Artigo original

http://dx.doi.org/10.18623/rvd.v22.n6.4007

UNDERSTANDING THE REVENUE PROFILES OF OPEC MEMBER COUNTRIES IN THE FACE OF OIL PRICE FLUCTUATIONS AND ECONOMIC POLICY UNCERTAINTY

ENTENDENDO OS PERFIS DE RECEITA DOS PAÍSES MEMBROS DA OPEP DIANTE DAS FLUTUAÇÕES DO PREÇO DO PETRÓLEO E DA INCERTEZA DA POLÍTICA ECONÔMICA

Article received on: 8/15/2025
Article accepted on: 11/14/2025

Umoru Husseini Tijani*
*Department of Banking and Finance University of Nigeria, Enugu Campus, Nigeria
husseinitijaniumoru@gmail.com

Ebere Ume Kalu*
*Department of Banking and Finance University of Nigeria, Enugu Campus, Nigeria
ebere.kalu@unn.edu.ng

Wilfred Isioma Ukpere**
**Department of Industrial Psychology and People Management, School of Management, College of Business Economics, University of Johannesburg, South Africa
wiukpere@uj.ac.za

Francis E. Monyei**
**Department of Industrial Psychology and People Management, School of Management, College of Business Economics, University of Johannesburg, South Africa
monyei_francis@yahoo.com

The authors declare that there is no conflict of interest

Abstract
Majority of OPEC member countries are familiar with the concept of 'Dutch Disease,' as they have neglected other sectors of their economy due to the revenue from crude oil. This has resulted to a structural imbalance and fiscal vulnerabilities in a good number of these economies. This is exacerbated by the oil market that remains highly volatile in the light of global uncertainties and geopolitical tensions. While existing literatures have explored these issues in isolation, this study investigated the interactive effect of oil price fluctuations and economic policy uncertainties. The study seeks to evaluate the responsiveness of revenue profiles of OPEC member countries to oil price fluctuations and economic policy uncertainties. Autoregressive Distributed Lag (ARDL) was employed for the countries-by-countries estimation to address the aggregative bias which is common with panel data estimation. The findings revealed that the government revenue of OPEC member countries has a positive and significant relationship with OPEC spot prices and a non-significant relationship with the other major global oil pricing benchmarks like NYMEX WTI, ICE Brent and DME Oman. The study also discovered that both global economic policy uncertainties and the interactive effect of oil price fluctuations and global uncertainties have a significant but negative relationship with the government revenue of OPEC member countries. The study suggests the acceleration of economic diversifications to reduce over-reliance on oil revenue while creating a safeguard against oil price volatilities.

Keywords: Oil Price Benchmark. OPEC. Revenue Profile. Economic Policy Uncertainty.

Resumo
A maioria dos países membros da OPEP está familiarizada com o conceito de "Doença Holandesa", visto que negligenciaram outros setores de suas economias devido à receita proveniente do petróleo bruto. Isso resultou em um desequilíbrio estrutural e vulnerabilidades fiscais em um bom número dessas economias. Essa situação é exacerbada pela alta volatilidade do mercado de petróleo em função das incertezas globais e das tensões geopolíticas. Enquanto a literatura existente explorou essas questões isoladamente, este estudo investigou o efeito interativo das flutuações do preço do petróleo e das incertezas da política econômica. O estudo busca avaliar a sensibilidade dos perfis de receita dos países membros da OPEP às flutuações do preço do petróleo e às incertezas da política econômica. O modelo Autorregressivo de Defasagem Distribuída (ARDL) foi empregado para a estimação país a país, a fim de lidar com o viés de agregação comum em estimativas de dados em painel. Os resultados revelaram que a receita governamental dos países membros da OPEP tem uma relação positiva e significativa com os preços spot da OPEP e uma relação não significativa com outros importantes índices globais de preços do petróleo, como NYMEX WTI, ICE Brent e DME Oman. O estudo também descobriu que tanto as incertezas da política econômica global quanto o efeito interativo das flutuações do preço do petróleo e das incertezas globais têm uma relação significativa, porém negativa, com a receita governamental dos países membros da OPEP. O estudo sugere a aceleração da diversificação econômica para reduzir a dependência excessiva da receita do petróleo, criando, ao mesmo tempo, uma proteção contra a volatilidade dos preços do petróleo.

