IOSR Journal Of Economics and Finance (IOSR-JEF)
e-ISSN: 2321-5933, p-ISSN: 2321-5925.Volume 17, Issue 2 Ser. 2 (Mar. – Apr. 2026), PP 01-18
www.Iosrjournals.Org

Oil Price Shocks, Fiscal Asymmetry And The Rent Transmission Paradox In Cemac Economies

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Abstract
This paper analyses the macroeconomic and fiscal effects of oil price fluctuations in the member countries of the Central African Economic and Monetary Community (CEMAC) over the period 1994–2022. Using a Structural Panel Vector Autoregression (PSVAR) framework based on Pedroni (2013), the study distinguishes between common regional shocks and idiosyncratic country-specific disturbances, allowing a comprehensive assessment of how oil price volatility propagates across the subregion.
A key contribution of the paper is the integration of fiscal variables, specifically public revenues and expenditures, within a multi-country SVAR framework. This approach enables a dynamic evaluation of oil price shocks that goes beyond traditional macroeconomic indicators. The empirical results reveal a pronounced fiscal asymmetry: public revenues respond strongly to oil price shocks, explaining up to 38% of their long-run variance, while public expenditures remain comparatively rigid. At the same time, the long-run contribution of oil shocks to GDP fluctuations remains limited (around 3.18%), suggesting the existence of a rent transmission paradox and a structural decoupling between the extractive sector and the broader economy.
The analysis also highlights significant regional heterogeneity. The Republic of the Congo and Equatorial Guinea exhibit strong procyclical reactions to oil price changes, Gabon shows patterns consistent with Dutch disease dynamics, while Cameroon and Chad display greater resilience due to relatively more diversified economic structures. These findings underscore the importance of institutional quality, fiscal governance, and economic diversification in shaping the macroeconomic transmission of natural resource shocks. The paper concludes by proposing pragmatic policy reforms aimed at improving fiscal smoothing, strengthening public investment efficiency, and enhancing domestic linkages of the petroleum sector.
Keywords: *Oil Price Shocks; Fiscal Asymmetry; Resource Dependence; Structural Panel VAR; CEMAC*

Date of Submission: 17-03-2026 Date of Acceptance: 27-03-2026

I. Introduction

Over the past five decades, oil price fluctuations have remained one of the most significant external shocks affecting the global economy. Since the first oil shock of 1973, the international oil market has been characterised by recurrent episodes of sharp price increases and declines driven by geopolitical tensions, supply disruptions and changes in global demand. Because oil constitutes a key input in production and transportation processes, fluctuations in its price have important implications for macroeconomic performance, influencing economic growth, inflation, fiscal balances and external accounts in both oil-importing and oil-exporting countries (Hamilton, 1983; Kilian, 2009).

A large body of literature has examined the macroeconomic consequences of oil price shocks, with most empirical studies focusing on advanced economies, particularly the United States and other OECD countries. These studies have demonstrated that oil price fluctuations can significantly affect output dynamics, inflation and monetary policy responses. However, considerably less attention has been devoted to the transmission mechanisms of oil price shocks in resource-dependent developing economies. This gap is particularly relevant in sub-Saharan Africa, where several economies remain highly dependent on hydrocarbon exports as a major source of fiscal revenues and foreign exchange earnings.

The Central African Economic and Monetary Community (CEMAC) provides a particularly relevant case in this regard. Several member states of the union, notably the Republic of the Congo, Equatorial Guinea, Gabon and Chad, derive a substantial share of their export revenues and public resources from the oil sector. In some of these countries, hydrocarbons account for a dominant share of government revenues and export earnings, making national economies highly vulnerable to fluctuations in international commodity prices. As a consequence, periods of rising oil prices tend to improve fiscal positions and external balances, while price declines can rapidly generate macroeconomic instability, fiscal stress and external imbalances.

The vulnerability of CEMAC economies to oil price volatility became particularly evident following the sharp decline in global oil prices in 2014. This shock triggered a major economic and financial crisis in the subregion, leading to deteriorating fiscal balances, declining foreign exchange reserves and increased public debt levels. In response to these challenges, CEMAC countries adopted the Economic and Financial Reform Programme (PREF-CEMAC), which aimed to restore macroeconomic stability and strengthen the resilience of the region's economies through coordinated fiscal and structural reforms supported by international partners such as the International Monetary Fund and the World Bank.

Despite the importance of oil revenues for public finances in CEMAC countries, an important paradox emerges in many resource-dependent economies. Periods of favourable oil prices often generate substantial increases in fiscal revenues, yet these windfalls do not necessarily translate into sustained economic growth or structural transformation. This phenomenon has been widely discussed in the literature on the resource curse and the Dutch disease, which emphasise the role of institutional quality, governance structures and economic diversification in determining whether natural resource wealth contributes to long-term development (Corden & Neary, 1982; Mehlum, Moene, & Torvik, 2006; Ross, 2015).

In this context, the present study examines the macroeconomic and fiscal effects of oil price shocks in CEMAC economies. The main objective is to assess the extent to which fluctuations in international oil prices affect public finances and key macroeconomic variables in the region. Particular attention is given to the relationship between oil revenues, public expenditure dynamics and economic growth. More specifically, this study contributes to the literature by identifying and empirically validating a rent transmission paradox in a resource-dependent monetary union.

To address this issue, the analysis relies on a Structural Panel Vector Autoregression (PSVAR) framework based on Pedroni (2013), which allows the identification of both common regional shocks and country-specific disturbances. By incorporating fiscal variables within a multi-country econometric framework, the study provides a more comprehensive assessment of the transmission mechanisms of oil price shocks in resource-dependent economies.

The empirical results reveal a pronounced fiscal asymmetry. While oil price increases generate strong and immediate responses in public revenues, their effects on public expenditures and long-term economic growth remain comparatively limited. This pattern suggests the existence of a structural decoupling between the extractive sector and the broader productive economy in CEMAC countries.

The remainder of the paper is organised as follows. Section 2 presents stylised facts on the role of oil in CEMAC economies. Section 3 reviews the relevant theoretical and empirical literature on oil price shocks. Section 4 describes the data and the econometric methodology used in the empirical analysis. Section 5 presents and discusses the main empirical results. Finally, Section 6 concludes and outlines the main policy implications

II. Importance Of Oil In The Economies Of The CEMAC Sub-Region

In the CEMAC region, oil remains a key economic driver for several member states, notably Gabon, the Republic of the Congo, and Equatorial Guinea. According to World Bank data (2021), the oil sector can account for up to 40% of a country's GDP. Specifically, oil revenues represented 35% of GDP in Congo and between 14% and 16% in Chad, Gabon, and Equatorial Guinea. This substantial contribution reflects the characteristics of a rentier economy, where oil dependency shapes economic trajectories, national budgets, and long-term development planning.

Share of the Oil Sector in CEMAC GDP

An analysis of the oil sector's share in CEMAC's GDP reveals that in 2022, growth was primarily driven by the non-oil sector, which contributed 2.8 percentage points—up from 1.1 points in 2021, according to the IMF's November 2023 report. In contrast, the oil sector contributed just 0.1 point, a modest improvement from -1.4 points in 2021, largely due to a decline in production despite favourable oil prices.

Nevertheless, the oil sector's share of GDP has increased since 2018, rising from 20.6% to 22.9% in 2022. This suggests that relative growth in oil output, combined with a favourable pricing environment, benefited these economies during the period. Simultaneously, the non-oil sector's share declined slightly, from 79.4% to 77.1%.

This upward trend in the oil sector's share underscores a growing economic dependence, which—while lucrative—also heightens vulnerability to price volatility. The marginal decline in the non-oil sector highlights the urgency of pursuing economic diversification to mitigate exposure to oil shocks.

Share of Oil Revenues in Total Revenues of CEMAC Countries

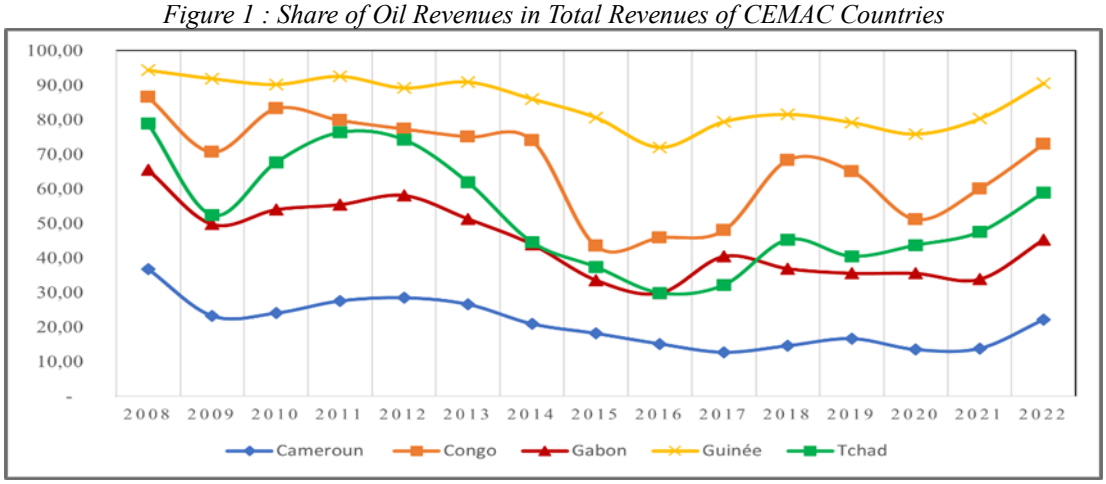
The evolution of oil revenues as a share of total government revenues in CEMAC countries from 2008 to 2022 reveals divergent national trajectories, shaped by distinct economic dynamics and sectoral policies.

