as previously reported in Table 4. The interaction term *Op_Inst* is positive and significant, confirming previous results that showed that institutions moderate the impact of oil price on economic growth in oil-importing African economies. Concerning other macroeconomic variables, inflation remains negative and is statistically significant while all the other variables are not statistically significant. These findings align with the earlier results presented in Table 4.

5. CONCLUSION

The purpose of this study was to empirically investigate the moderating effect of institutional quality on the oil price-economic growth relationship among selected African oil-importing countries for a thirty-year period from 1990 to 2020. By focusing on African economies, this study contributes to a more nuanced understanding of this phenomenon within a specific regional context. The study hypothesised that good institutional frameworks could mitigate the adverse effects of oil price variations on economic growth in oil-importing countries. Employing a PARDL model with oil price and institutional quality as the main variables, the study establishes the existence of a causal relationship between rising oil prices and economic growth. The study concludes that oil price increases have a negative impact on economic growth. The results of the study also confirm a positive and significant impact of institutional quality on the economic growth of oil-importing countries. Furthermore, our results suggest that strong institutions moderate the adverse effect of oil price increases on economic growth. Increasing government expenditure and domestic investment as well as exchange rate depreciation all have a positive effect. On the other hand, rising unemployment and inflation rates have adverse effects on the growth of African economies.

The results from this research are useful for formulating policies that will forestall the likely consequences of oil price shocks in oil-importing economies. Furthermore, the results will guide policy decisions on the deployment of renewable energies and the importance of energy transition efforts in Africa. Based on these empirical results, the study recommends that net oil importers should invest more into research and development to discover innovative methods that can substitute the use of oil in the production processes. Authorities should focus on eliminating dependency on oil energy and promote investment into alternative non-petroleum renewable energy sources. Furthermore, the study recommends policy reforms to build and maintain robust institutions to promote economic growth. In addition, the study recommends the adoption of stabilization policies that counter the risks of oil prices changes by pursuing accommodative monetary policies through interest rate adjustments in oil-importing economies.

One of the limitations of this study is its focus on one group of countries, i.e., African oil-importing countries, hence the recommendations informed by our findings may not be applicable to countries in other regions. Therefore, we recommend that future studies consider expanding the study sample to include other countries from different regions across the globe. An alternative avenue for future research would be analysing the time-varying effect of oil price shocks on macroeconomic aggregates. Another limitation of this study is that it focuses on analysing the impact of oil price on economic growth whereas the effects of oil price changes are not necessarily limited to economic growth. It would be interesting for future studies to focus on the impact of oil prices on energy efficiency, the environment, as well as energy transition.

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APPENDIX

Table A.1. Descriptive statistics

Variable	*Definitions*	*Observations*	*Mean*	*St. dev.*	*Minimum*	*Maximum*
RGDP	Real gross domestic product	572	9.9	0.60	8.69	11.62
Op	Oil price	572	1.56	0.31	1.09	2.04
Inst	Institutional quality	572	0.05	0.94	-2.56	2.73
Inf	Inflation rate	572	0.79	0.59	-1.58	4.38
UnE	Unemployment	572	0.83	0.34	-0.22	1.48
Ge	Government expenditure	572	1.14	0.18	0.31	1.95
Di	Domestic investment	572	1.26	0.22	-0.53	1.74
Er	Exchange rate	572	1.93	1.29	-7.28	3.95

Source: Authors' computation from World Bank's WDI.

Table A.2. Correlation matrix

	RGDP	***Op***	***Inst***	***Inf***	***UnE***	***Ge***	***Di***	***Er***
RGDP	1							
Op	-0.186	1						
Inst	0.064	-0.301	1					
Inf	0.066	-0.191	-0.072	1				
UnE	-0.284	-0.091	0.224	0.123	1			
Ge	0.083	0.028	0.143	-0.085	0.367	1		
Di	0.182	0.246	0.139	-0.184	0.238	0.252	1	
Er	0.296	0.19	-0.075	-0.429	-0.472	-0.209	0.0268	1

Source: Authors' computation from World Bank's WDI.

Table A.3. List of oil-importing countries

No.	***Country***	***No.***	***Country***	***No.***	***Country***
1.	Botswana	9.	Kenya	16.	Rwanda
2.	Burkina Faso	10.	Madagascar	17.	Senegal
3.	Chad	11.	Malawi	18.	Sierra Leone
4.	Gambia	12.	Mali	19.	Togo
5.	Ghana	13.	Morocco	20.	Tunisia
6.	Guinea	14.	Mozambique	21.	Tanzania
7.	Guinea Bissau	15.	Namibia	22.	South Africa
8.	Uganda				