Palavras-chave: *Preço de referência do petróleo. OPEP. Perfil de receita. Incerteza da política econômica.*

1 INTRODUCTION

Energy serves as the backbone or fuel of every economic development. This makes oil a crucial variable of interest to both developed and developing economies (Aimer, 2018). Although efforts are underway to find more sustainable and environmentally friendly alternatives, crude oil remains the world's primary energy

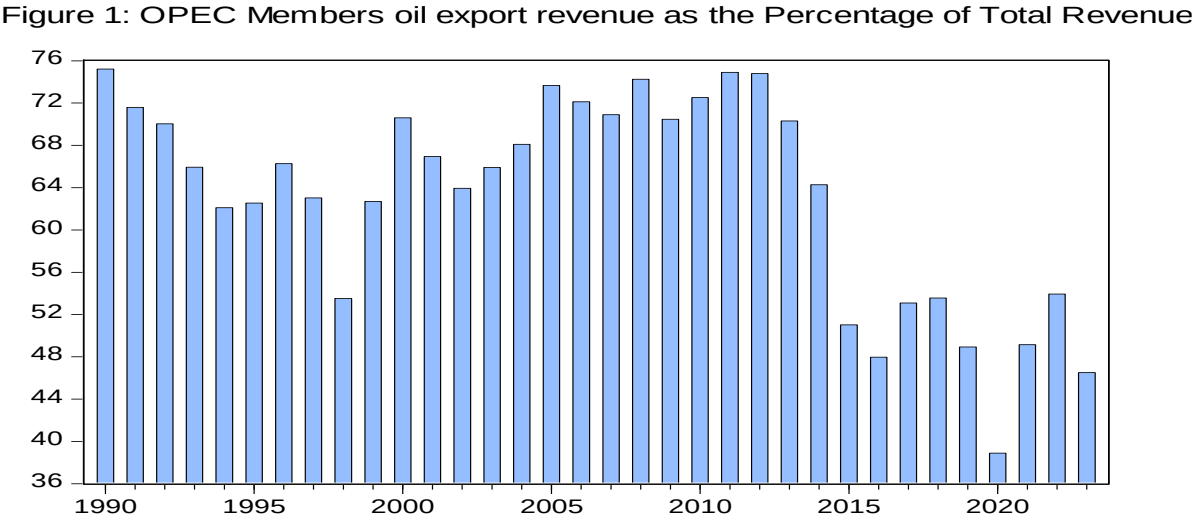
source (Kalu et al., 2019). Crude price is vital to all nations especially oil-producing and oil-exporting nations and this has made it to be of great research interest. Models or frameworks to forecast oil prices continue to evolve even in the face of persistent volatility of oil prices. The diverse sources of oil price fluctuations vary in magnitude, direction, and persistence which largely complicate forecasts (Abdlaziz et al., 2018). For oil-exporting countries, oil is more than merely a fuel for industrial growth. Economic activities in most of these nations are significantly influenced by global oil prices.

Theoretically, a stable or rising oil price should have positive implications for these countries, as it results in increased revenues at the same production level (Hassan 2021). However, many of these countries suffer from what scholars refer to as the 'Dutch disease' syndrome, a condition of structural economic imbalance caused by mismanagement of oil revenues, leading to adverse impacts on the economy and reducing the competitiveness of other sectors or exportable products in the global market (Abdlaziz et al., 2018). The revenue from oil exports, often called 'black gold,' has led many of these countries to neglect investments in education and human capacity development (Hassan 2021). This neglect contributes to a shortage of skilled labour and a drop in human capacity. This creates a multiplier effect that underpins the 'resource curse theory' (Yang et al., 2017 and Cai et al., 2024).

Most oil exporting countries belong to the Organisation of Petroleum Exporting Countries (OPEC). The overreliance of most of these oil exporting countries on revenue has led to their fiscal stability becoming dependent on stable income from oil, which in turn depends on stable or positive changes in global oil price (Nasir *et al.,* 2018). This is further buttressed by the oil export revenue to total revenue ratio of OPEC member nations which has averaged over 70% over the last three decades as shown in fig.1.