Equatorial Guinea stands out with consistently high oil revenue shares, above 80% throughout the period, indicating deep reliance on the sector. Cameroon, by contrast, shows greater diversification, with oil revenues fluctuating between 20% and 40%, thereby reducing its exposure to global oil price volatility.

Congo and Chad experienced pronounced fluctuations, with peaks and troughs reflecting global oil shocks and shifts in production capacity. Notably, Congo saw a sharp decline between 2014 and 2016, followed by a recovery—suggesting reforms or renewed investment efforts. Gabon, meanwhile, displays a downward trend, possibly indicating a transition toward non-oil revenue sources or a depletion of extractable reserves.

These patterns highlight the structural risks associated with oil dependence. Countries whose public revenues rely heavily on oil are more exposed to external shocks. Such volatility can weaken macroeconomic stability and limit the capacity for sustained public spending. Diversification strategies, which appear to be emerging in countries such as Cameroon and Gabon, provide a potential pathway to greater resilience by supporting the development of alternative sources of growth. This structural dependence provides a key background for interpreting the asymmetric fiscal responses identified in the empirical analysis.

Figure 1 : Share of Oil Revenues in Total Revenues of CEMAC Countries



Source: Authors

III. Literature Review

Oil price fluctuations are widely recognised as a major source of macroeconomic instability in both oil-importing and oil-exporting economies. A large body of theoretical and empirical literature has examined the mechanisms through which oil price shocks influence economic activity, inflation, fiscal balances and external accounts. This section reviews the main strands of the literature. It first discusses the transmission mechanisms through which oil price fluctuations affect economic performance. It then examines the structural implications of natural resource dependence, particularly through the Dutch disease and resource curse frameworks. Finally, it reviews empirical evidence on the macroeconomic effects of oil price shocks in different regional contexts, with particular attention to resource-dependent economies.

Transmission Mechanisms of Oil Price Fluctuations

Several channels have been identified through which oil price movements influence national economies. One important mechanism operates through production costs. Because oil is a key intermediate input in many production processes, increases in oil prices raise production and transportation costs, thereby reducing aggregate supply and potentially generating stagflationary pressures characterised by lower output and higher inflation (Rasche & Tatom, 1977; Hamilton, 1983). Firms facing higher energy costs may pass these increases on to consumers, further reinforcing inflationary dynamics.

A second transmission mechanism relates to income transfers between oil-importing and oil-exporting economies. Rising oil prices generate a redistribution of income from importing countries to exporting countries, often resulting in higher fiscal revenues and increased domestic demand in oil-exporting economies. Conversely,

oil-importing countries experience a deterioration in their terms of trade and a decline in purchasing power (Jones, Leiby, & Paik, 2004; Kilian, 2009). These asymmetric effects help explain why the macroeconomic consequences of oil price shocks differ significantly across countries.

Oil price shocks may also affect macroeconomic performance through monetary policy responses. Central banks often react to rising oil prices and the associated inflationary pressures by tightening monetary policy, which may dampen economic activity in the short run (Bernanke, Gertler, & Watson, 1997). In the context of the CEMAC monetary union, however, the fixed exchange-rate regime limits national monetary autonomy and may constrain the ability of individual countries to respond to asymmetric shocks.

Natural Resources, Dutch Disease and the Resource Curse

Beyond short-term macroeconomic effects, the literature has emphasised the structural implications of natural resource dependence. The Dutch disease framework, originally formalised by Corden and Neary (1982), explains how resource booms may lead to real exchange-rate appreciation and a reallocation of productive resources toward the booming sector. As a consequence, other tradable sectors such as manufacturing and agriculture may lose competitiveness, potentially leading to deindustrialisation.

Closely related to this argument is the broader literature on the resource curse. According to this perspective, countries endowed with abundant natural resources may experience weaker long-term economic performance due to institutional weaknesses, governance challenges and inefficient management of resource revenues (Mehlum, Moene, & Torvik, 2006; Ross, 2015). In many cases, natural resource windfalls encourage procyclical fiscal behaviour, rent-seeking activities and limited incentives for economic diversification.

Empirical studies have provided evidence supporting these mechanisms in several resource-dependent economies. For example, Badeeb, Lean & Clark (2017) highlights the role of commodity price shocks in shaping industrial dynamics in CEMAC countries, while Biedermann, Barczikay and Szalai (2023) document the presence of Dutch disease effects in Angola. These findings suggest that while natural resource booms may generate short-term economic gains, they may also create long-term structural constraints on diversification and economic development.

Empirical Evidence on Oil Price Shocks

In many oil-exporting economies, oil price increases are generally associated with higher economic growth and improved fiscal performance. Evidence from Iran shows that positive oil price shocks stimulate industrial production, while in Azerbaijan they are associated with inflationary pressures and expanding economic activity. Similar patterns are observed in several Middle Eastern economies, where oil revenues play a central role in financing public investment and supporting domestic demand (Berument, Ceylan, & Dogan, 2010).

However, evidence from African oil-exporting countries reveals more heterogeneous outcomes. In Nigeria, oil price shocks significantly affect exchange rate dynamics and monetary aggregates, reflecting strong macroeconomic dependence on oil revenues. In Algeria, periods of declining oil prices tend to expose structural vulnerabilities and macroeconomic instability. More broadly, empirical studies point to asymmetric macro-fiscal effects, with negative shocks often having more persistent impacts than positive ones. Within the CEMAC region, findings remain mixed. Some studies highlight strong fiscal sensitivity to oil price downturns, particularly through declining revenues and rising debt pressures, while others report limited effects of oil price increases on economic growth, suggesting that institutional constraints and inefficiencies in public spending may weaken transmission mechanisms.

By contrast, the empirical evidence for oil-importing economies is more consistent. Oil price increases have historically been associated with lower economic growth and higher inflation, with asymmetric effects in which negative impacts dominate positive ones. Similar findings are reported for OECD and Asian economies, where oil price shocks significantly affect inflation, consumption and external balances. In many African oil-importing countries, rising oil prices are associated with fiscal stress and inflationary pressures, with direct implications for household welfare and food security.

Taken together, these results indicate that the macroeconomic impact of oil price shocks depends critically on structural characteristics, institutional quality and policy frameworks. In some regions, particularly in the Middle East, oil revenues are more effectively transformed into growth through strong fiscal transmission mechanisms and sustained public investment. In contrast, other regions, including parts of Africa and Latin America, exhibit more volatile and less efficient transmission patterns, often associated with procyclical fiscal policies and weaker institutional frameworks (Van der Ploeg, 2011; Ross, 2015).

Research Gap and Contribution

Despite the extensive literature on oil price shocks, several important limitations remain. Existing studies have generally focused either on macroeconomic variables or on fiscal indicators, without fully capturing the interactions between public finances and broader economic dynamics. As a result, the mechanisms through which

oil price fluctuations are transmitted from the extractive sector to the rest of the economy remain only partially understood.

In addition, much of the empirical literature relies on single-country analyses, which limits the ability to account for regional interdependencies and common external shocks affecting economically integrated areas such as CEMAC. This is particularly important in a monetary union context, where shared policy frameworks and external constraints may shape the transmission of oil shocks in a distinct way.

Furthermore, relatively few studies explicitly distinguish between common shocks and country-specific disturbances when analysing oil price transmission mechanisms. This distinction is essential in order to better understand the extent to which macroeconomic dynamics are driven by external factors as opposed to domestic structural conditions.

Against this background, this study contributes to the literature in several ways. It develops a unified empirical framework that integrates both macroeconomic and fiscal variables within a Structural Panel VAR model, while explicitly distinguishing between common and idiosyncratic shocks. More importantly, the analysis provides evidence of a systematic disconnect between oil revenue dynamics and long-term economic performance in CEMAC economies.

This result supports the existence of a rent transmission paradox, whereby oil price increases lead to strong fiscal responses but only limited and weakly sustained effects on economic growth.

IV. Methodology

This section presents the empirical strategy used to analyse the macroeconomic and fiscal effects of oil price fluctuations in CEMAC economies. It first describes the data and variables, then introduces the structural Panel VAR framework, explains the identification strategy, and finally discusses estimation procedures, diagnostics and robustness checks.

Data and Variables

The empirical analysis relies on an annual panel dataset covering the six member states of the CEMAC, namely Cameroon, Chad, the Republic of the Congo, Equatorial Guinea, Gabon and the Central African Republic, over the period 1994–2022. The sample period is determined by data availability and consistency across macroeconomic and fiscal indicators.

The database combines macroeconomic variables, fiscal aggregates and international oil prices. Macroeconomic indicators include real GDP, inflation, household final consumption expenditure and public investment. Fiscal variables consist of government revenues and public expenditures, while international oil prices capture external commodity shocks affecting the subregion.

Oil prices are proxied using the West Texas Intermediate (WTI) benchmark. Although CEMAC crude exports are more directly linked to Brent prices, both benchmarks display strong co-movement. Following Kilian (2009), WTI is retained for consistency and data continuity, while robustness checks using Brent prices are conducted to verify the stability of the results.

Government revenues and expenditures are expressed as percentages of GDP in order to capture fiscal dependence and sustainability, which are central dimensions in resource-dependent economies. Because GDP also appears in log-differences within the macroeconomic block, this ratio specification may generate mechanical correlation between the numerator and the denominator. To address this potential concern, additional estimations using real-level fiscal variables are conducted to ensure that impulse responses and variance decompositions are not driven by denominator effects.

Table 1: Variables and Data Sources

Variable	Unit	Source
Real GDP (GDP)	Constant 2015 US$	World Development Indicators
Household consumption (HHCONS)	Constant 2015 US$	World Development Indicators
Public investment (INV)	% of GDP	World Development Indicators
Inflation (INF)	Annual %	World Development Indicators
Public expenditure (PEXP)	% of GDP	BEAC
Government revenues (REV)	% of GDP	BEAC
Oil prices (OP)	USD/barrel (WTI)	Energy statistics

Source: Authors

Structural Panel VAR Framework

The analysis is based on a Structural Panel Vector Autoregression (PSVAR) framework, following the approach proposed by Pedroni (2013). This framework allows the joint modelling of macroeconomic and fiscal variables while capturing both common regional dynamics and country-specific heterogeneity within the CEMAC area.

The choice of a PSVAR model is motivated by the nature of oil price shocks, which affect economies through multiple and interdependent channels involving both macroeconomic and fiscal variables. A VAR-based approach is therefore appropriate, as it captures the dynamic interactions among endogenous variables without imposing strong a priori restrictions (Sims, 1980; Kilian, 2009). In addition, the panel dimension of the model makes it possible to account for shared external shocks across countries while preserving cross-country heterogeneity. This is particularly relevant in a monetary union such as CEMAC, where economies are exposed to common shocks but may respond differently depending on their structural characteristics.

The structural specification further allows for the identification of economically meaningful shocks by distinguishing between common regional components and country-specific disturbances (Pedroni, 2013). This feature is essential for analysing the transmission of oil price shocks in a regional context characterised by strong economic and institutional linkages.

The PSVAR framework is especially well suited to the CEMAC context, as it captures regional spillover effects associated with common shocks. This is particularly important for countries such as the Central African Republic, which is not a major oil producer but may still be affected indirectly through regional trade, fiscal interdependencies and monetary integration.

Baseline Dynamic Specification

The reduced-form PSVAR is defined as:

$$\Delta Z_{i,t} = B_i(L)\Delta Z_{i,t-1} + \varepsilon_{i,t} \qquad (1)$$

where $\Delta Z_{i,t}$denotes the vector of endogenous variables for country i at time t, $B_i(L)$is a lag polynomial, and $\varepsilon_{i,t}$represents reduced-form innovations.

All variables are expressed in first differences to ensure stationarity and prevent spurious regressions (Hamilton, 1994).

Specification of Endogenous Variables

Two complementary systems are estimated.

The macroeconomic block is specified as:

$$\Delta Z_{i,t} = [\Delta OP, \Delta \ln(GDP), \Delta INF, \Delta INV, \Delta \ln(HHCONS)] \quad (2)$$

The vector of stationary endogenous variables, of dimension five, is composed of the first differences of key macroeconomic indicators.

This specification captures transmission channels from oil prices to output, prices, investment, and household demand.

The fiscal block is defined as:

$\Delta Z_{i,t} = [\Delta OP, \Delta REV, \Delta \mathrm{PEXP}]$ (3)

The three-dimensional vector of stationary endogenous variables comprises the first differences of the selected macroeconomic indicators. This system allows the analysis of fiscal responses to oil shocks, which constitute a core transmission channel in resource-dependent economies.

Decomposition of Structural Shocks

Following Pedroni (2013), innovations are decomposed into common and idiosyncratic components:

$$\varepsilon_{i,t} = \bar{\varepsilon}_t + \tilde{\varepsilon}_{i,t} \qquad (4)$$

where $\bar{\varepsilon}_t$represents shocks common to all countries and $\tilde{\varepsilon}_{i,t}$denotes country-specific disturbances.

The orthogonality condition is:

$$E(\tilde{\varepsilon}_{i,t}\tilde{\varepsilon}'_{j,t}) = 0 \text{for } i \neq j \qquad (5)$$

allowing separation between regional and domestic sources of fluctuations.

Structural Identification Strategy

In order to provide an economic interpretation of the estimated innovations, the reduced-form residuals are transformed into structural shocks. The identification strategy relies primarily on short-run restrictions implemented through a recursive Cholesky decomposition, following the approach initially proposed by Sims (1980).

Structural Form and Identification Equations

The structural form of the PSVAR model can be written as:

$$A_i(0)\,\Delta Z_{i,t} = A_i(L)\,\Delta Z_{i,t-1} + u_{i,t} \qquad (6)$$

where $u_{i,t}$denotes a vector of orthogonal structural shocks and $A_i(0)$captures contemporaneous relationships among variables.

The relationship between reduced-form residuals and structural shocks is given by:

$$\mu_{i,t} = A_i(0)\, \varepsilon_{i,t} \qquad (7)$$

with the corresponding covariance matrix:

$$\Omega_\mu = A(0)\, A(0)' \qquad (8)$$

Identification is achieved through a Cholesky factorisation of the variance–covariance matrix:

$$\Omega_\mu = LL' \qquad (9)$$

where $L$is a lower triangular matrix imposing recursive contemporaneous restrictions on the system.
As a robustness check, long-run restrictions in the spirit of Blanchard and Quah (1989) are also considered:

$$A_i(1) = F_i(1)\, A_i(0) \qquad (10)$$

Economic Justification of Variable Ordering

The identification scheme is further grounded in economic reasoning through the ordering of variables in the recursive structure.

Oil prices are placed first in the system, reflecting the fact that CEMAC economies are price takers in global oil markets. Domestic macroeconomic conditions in the region are therefore unlikely to affect international oil prices contemporaneously (Kilian, 2009; Kilian & Lütkepohl, 2017).

Real GDP is ordered before inflation, consistent with the presence of nominal rigidities, whereby output tends to adjust more rapidly than prices in the short run (Blanchard & Galí, 2007). This ordering reflects standard macroeconomic dynamics in which production responds first to shocks, while price adjustments occur with some delay.

Investment and household consumption are positioned after output and inflation, as expenditure decisions are typically influenced by current macroeconomic conditions. These variables therefore respond contemporaneously to changes in economic activity and price dynamics.

Within the fiscal block, government revenues are assumed to react immediately to oil price shocks, reflecting their strong dependence on hydrocarbon exports and related fiscal receipts. In contrast, public expenditures are expected to adjust more gradually, due to institutional rigidities, budgetary procedures and implementation delays.

Dynamic Representation and Impulse Responses

The structural form of the model can be transformed into its moving-average representation, which provides the basis for analysing the dynamic effects of structural shocks. The link between the reduced-form and structural dynamics is given by:

$$A_i(0)\, F_i(L) = A_i(L) \qquad (11)$$

This representation allows the system to be expressed as:

$$\Delta Z_{i,t} = \sum_{s=0}^{\infty} \Psi_s\ \varepsilon_{i,t-s} \qquad (12)$$

where $\Psi_s$captures the propagation of structural shocks over time.

Impulse response functions derived from this representation trace the dynamic effects of a one-standard-deviation oil price shock on macroeconomic and fiscal variables. These responses provide information on both the magnitude and persistence of the transmission mechanisms across CEMAC economies, allowing for the identification of short-run adjustments and longer-term dynamics.

Forecast Error Variance Decomposition

To assess the relative importance of oil price shocks in explaining macroeconomic fluctuations, forecast error variance decomposition (FEVD) is computed as:

$$FEVD_h(j,k) = \frac{\sum_{s=0}^{h-1} (\Psi_s)_{jk}^2}{\sum_{s=0}^{h-1} \sum_{m=1}^{M} (\Psi_s)_{jm}^2} \qquad (13)$$

where $h$denotes the forecast horizon, $j$the affected variable, and $k$the structural shock.

This decomposition makes it possible to quantify the contribution of oil price shocks to the total forecast error variance of each variable over different time horizons. It provides a complementary perspective to impulse response functions by highlighting the relative importance of oil shocks compared to other sources of macroeconomic fluctuations.

Estimation Strategy, Diagnostics and Robustness

The PSVAR model is estimated using standard panel techniques, allowing for both dynamic interactions and cross-country heterogeneity. The optimal lag length is selected using conventional information criteria,

including the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC), ensuring a balance between model fit and parsimony.