Figure 1

O Pec Members Oil Export Revenue as the percentage of total revenue



Source: OPEC Statistical Bulletin 2024

Despite the various attempts at diversification with mixed success, oil export still accounts for over 50 percent of OPEC members' total export receipts and hence, the importance of the stability of global oil prices to these countries. OPEC was established in Baghdad in 1960 with the objective of stabilizing the oil market around a 'fair' price through the regulation of the production quotas of its members (Kalu *et al.,* 2020). And to ensure an efficient and constant supply of oil to consuming nations, thereby facilitating a fair return on capital to investors in the industry (Pierru *et al.,* 2018). The establishment of OPEC marked a turning point in the oil market, which, before then, was controlled by the conglomerate of Western companies popularly referred to as the 'seven sisters' (Pierru *et al.,* 2018). These oil companies were in control of the production and distribution of global oil without accountability to the oil-rich countries beyond tax payment (Çemrek *et al.,* 2018). This was possible because they referred to it as the colonial concession agreement. The creation of OPEC was triggered by the move by these companies to cut prices to the detriment of oil-rich countries, and it enabled the control of oil resources to change from companies to the sovereign nations (Çemrek *et al.,* 2018). It started with five founding members in Iran, Iraq, Kuwait, Saudi Arabia, and Venezuela (Kalu *et al.,* 2020). Over the years, the membership was expanded to include other oil-producing nations like Algeria, Angola, Libya, Qatar, Nigeria, the United Arab Emirates, Ecuador, Gabon, Equatorial Guinea, and the Republic of the Congo (Kalu *et al.,* 2020).

OPEC influences the market price by acting as a swing producer through adjusting its members' production quotas to balance the market (Lin et al., 2021). The effectiveness of OPEC in achieving its objectives depends on maximum cooperation among all members and sometimes non-member allies. Therefore, the organisation's decision-making process is democratic, conducted through regular meetings and voting, with all members having equal voting rights regardless of production capacity (Lin et al., 2021). Sometimes, OPEC's effectiveness is weakened by a failure to enforce production quotas, as some members display the 'prisoner's dilemma' syndrome, abandoning potential collective benefits in favour of short-term self-interest (Roeben, 2024). This pattern reflects the organisation's mixed success in fulfilling its objectives since its inception. Between 1970 and the 1980s, OPEC was highly effective in manipulating the global oil price through supply regulation (Farimani et al., 2019). However, this effectiveness waned in the mid to late 1980s when members cheated on quotas (Farimani et al., 2019). Additionally, the rise of US shale oil and discovery of oil in other non-member countries diminished market control, leading to a shift from defending the market price to protecting market share (Roeben, 2024). This shift prompted the formation of OPEC+ through alliances with non-OPEC producers such as Russia, Mexico, and Kazakhstan, which enhanced the organisation's stability and effectiveness. Nevertheless, this stability has been challenged by events like the 2020 oil price war and tensions between Saudi Arabia and Russia, Russo-Ukrainian spate, including the COVID-19 pandemic and the global financial crises (Roeben, 2024).

OPEC hold and influence over the global oil market price is exacerbated by global economic policy uncertainty. The oil market, in nature, is a very volatile market susceptible to geopolitical tensions. The environmental concerns over fossil fuel uses, the growing push for decarbonisation, and the global shift towards renewable energy sources are increasing the complexities of the environment in which OPEC operates (Chen *et al.*, 2024). The organisation is not only challenged with maintaining relevance but also fighting to secure the economic future of its member countries, whose fiscal resilience is dependent on oil revenue. The already difficult tasks are made all the more challenging by the uncertainty surrounding the future of the oil industry. This uncertainty is transmitted into economic and regulatory activities of oil-exporting countries (Chen *et al.*, 2024). It is notable that high uncertainty is detrimental through the deferral of investments, increased credit spread and risk premiums, reduced business investments

and employment, and the delay in the purchase of durable goods by consumers (Wang et al., 2022). The effect of all these will be economic policy uncertainty at the micro and macro levels.

Economic policy uncertainty refers to the absence of clarity and predictability relating to government actions that affect economic decisions regarding goods (Mishra and Sahu, 2025). It includes vagueness or indecision about fiscal policy, such as taxation and government spending, and monetary policy, such as prevailing interest rate decisions, regulatory changes, trade agreements, and geopolitical events (Balakeffi *et al.*, 2019). The consequence of uncertainty on global economic dynamics can be profound due to its implications on macroeconomic variables like investment, consumption, employment, and the gross domestic product of countries (Balakeffi *et al.*, 2019). At the macro level, a high level of economic policy uncertainty will affect the flow of foreign direct investment as it affects investors' confidence, thereby reducing cross-border capital flows. Businesses will either postpone or reduce the magnitude of their investment plans due to unclear policies (Nwafor *et al.*, 2023). The response in the financial market will be high volatility due to the adjustment of asset prices to reflect the increased risks resulting from policy shifts.