Prior to estimation, the time-series properties of the variables are examined using panel unit root tests to assess their stationarity. When necessary, variables are transformed to avoid spurious regression results, which is particularly important in a panel VAR framework where non-stationary series may lead to biased and inconsistent estimates.

The stability of the model is evaluated by examining the eigenvalues of the companion matrix. All eigenvalues are required to lie inside the unit circle to ensure that the system is dynamically stable and that impulse response functions are well defined (Lütkepohl, 2005).

Diagnostic tests are conducted to assess the adequacy of the model. In particular, residual autocorrelation tests are used to verify the absence of serial correlation, while heteroskedasticity checks are performed to assess the consistency of the error structure across countries and over time.

To ensure the robustness of the results, several alternative specifications are considered. These include variations in lag length, alternative variable orderings, and the use of different oil price benchmarks. In addition, long-run restrictions following Blanchard and Quah (1989) are implemented as an alternative identification strategy, and the fiscal block is re-estimated using alternative specifications of fiscal variables in order to address potential denominator effects related to GDP ratios.

The consistency of the results across these specifications supports the reliability of the empirical findings and strengthens the interpretation of the estimated impulse responses.

V. Results And Discussion

This section provides preliminary evidence on the relationships between oil prices and key macroeconomic and fiscal variables across CEMAC countries. It also reports stationarity and cointegration tests that motivate the use of a structural Panel VAR framework for analysing the dynamic effects of oil price shocks.

Relationship between Variables and Stationarity Tests

Relationship between Macroeconomic Variables and Oil Price Fluctuations

The scatter plots presented in the appendix reveal heterogeneous relationships between oil prices and key macroeconomic variables, including real GDP, household consumption, investment and inflation, across member states of the CEMAC. This heterogeneity reflects differences in economic diversification, institutional capacity and dependence on hydrocarbon revenues.

Oil-exporting economies such as the Republic of the Congo and Equatorial Guinea exhibit strong positive correlations between oil prices and real GDP, confirming the central role of hydrocarbon rents in driving economic activity. Investment and household consumption also tend to increase during periods of rising oil prices, suggesting a relatively strong transmission of oil revenues into domestic demand. At the same time, this dynamic reflects a high degree of vulnerability to external price fluctuations.

By contrast, Cameroon and Chad display weaker relationships between oil prices and macroeconomic aggregates, which may reflect relatively more diversified economic structures and greater resilience to oil shocks. Inflation dynamics remain comparatively stable, indicating partial insulation of domestic price systems from international commodity price movements.

Gabon represents an intermediate case, with weaker and sometimes inconsistent correlations between oil prices and macroeconomic variables. This outcome may reflect partial diversification efforts or inefficiencies in the allocation of resource revenues, in line with the resource-curse literature (Collier & Venables, 2010).

A particularly interesting result concerns the Central African Republic. Despite not being an oil-producing economy, it exhibits a modest positive association between oil prices and GDP. This finding suggests the presence of regional spillover effects transmitted through trade, fiscal linkages and monetary integration within the CEMAC area, reinforcing the relevance of a panel framework capable of capturing common shocks (Pesaran, Schuermann, & Weiner, 2004).

Collectively, the descriptive evidence points to substantial heterogeneity in macroeconomic sensitivity to oil price fluctuations, reflecting uneven capacities across countries to absorb and manage external shocks.

Relationship between Fiscal Variables and Oil Price Fluctuations

The scatter plots also reveal marked differences in fiscal responses to oil price changes, particularly between government revenues and public expenditures.

In oil-dependent economies such as the Republic of the Congo and Chad, public revenues display strong positive correlations with oil prices, confirming the direct exposure of fiscal systems to oil market dynamics. Similar but less pronounced patterns are observed in Cameroon and Equatorial Guinea, while Gabon exhibits more limited responsiveness, possibly reflecting inefficiencies in revenue mobilisation or institutional constraints.

In contrast, public expenditures appear to respond weakly and inconsistently to oil price fluctuations across most countries. Even during periods of rising oil revenues, expenditures tend to adjust only gradually. This asymmetry suggests that increases in fiscal resources are not immediately translated into higher public spending.

This pattern can be interpreted in light of the literature on fiscal pro-cyclicality in developing economies. While revenues react rapidly to external shocks, expenditure adjustments are often constrained by administrative capacity, investment planning delays and institutional rigidities (Kaminsky, Reinhart, & Végh, 2004; Talvi & Végh, 2005). In this context, CEMAC countries may experience a form of constrained pro-cyclicality, whereby fiscal resources expand during commodity booms but the absorptive capacity of the public sector limits the pace of expenditure adjustment.

This asymmetry is also consistent with the broader literature on absorptive capacity and public investment efficiency, which emphasises that resource-rich economies often face difficulties in transforming temporary revenue windfalls into productive capital accumulation (Pritchett, 2000; Collier & Venables, 2012). It already points to a potential disconnect between revenue dynamics and broader economic outcomes, a pattern that will be further explored in the econometric results.

Stationarity and Cointegration Tests

Testing for stationarity is a necessary prerequisite for VAR estimation, as non-stationary time series may lead to spurious relationships (Granger & Newbold, 1974). To this end, panel unit root tests, including the Levin–Lin–Chu (2002) and Breitung (2000) tests, are employed. The results, reported in the appendix, indicate that all variables become stationary after first differencing, suggesting that they are integrated of order one, I(1).

Given this result, panel cointegration tests proposed by Pedroni (2004) are conducted to assess the existence of long-run equilibrium relationships among the variables. The findings do not provide evidence of cointegration at conventional significance levels. This absence of long-run relationships supports the use of a PSVAR framework in first differences and suggests that oil price shocks primarily operate through short- to medium-term dynamic channels in CEMAC economies.

Effects of Oil Price Fluctuations on Macroeconomic and Fiscal Variables in CEMAC Countries: Empirical Results

This section presents the empirical findings derived from the structural panel VAR (PSVAR) model proposed by Pedroni (2013). Impulse response functions (IRFs) are used to analyse how macroeconomic and fiscal variables react to a one-standard-deviation positive oil price shock. In addition, forecast error variance decomposition is conducted to assess the relative importance of oil shocks, distinguishing between common shocks affecting the entire CEMAC region and idiosyncratic shocks specific to individual countries.

The reported IRFs display median responses together with the interquartile range (25th and 75th quantiles), in line with standard practice in panel econometrics (Lütkepohl, 2005; Kilian & Lütkepohl, 2017). The analysis focuses on positive oil price shocks, as negative shocks generally exhibit broadly symmetric dynamics.

Aggregate Responses of Public Revenues and Public Expenditures

Public revenue responses.

Impulse response functions indicate that public revenues react strongly and positively to oil price shocks across CEMAC countries. The median response increases sharply in the short run, reflecting the immediate transmission of higher oil prices through royalties, export duties and petroleum-related taxation. This result confirms the high degree of fiscal dependence on hydrocarbon revenues in the region and is consistent with evidence from other resource-dependent economies (Collier & Venables, 2010; Arezki et al., 2012).

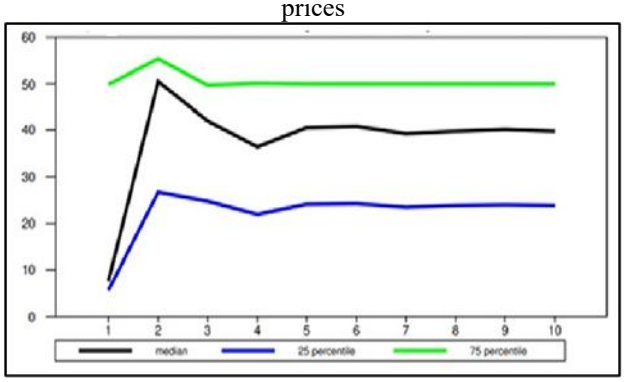
Beyond direct oil-related inflows, rising oil prices also stimulate domestic economic activity, thereby expanding the broader tax base through increased consumption and corporate income. However, the substantial interquartile dispersion observed in the responses points to significant cross-country heterogeneity. This suggests that institutional capacity, fiscal rules and revenue management frameworks play an important role in shaping the magnitude of fiscal gains.

Public expenditure responses

In contrast, public expenditures display markedly different dynamics. In the short run, the median response remains close to zero, indicating that government spending does not automatically adjust to increases in oil revenues. This weak short-term response reveals a clear asymmetry in the fiscal transmission mechanism.

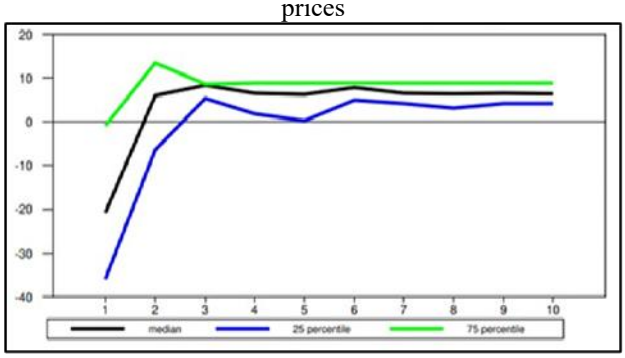
The wide interquartile range reflects heterogeneous fiscal behaviours across countries. Some governments appear to adopt precautionary strategies, possibly in response to oil price volatility, while others increase spending to support infrastructure investment or social programmes (Barnett & Ossowski, 2003; IMF, 2012). Over time, expenditure responses tend to converge toward neutrality, suggesting gradual fiscal adjustment aimed at preserving macroeconomic stability.

Figure 2: Impulse Response Functions following a one standard deviation positive idiosyncratic shock to oil prices



Source: Authors

Figure 3:Impulse Response of Public Revenues to a one standard deviation positive idiosyncratic shock in oil prices



Source: Authors

This asymmetry is further confirmed by the forecast error variance decomposition results. The contribution of oil price shocks to public revenue fluctuations increases significantly over time, rising from 6.6% at horizon one to nearly 38% at horizon five. By contrast, the contribution of oil shocks to expenditure variability remains low and relatively stable, fluctuating around 2% to 3%.

These results highlight a structural asymmetry between revenue and expenditure dynamics. While oil price shocks generate immediate and substantial increases in public revenues, their transmission to public spending remains limited, delayed and quantitatively weak. This divergence points to structural constraints in the fiscal transmission process and provides strong empirical support for the existence of a disconnect between resource inflows and their effective allocation, which lies at the core of the rent transmission paradox explored in this study.

Table 2. Forecast Error Variance Decomposition of Public Revenues and Public Expenditures Following a Positive Common Oil Price Shock.

Horizon	Public revenues contribution (%)	Public expenditure contribution (%)
1	6,60	2,94
2	30,74	1,88
3	36,86	2,58
4	37,56	2,45
5	38,0	2,35

Source: Authors' calculations.

This divergence can be interpreted as a form of constrained fiscal pro-cyclicality. While revenues respond mechanically to oil price movements, expenditure adjustments remain limited by administrative capacity, budget planning cycles and project implementation delays. Similar dynamics have been documented in resource-rich developing economies, where absorptive-capacity constraints hinder the rapid transformation of resource windfalls into productive investment (Talvi & Végh, 2005; Pritchett, 2000; Collier & Venables, 2011).

Country-level patterns further support this interpretation. The Republic of the Congo, Gabon and Chad appear particularly vulnerable to oil price fluctuations due to their high fiscal dependence on petroleum revenues. In these economies, a decline in oil prices can significantly reduce fiscal resources and constrain essential public spending (Beck, 2018; CEMAC, 2021), highlighting the structural importance of economic diversification (IMF,

2022). By contrast, Cameroon and the Central African Republic exhibit more moderate fiscal responses, reflecting either relatively broader economic bases or indirect exposure through regional spillover effects.

Institutional and governance factors also play a central role in shaping expenditure dynamics. In several cases, increases in oil revenues do not translate proportionally into productive public spending, partly due to weaknesses in transparency, accountability and public financial management systems (Transparency International, 2020). As a result, additional revenues may be diverted toward non-priority expenditures or face implementation bottlenecks, thereby reducing their developmental impact (Collier & Venables, 2011).

These findings indicate that oil price shocks mainly affect the revenue side of public finances, while rigidities in public expenditure constrain the ability of governments to transform windfall gains into effective and timely development outcomes. This result is consistent with the macro-fiscal asymmetry identified earlier and supports the existence of a rent transmission paradox in CEMAC economies.

Impulse Response Analysis of Macroeconomic Variables to a common oil price shock

Impulse response functions indicate that a positive oil price shock generates immediate but heterogeneous macroeconomic effects across CEMAC economies. Real GDP, inflation and household consumption respond positively in the short run, while the response of investment appears with a lag. The similarity between responses to common and idiosyncratic shocks suggests the presence of shared structural features across countries, notably a high dependence on hydrocarbon revenues and limited economic diversification (Besso & Feubi Pamen, 2017; Okiemy & Mbongo, 2021).

Response of real GDP

Most CEMAC economies exhibit an immediate positive response of real GDP following a positive oil price shock. This reflects the short-term stimulus effect of higher export revenues, improved fiscal space and increased aggregate demand. Such dynamics are consistent with the role of commodity price booms as cyclical growth drivers in oil-exporting economies (Beck, 2018; IMF, 2022).

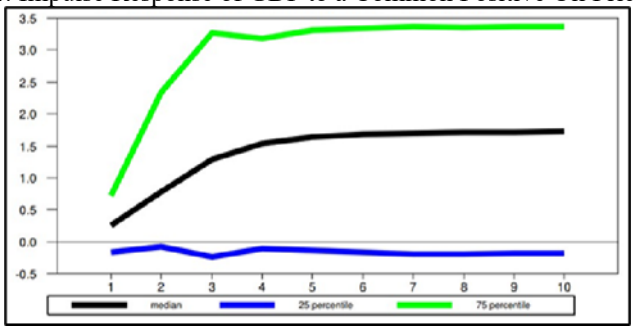
However, this positive effect remains moderate in magnitude and tends to dissipate rapidly over time. In several countries, the response is weak or short-lived, suggesting that oil windfalls are not translated into sustained increases in productive activity. This limited persistence highlights the role of structural constraints, including weak sectoral linkages, limited diversification and institutional inefficiencies in the allocation of public resources (Baumeister & Peersman, 2013). This pattern is consistent with the variance decomposition results, which show that oil shocks account for only a small share of GDP fluctuations in the long run.

Response of inflation

Inflation increases in the immediate aftermath of a positive oil price shock, reflecting the pass-through of higher energy and transportation costs to domestic prices. However, this effect declines rapidly after the first year, indicating that inflationary pressures are largely transitory.

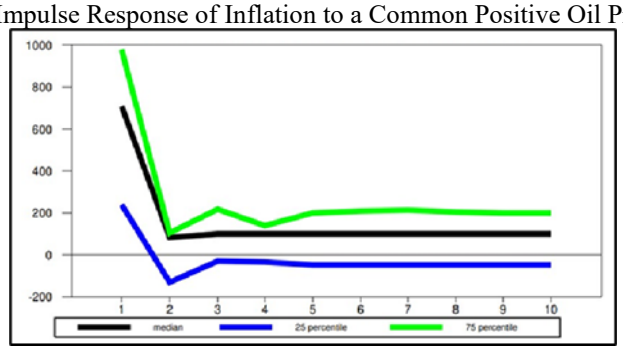
This suggests the presence of stabilising mechanisms within CEMAC economies, including administered prices, fuel subsidies and the fixed exchange-rate regime, which mitigate the medium-term impact of oil shocks on domestic price dynamics (Cologni & Manera, 2008). Evidence from Cameroon further indicates that domestic fuel-pricing policies can significantly shape the transmission of international oil price changes to inflation dynamics (Nguetse Tegoum, Takamgno, & Neguem, 2018).

Figure 4: Impulse Response of GDP to a Common Positive Oil Price Shock



Source: Authors

Figure 5: Impulse Response of Inflation to a Common Positive Oil Price Shock



Source: Authors

Response of investment and implementation lag

Public investment responds positively to oil price shocks, but only with a delay, becoming significant from the second year onward. This lag reflects institutional and procedural rigidities in public financial management, including budgetary cycles, project preparation constraints and procurement processes.

In the short run, investment responses are often weak or even negative, suggesting precautionary fiscal behaviour in the face of uncertainty regarding the persistence of oil price increases. The delayed adjustment therefore appears to be driven less by financing constraints than by limited administrative absorption capacity.

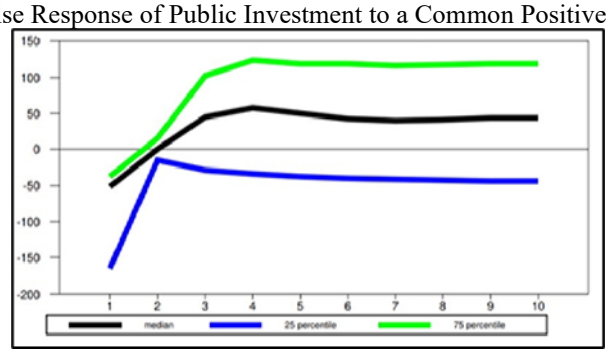
As oil revenues stabilise and fiscal expectations adjust, governments progressively integrate additional resources into investment programmes. This delayed response is consistent with the expenditure inertia identified in the fiscal analysis (Collier & Venables, 2011).

Response of household consumption

Household final consumption increases following a positive oil price shock, with the strongest effect observed after one to two periods before gradually stabilising. This reflects the indirect transmission of oil revenues through fiscal channels and domestic economic activity.