At the global level, the regulatory authorities will react to heightened uncertainty by protecting their economies from external shock or spillover through protectionist behaviour that will disrupt the global supply chain (Alao and Payaslioglu, 2021). As aforementioned, the oil market is volatile and susceptible to geopolitical tensions, regulatory changes, and macroeconomic policy uncertainty. The oil market thrives on predictability, and therefore, the demand and supply expectations are influenced by uncertainties. Any uncertainty about the global economic prospects will affect oil price through its demand and supply dynamics (Alao and Payaslioglu, 2021). This can be destabilizing for oil-producing countries whose oil revenue forms a major percentage of their government income. Fluctuations in oil prices will therefore result in unreliable revenue projections, which might lead to fiscal deficits and borrowing pressures (Farooq *et al.*, 2025). Domestic economic policy uncertainty in oil-exporting countries will deter foreign investment in the exploration and production of crude oil. This is because investors are risk-averse and usually require assurance about their investment and will otherwise divert their funds to more predictable or secure sectors (Farooq *et al.*, 2025). A vicious circle is created in oil-exporting countries where oil price fluctuations will create

uncertainty, which will lead to lower investment in oil production infrastructure that will result in future uncertainty and price volatility in the oil market.

It is against this background that we assess how the revenue profile of the OPEC member countries responds to the circular situation where price volatility in oil leads to uncertainty, which in turn leads to price volatility. Most of the existing literature has focused on the effects of oil volatility on the economy, revenue levels, and other macroeconomic indicators of OPEC members and other oil-producing nations. This research adds to the existing body of knowledge by introducing some innovative methodological and analytical techniques that will distinguish it from the existing literature. First, as opposed to most of the studies of this kind that used panel data methodology in their estimation, the analysis and estimation in this study were done with country-specific analysis. This strategy allowed us to overcome the problem of the aggregation bias that normally conceals the heterogeneous response of the dependent variables to the explanatory variables. For example, the use of panel data would have unified the response in all the revenue profiles of OPEC member countries to oil price fluctuations and economic uncertainty. This would have painted a false picture because some of the OPEC countries like Saudi Arabia and United Arab Emirate haves established sovereign wealth funds and other means to diversify their revenues. With this, such countries can weather the fluctuations of oil prices and economic uncertainties better than countries like Nigeria, Gabon or Equatorial Guinea where mismanagement, poor institutions and corruption divert most public revenues. Thus, this peculiar country-by-country analytical approach provides better insight into the extent to which the revenue profiles in every country respond to oil price fluctuation as well as uncertainty in global economic policies. It is also facilitated by a comparative study of the reactions of one country to the other.

This research work is further differentiated from existing studies by not relying on a single aggregated global oil price but instead decomposing the proxies for global oil price into the major global oil price as done by Okwueze et al (2025). This approach allows for a more dynamic and pronounced analysis of the responsiveness of each OPEC country to different benchmarks such as West Texas Intermediate (WTI), ICE Brent, DME Oman and OPEC spot price. This methodology will facilitate the measurement of unique exposure, vulnerability, and contractual dependency of government revenue to a particular oil benchmark. The method enabled the assessment of the relative impact of

each benchmark on the revenue profile of OPEC members, differentiated by the exposure, vulnerability, and contractual dependence of each country to a given oil pricing benchmark. In addition to this, the incorporation of the Economic Policy Uncertainty (EPU) index into the analysis allows the capturing of other macroeconomic and geopolitical factors which can affect the price and revenue profile interconnectedness of these countries.

Additionally, while there are existing studies on economic policy uncertainty, such as those by Parvaneh and Marziyeh (2024) and Adekoya and Oliyide (2021), they were done in isolation or in the context of oil prices' effects on the market and not directly on fiscal performance or government revenue, especially within OPEC countries. This study is distinguished by integrating economic policy uncertainty in the evaluation of the impact of oil price fluctuations on the revenue and fiscal stability of OPEC member countries. This gives the study a dual-lens approach, which offers a more comprehensive understanding of the complex effects of these variables on the revenue performance of OPEC member countries.

The rest of the research work is divided into four sections. The first of which deals with the review of related literature, the third section deals with the methodology, the fourth and fifth sections deal with the results of the various analyses and the conclusion, respectively.