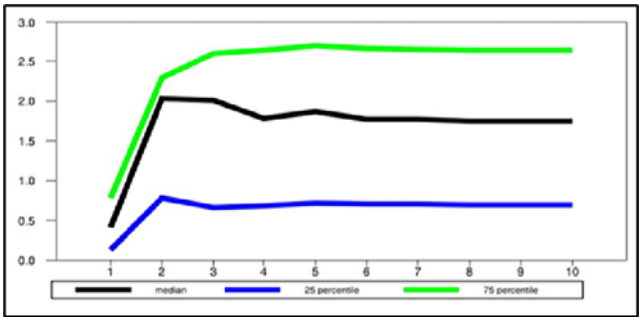
However, the magnitude of the response remains relatively modest, suggesting that the transmission of oil windfalls to household welfare is partial. While higher revenues may support incomes and demand, structural constraints limit the overall expansion of consumption (Beck, 2018; Kinda, Mlachila & Ouedraogo, 2016; Tiedemann et al., 2024). In particular, evidence from Cameroon shows that fuel price reforms and domestic pricing mechanisms play a key role in shaping how international oil price changes affect household purchasing power and consumption behaviour (Nguetse Tegoum, Takamgno, & Neguem, 2018).

Figure 6: Impulse Response of Public Investment to a Common Positive Oil Price Shock



Source: Authors

Figure 7: Impulse Response of Household final consumption to a Common Positive Oil Price Shock



Source: Authors

Empirical Results on Forecast Error Variance Decomposition

Variance decomposition results provide additional insight into the role of oil shocks in shaping macroeconomic fluctuations. While oil prices strongly influence fiscal revenues, their contribution to broader macroeconomic variability remains limited. In particular, oil shocks explain only about 3.18% of GDP variability at a five-year horizon, despite the positive short-run responses observed in the impulse-response analysis. This confirms that oil-driven growth effects remain quantitatively marginal in the long run and underscores the limited persistence of these effects.

This contrast suggests that the transmission of oil shocks to aggregate economic activity remains incomplete. Although oil revenues represent a major source of fiscal income, their effects are only partially transmitted to the wider economy. Several structural mechanisms help explain this outcome. The extractive sector in many CEMAC economies operates as an enclave activity with weak linkages to domestic production systems, generating limited spillovers to manufacturing and services. In addition, the high import content of extraction activities and foreign ownership structures reduce domestic value-added transmission. Furthermore, governance constraints and inefficiencies in expenditure allocation limit the capacity of governments to transform oil windfalls into sustained productive investment.

Taken together, these factors indicate that oil shocks strongly influence fiscal aggregates but only weakly affect long-term growth dynamics. This interpretation is consistent with the resource-curse literature, which emphasizes limited structural transformation in commodity-dependent economies (Collier & Venables, 2011; Arezki et al., 2012). The FEVD results qualify the impulse-response findings: oil shocks generate short-term macroeconomic gains, yet their long-run contribution to growth remains modest due to persistent structural and institutional constraints. These results highlight the importance of economic diversification and stronger fiscal institutions capable of converting resource revenues into broader productive capacity.

Table 3: Forecast Error Variance Decomposition of Macroeconomic Variables Following a One Standard Deviation Common Positive Oil Price Shock

Horizon	GDP (%)	Inflation (%)	Investment (%)	Household Consomption (%)
1	0.60	25.36	3.72	0.43
2	1.48	19.55	5.42	2.27
3	2.38	17.13	5.90	2.90
4	2.87	16.43	6.50	3.02
5	3.18	15.21	6.95	3.10

Source: Authors

Discussion: the rent paradox and institutional quality

The results reveal a clear asymmetry in fiscal adjustment following oil price shocks. While public revenues react strongly and contribute significantly to macro-fiscal volatility, public expenditures remain comparatively rigid. This divergence suggests that the transmission of oil windfalls to the domestic economy is shaped not only by fiscal capacity but also by institutional and governance factors that constrain the effective allocation of public resources.

Unpacking Fiscal Inertia: the Institutional Transmission Channel

One key result is the persistence of fiscal inertia in CEMAC economies. Whereas revenues react rapidly to oil shocks and operate as immediate transmission channels, expenditures adjust more slowly and only partially, exhibiting a ratchet-type adjustment pattern. This rigidity reflects a combination of structural and political-economy factors.

First, public budgets remain heavily concentrated in current expenditures, particularly public wages, which often function as implicit social stabilisers. Given the importance of the public sector as a source of formal employment in several CEMAC countries, reducing wage bills during downturns entails significant political and social costs. As a result, a large share of public spending becomes structurally inelastic to commodity price fluctuations, consistent with evidence on fiscal rigidity in resource-dependent economies (Ossowski et al., 2008).

Second, political-economy mechanisms associated with the voracity effect (Tornell & Lane, 1999) suggest that windfall revenues during boom periods are rapidly committed to multi-year infrastructure projects or distributive networks. Once initiated, these commitments are difficult to reverse due to contractual obligations and sunk costs, often leading to continued spending financed through borrowing rather than adjustment.

Third, weaknesses in public financial management systems limit governments' capacity to implement counter-cyclical fiscal policies. Constraints related to procurement efficiency, expenditure planning and the absence of effective stabilisation mechanisms generate a pattern of constrained pro-cyclicality, in which revenues increase sharply with oil prices while expenditures adjust slowly and only partially. As a result, oil windfalls are not systematically transformed into productive investment.

Governance constraints and the allocation of oil rents

Beyond structural rigidities, governance-related factors further weaken the fiscal transmission mechanism. Limited transparency and accountability reduce the efficiency with which additional revenues are translated into development-oriented expenditure (Transparency International, 2020). In many cases, spending priorities favour short-term or politically visible uses rather than investments capable of generating sustained productivity gains.

Administrative limitations reinforce this pattern. Complex budgetary procedures and implementation delays constrain governments' ability to scale up investment rapidly following positive revenue shocks, which helps explain the investment lag identified in the impulse-response analysis. As a result, fiscal expansion during oil booms remains only partially connected to broader structural transformation.

Rent paradox and the limits of oil-led growth

These findings are consistent with the resource-curse literature, which emphasises the role of institutional quality in shaping the developmental impact of natural resource rents (Collier & Venables, 2011; Arezki et al., 2012). However, the evidence from CEMAC introduces an important nuance. While previous studies often highlight strong fiscal pro-cyclicality in developing economies (Talvi & Végh, 2005), the results here point instead to a form of constrained pro-cyclicality, where revenues react strongly but expenditures remain relatively rigid.

This configuration gives rise to a rent transmission paradox: oil booms significantly increase public revenues but fail to translate proportionally into productive expenditure or sustained economic growth. This paradox reflects a disconnect between revenue generation and expenditure effectiveness, rather than a lack of resources per se. The weak long-run contribution of oil shocks to GDP variability identified in the variance decomposition analysis reinforces this interpretation.

Comparatively, the CEMAC results differ from those observed in other oil-exporting regions. In many Middle Eastern economies, oil price shocks tend to generate stronger and more persistent GDP responses, largely due to the scale of public investment programmes and higher fiscal absorption capacity, which allow oil revenues to be rapidly converted into productive capital (Berument, Ceylan, & Dogan, 2010; El Anshasy & Bradley, 2012). In contrast, oil-exporting economies in Latin America have often experienced greater macroeconomic volatility associated with pro-cyclical fiscal behaviour and institutional constraints in the management of commodity revenues (Van der Ploeg, 2011; Ross, 2015).

The CEMAC case appears closer to that of several African oil exporters, such as Nigeria and Angola, where oil price fluctuations strongly affect fiscal balances and external accounts but generate limited spillovers to the broader economy due to weak sectoral linkage and structural dependence on extractive activities (Olomola & Adejumo, 2006; Badeeb, Lean, & Clark, 2017). This comparison reinforces the interpretation that institutional quality and economic structure are central in shaping the macroeconomic transmission of oil shocks. These findings provide a coherent framework for interpreting the macro-fiscal dynamics observed in CEMAC economies and their implications for long-term development.

Comparative Analysis and Regional Heterogeneity

Building on the institutional mechanisms discussed in Section 5.4, the structural Panel VAR analysis reveals substantial heterogeneity across CEMAC economies, reflecting differences in hydrocarbon dependence, diversification patterns and exposure to regional spillovers.

A first group comprising the Republic of the Congo, Equatorial Guinea and Gabon exhibits strong sensitivity to oil price shocks. These economies rely heavily on petroleum revenues and therefore display elevated fiscal and macroeconomic volatility. Equatorial Guinea and the Republic of the Congo show particularly strong

links between oil prices, GDP and fiscal revenues, confirming the central role of hydrocarbon rents identified in the previous sections. Gabon, however, demonstrates weaker growth transmission, suggesting that oil windfalls are only partially converted into broader economic activity, a pattern consistent with Dutch disease dynamics and the structural decoupling highlighted in the variance decomposition results.

A second group, including Cameroon and Chad, appears comparatively more resilient. Cameroon's broader productive base moderates the transmission of oil shocks, reinforcing the idea that economic diversification acts as a structural buffer against commodity price volatility. Chad, while also an oil producer, exhibits relatively stable responses in expenditure and inflation, indicating a more moderate transmission of shocks than in more specialised economies. This behaviour is consistent with the limited and delayed expenditure adjustments discussed in the fiscal analysis.

A third case is represented by the Central African Republic, which is not a major oil producer but still displays positive responses to oil price shocks. This pattern confirms the presence of regional spillovers within the monetary union, whereby oil dynamics in producing countries affect neighbouring economies through trade linkages, fiscal interactions and shared monetary conditions.

These findings are consistent with empirical evidence highlighting structural heterogeneity within African commodity-exporting regions (Besso & Feubi Pamen, 2017; Okiemy & Mbongo, 2021). At the same time, two important nuances emerge. First, unlike conventional models of oil-exporting economies where oil shocks strongly drive long-run growth, the variance decomposition results show that oil explains only a limited share of GDP variability, around 3.18 percent at a five-year horizon. This supports the interpretation of a weak transmission of oil revenues to sustained economic activity. Second, in contrast with the expectation of strongly pro-cyclical expenditure in developing economies, spending responses remain comparatively muted, in line with the fiscal inertia and institutional constraints identified in Section 5.4.

Overall, the comparative evidence suggests that resilience depends less on resource abundance itself than on economic structure and the capacity to absorb and allocate resource inflows effectively. Economies with more diversified productive bases exhibit weaker transmission of oil shocks, whereas highly specialised systems remain more exposed to commodity cycles. This regional heterogeneity reinforces the importance of accounting for country-specific structural conditions when analysing the macroeconomic effects of oil price fluctuations within the CEMAC area.

VI. Conclusion And Policy Implications

Conclusion

This study provides an empirical assessment of the macroeconomic and fiscal transmission of oil price shocks across the CEMAC region over the period 1994–2022. Using the Structural Panel VAR framework developed by Pedroni (2013), the analysis distinguishes between common regional shocks and country-specific disturbances, offering a refined understanding of how commodity price volatility propagates within a resource-dependent monetary union.

The results challenge the conventional assumption that oil wealth automatically translates into sustained economic growth. While positive oil price shocks generate strong and immediate increases in public revenues, explaining up to 38 percent of their long-run variability, their contribution to GDP fluctuations remains limited, at around 3.18 percent at a five-year horizon. This result points to a weak transmission of oil revenues to the real economy and highlights a structural decoupling between the extractive sector and broader economic activity.

The analysis further reveals a pattern of constrained procyclicality. Fiscal revenues react rapidly to oil price increases, whereas public expenditures remain comparatively rigid due to institutional and administrative constraints. This asymmetry is reflected in the delayed response of investment, which becomes positive only from the second year following a shock. The evidence suggests that the main constraint lies not in resource availability, but in the capacity to effectively allocate and implement public spending.

Significant cross-country heterogeneity also emerges. Economies with more diversified productive structures, such as Cameroon, display greater resilience to oil shocks, while highly oil-dependent economies such as the Republic of the Congo and Equatorial Guinea remain more exposed to volatility and weaker transmission effects. At the same time, the presence of regional spillovers highlights the importance of common monetary and economic linkages within the CEMAC area.

These findings support the existence of a rent transmission paradox, whereby oil price increases generate substantial fiscal gains but translate only weakly into sustained and broad-based economic growth. Institutional quality, fiscal management capacity and economic structure therefore emerge as the key factors shaping the developmental impact of natural resource rents in the region. This raises important questions regarding the long-term sustainability of oil-led development strategies in resource-dependent monetary unions.

Policy Implications: Toward Realistic Reform Pathways

The empirical evidence points less toward broad normative prescriptions than toward pragmatic reforms adapted to existing institutional constraints in CEMAC countries.

Improving fiscal smoothing within existing frameworks appears as a first priority. Rather than creating complex new fiscal institutions, governments could strengthen current budgetary systems by introducing simple and transparent revenue smoothing rules embedded in national budget processes and regional surveillance mechanisms coordinated with the Bank of Central African States. Incremental adjustments are likely to be more effective than ambitious institutional innovations in contexts where administrative capacity remains limited.

Reducing the investment lag requires a focus on expenditure execution. The delayed response of investment suggests that the main constraint lies not in financing but in implementation capacity. Streamlining procurement procedures, improving project preparation prior to budget approval, and strengthening execution mechanisms would allow oil windfalls to be converted more rapidly into productive capital.

Strengthening domestic economic linkages also emerges as a key lever. Rather than pursuing broad and often difficult diversification strategies, policy efforts could prioritise sectors already connected to petroleum activities, including logistics, maintenance services, energy infrastructure and regional supply chains. Such an approach would help reduce the enclave nature of extraction and increase domestic multiplier effects.

Enhancing fiscal transparency and expenditure quality remains central. The weak response of public spending points to governance constraints in the allocation of resources. Improving expenditure tracking, reinforcing audit systems and increasing transparency in project selection would strengthen the link between oil revenues and development outcomes without requiring large scale institutional restructuring.

Deepening practical regional cooperation offers additional gains. The presence of spillover effects, including for non oil producing countries such as the Central African Republic, highlights the importance of coordinated action within the monetary union. Strengthening trade corridors, improving infrastructure coordination and reinforcing macroeconomic dialogue could enhance collective resilience to external shocks.

Overall, oil price shocks in CEMAC economies operate primarily through fiscal channels rather than broad based productive expansion. The combination of strong revenue responses, delayed investment adjustment and weak long run growth effects confirms the existence of a structural decoupling between the extractive sector and the real economy. Improving resilience therefore depends less on ambitious structural redesign than on realistic institutional improvements and a gradual strengthening of domestic linkages.

References

[1]. Arezki, R., Hamilton, K., & Kazimov, K. (2011). Resource Windfalls, Macroeconomic Stability And Growth: The Role Of Political Institutions (IMF Working Paper No. WP/11/142). International Monetary Fund. Https://Doi.Org/10.5089/9781463902315.001

[2]. Beck (2018). CEMAC Economic Update, June 2018: Reinforcing The Resilience Of The CEMAC Economies. World Bank. Https://Openknowledge.Worldbank.Org/Handle/10986/29965

[3]. Badeeb, Lean & Clark (2017). Badeeb, R. A., Lean, H. H., & Clark, J. (2017). The Evolution Of The Natural Resource Curse Thesis: A Critical Literature Survey. Resources Policy, 51, 123–134. Https://Doi.Org/10.1016/J.Resourpol.2016.10.015

[4]. Barnett, S., & Ossowski, R. (2003). Operational Aspects Of Fiscal Policy In Oil-Producing Countries (IMF Working Paper No. 02/177). International Monetary Fund. Https://Doi.Org/10.5089/9781451858907.001

[5]. Baumeister, C., & Peersman, G. (2013). Time-Varying Effects Of Oil Supply Shocks On The US Economy. American Economic Journal: Macroeconomics, 5(4), 1–28. Https://Doi.Org/10.1257/Mac.5.4.1

[6]. Bernanke, B. S., Gertler, M., & Watson, M. W. (1997). Systematic Monetary Policy And The Effects Of Oil Price Shocks. Brookings Papers On Economic Activity, 1997(1), 91–142. Https://Doi.Org/10.2307/2534705

[7]. Berument, H., Ceylan, N. B., & Dogan, N. (2010). The Impact Of Oil Price Shocks On The Economic Growth Of Selected MENA Countries. The Energy Journal, 31(1), 149–176.Https://Doi.Org/10.5547/ISSN0195-6574-EJ-Vol31-No1-8

[8]. Besso, C. P., & Feubi Pamen, E. (2017). Oil Price Shocks And Macroeconomic Dynamics In CEMAC Countries. African Development Review, 29(S1), 1–15. Https://Doi.Org/10.1111/1467-8268.12245

[9]. Biedermann, Z., Barczikay, T., & Szalai, L. (2023). The Dutch Disease In Angola. Engineering Proceedings, 39(1), 40. Https://Doi.Org/10.3390/Engproc2023039040

[10]. Blanchard, O. J., & Galí, J. (2007). The Macroeconomic Effects Of Oil Price Shocks (NBER Working Paper No. 13368). National Bureau Of Economic Research. Https://Doi.Org/10.3386/W13368

[11]. Blanchard, O. J., & Quah, D. (1989). The Dynamic Effects Of Aggregate Demand And Supply Disturbances. American Economic Review, 79(4), 655–673. Https://Doi.Org/10.2307/1827924

[12]. BP. (2022). Statistical Review Of World Energy 2022 (71st Ed.). British Petroleum.

[13]. Breitung, J. (2000). The Local Power Of Some Unit Root Tests For Panel Data. Advances In Econometrics, 15, 161–177. Https://Doi.Org/10.1016/S0731-9053(00)15006-6

[14]. Commission De La CEMAC. (2021). Rapport De La Surveillance Multilatérale. Communauté Économique Et Monétaire De l'Afrique Centrale.

[15]. Collier, P., & Venables, A. J. (2011). Plundered Nations? Successes And Failures In Natural Resource Extraction. Palgrave Macmillan.

[16]. Collier, P., & Venables, A. J. (2010). International Rules For Trade In Natural Resources. Journal Of Globalization And Development, 1(1), Article 8. Https://Doi.Org/10.2202/1948-1837.1027
[17]. Cologni, A., & Manera, M. (2008). Oil Prices, Inflation And Interest Rates In A Structural Cointegrated VAR Model For The G-7 Countries. Energy Economics, 30(3), 856–888. Https://Doi.Org/10.1016/J.Eneco.2008.01.006
[18]. Corden, W. M., & Neary, J. P. (1982). Booming Sector And De-Industrialisation. The Economic Journal, 92(368), 825–848. Https://Doi.Org/10.2307/2232553
[19]. El Anshasy, A. A., & Bradley, M. D. (2012). Oil Prices And The Fiscal Policy Response In Oil-Exporting Countries. Journal Of Policy Modeling, 34(5), 605–620. Https://Doi.Org/10.1016/J.Jpolmod.2011.10.002
[20]. Granger, C. W. J., & Newbold, P. (1974). Spurious Regressions In Econometrics. Journal Of Econometrics, 2(2), 111–120. Https://Doi.Org/10.1016/0304-4076(74)90034-7
[21]. Hamilton, J. D. (1983). Oil And The Macroeconomy Since WWII. Journal Of Political Economy, 91(2), 228–248. Https://Doi.Org/10.1086/261140
[22]. Hamilton, J. D. (1994). Time Series Analysis. Princeton University Press.
[23]. Hamilton, J. D. (1996). This Is What Happened To The Oil Price-Macroeconomy Relationship. Journal Of Monetary Economics, 38(2), 215–220. Https://Doi.Org/10.1016/S0304-3932(96)01282-2
[24]. Hamilton, J. D. (2003). What Is An Oil Shock? Journal Of Econometrics, 113(2), 363–398. Https://Doi.Org/10.1016/S0304-4076(02)00207-5
[25]. International Monetary Fund. (2012). Macroeconomic Policy Frameworks For Resource-Rich Developing Countries.
[26]. International Monetary Fund. (2022). Central African Economic And Monetary Community (CEMAC): Staff Report On Common Policies In Support Of Member Countries' Reform Programs. Https://Doi.Org/10.5089/9798400226344.002
[27]. International Monetary Fund. (2023). Central African Economic And Monetary Community (CEMAC): Common Policies In Support Of Member Countries' Reform Programs (Country Report No. 23/245). Https://Doi.Org/10.5089/9798400248438.002
[28]. Jimenez-Rodriguez, R., & Sanchez, M. (2005). Oil Price Shocks And Real GDP Growth: Empirical Evidence For Some OECD Countries. Applied Economics, 37(2), 201–228. Https://Doi.Org/10.1080/0003684042000281561
[29]. Jones, D. W., Leiby, P. N., & Paik, I. K. (2004). Oil Price Shocks And The Macroeconomy: What Has Been Learned Since 1996. The Energy Journal, 25(2), 1–32. Https://Doi.Org/10.5547/ISSN0195-6574-EJ-Vol25-No2-1
[30]. Kaminsky, G. L., Reinhart, C. M., & Végh, C. A. (2004). When It Rains, It Pours: Procyclical Capital Flows And Macroeconomic Policies. NBER Macroeconomics Annual, 19, 11–82. Https://Doi.Org/10.1086/Ma.19.3585327
[31]. Kilian, L. (2009). Not All Oil Price Shocks Are Alike: Disentangling Demand And Supply Shocks In The Crude Oil Market. American Economic Review, 99(3), 1053–1069. Https://Doi.Org/10.1257/Aer.99.3.1053
[32]. Kilian, L., & Lütkepohl, H. (2017). Structural Vector Autoregressive Analysis. Cambridge University Press. Https://Doi.Org/10.1017/9781108164818
[33]. Kinda, T., Mlachila, M., & Ouedraogo, R. (2016). Commodity Price Shocks And Financial Sector Fragility. IMF Working Paper WP/16/12. Https://Doi.Org/10.5089/9781513556214.001
[34]. Levin, A., Lin, C. F., & Chu, C. S. J. (2002). Unit Root Tests In Panel Data: Asymptotic And Finite-Sample Properties. Journal Of Econometrics, 108(1), 1–24. Https://Doi.Org/10.1016/S0304-4076(01)00098-7
[35]. Lütkepohl, H. (2005). New Introduction To Multiple Time Series Analysis. Springer. Https://Doi.Org/10.1007/978-3-540-27752-1
[36]. Mork, K. A. (1989). Oil And The Macroeconomy When Prices Go Up And Down: An Extension Of Hamilton's Results. Journal Of Political Economy, 97(3), 740–744. Https://Doi.Org/10.1086/261625
[37]. Mork, K. A. (1994). Business Cycles And The Oil Market. The Energy Journal, 15(Special Issue), 15–38. Https://Doi.Org/10.5547/ISSN0195-6574-EJ-Vol15-Nosi-2
[38]. Nguetse Tegoum, P. J., Takamgno, C. S., & Neguem, E. L. (2018). The Impact Of The Liberalization Of Petroleum Product Prices On The Economy Of Cameroon (AERC Research Paper No. 346). African Economic Research Consortium.
[39]. OECD. (2014). OECD Factbook 2014: Economic, Environmental And Social Statistics. OECD Publishing. Https://Doi.Org/10.1787/Factbook-2014-En
[40]. Okiemy, M., & Mbongo, K. G. (2021). Effects Of The Oil Shocks, Interest Rate, And Current Account Balance On The Sovereign Debt Of CEMAC Member Countries. Modern Economy, 12(1), 194–214. Https://Doi.Org/10.4236/Me.2021.121010
[41]. Olomola, P. A., & Adejumo, A. V. (2006). Oil Price Shocks And Macroeconomic Activities In Nigeria. International Research Journal Of Finance And Economics, 3, 28-34.
[42]. Ossowski, R., Villafuerte, M., Medas, P. A., & Thomas, T. (2008). Managing The Oil Revenue Boom: The Role Of Fiscal Institutions (IMF Occasional Paper No. 260). International Monetary Fund. Https://Doi.Org/10.5089/9781589067189.084
[43]. Pedroni, P. (2004). Panel Cointegration: Asymptotic And Finite Sample Properties Of Pooled Time Series Tests With An Application To The PPP Hypothesis. Econometric Theory, 20(3), 597–625. Https://Doi.Org/10.1017/S0266466604203073
[44]. Pedroni, P. (2013). Structural Panel Vars. Econometrics, 1(2), 180–206. Https://Doi.Org/10.3390/Econometrics1020180
[45]. Pesaran, M. H., Schuermann, T., & Weiner, S. M. (2004). Modeling Regional Interdependencies Using A Global Error-Correcting Macroeconometric Model. Journal Of Business & Economic Statistics, 22(2), 129–162. Https://Doi.Org/10.1198/073500104000000019
[46]. Pritchett, L. (2000). The Tyranny Of Concepts: CUDIE (Cumulated, Depreciated Investment Effort) Is Not Capital. Journal Of Economic Growth, 5(4), 361–384. Https://Doi.Org/10.1023/A:1009852226296
[47]. Rasche, R. H., & Tatom, J. A. (1977). The Effects Of The New Energy Regime On Economic Capacity, Production, And Prices. Federal Reserve Bank Of St. Louis Review, 59(4), 2-12.
[48]. Rotemberg, J. J., & Woodford, M. (1996). Imperfect Competition And The Effects Of Energy Price Increases On Economic Activity. Journal Of Money, Credit And Banking, 28(4), 549–577. Https://Doi.Org/10.2307/2078023
[49]. Sims, C. A. (1980). Macroeconomics And Reality. Econometrica, 48(1), 1–48. Https://Doi.Org/10.2307/1912017
[50]. Stock, J. H., & Watson, M. W. (2001). Vector Autoregressions. Journal Of Economic Perspectives, 15(4), 101–115. Https://Doi.Org/10.1257/Jep.15.4.101
[51]. Talvi, E., & Végh, C. A. (2005). Tax Base Variability And Procyclical Fiscal Policy In Developing Countries. Journal Of Development Economics, 78(1), 156–190. Https://Doi.Org/10.1016/J.Jdeveco.2004.07.002
[52]. Tchitchoua, J., & Eyimi Okpwae, A. D. (2021). Impact De La Hausse Du Cours Du Pétrole Sur La Croissance Economique Des Pays De La CEMAC. Revue Algérienne d'Économie Et De Gestion, 15(1), 1170–1189.
[53]. Tiedemann, S., Kinda, T., Mlachila, M., & Ouedraogo, R. (2024). Commodity Price Shocks And Macroeconomic Outcomes In Sub-Saharan Africa. IMF Working Paper.
[54]. Tornell, A., & Lane, P. R. (1999). The Voracity Effect. American Economic Review, 89(1), 22–46. Https://Doi.Org/10.1257/Aer.89.1.22

[55]. Van Der Ploeg, F. (2011). Natural Resources: Curse Or Blessing? Journal Of Economic Literature, 49(2), 366–420. Https://Doi.Org/10.1257/Jel.49.2.366
[56]. Transparency International. (2020). Corruption Perceptions Index 2020.
[57]. World Bank. (2021). CEMAC Quarterly Economic Barometer - Vol. 2: Fall 2021. World Bank.
[58]. Zhang, D., & Broadstock, D. C. (2014). Impact Of International Oil Price Shocks On Consumption Expenditures In ASEAN And East Asia (ERIA Discussion Paper No. 2014-24). Economic Research Institute For ASEAN And East Asia.