2 REVIEW OF LITERATURE

2.1 Fiscal policy in OPEC member countries

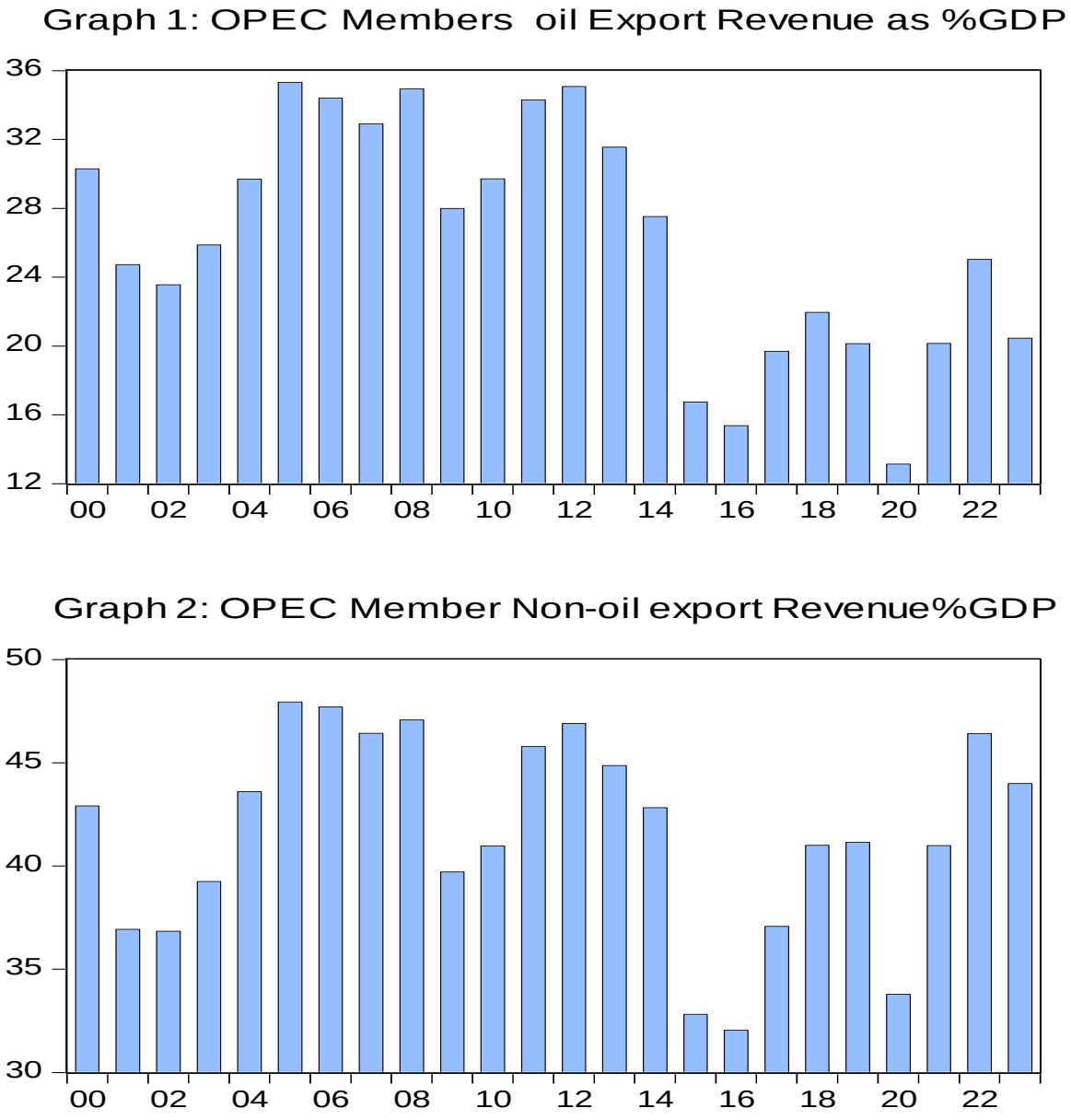
Fiscal policy in oil-exporting countries heavily relies on revenue from oil exports. Consequently, most of these nations face revenue volatility, reflecting the unpredictable nature of the global oil market. They also face an uncertain fiscal future, as crude oil is a finite resource that will eventually be depleted, and countries that fail to diversify their sources will see their revenues decline. This characteristic has made fiscal management more uncertain and challenging, impacting other macroeconomic variables (Sohag et al., 2024). First, fluctuations in oil prices can ripple through the entire economy via changes in government revenue. Oil price fluctuations can cause either positive or negative shocks to public finances. During periods of negative oil price volatility, governments often

respond by reducing public expenditure, leading to a contraction in economic activity and slower economic growth. Such austerity measures are often unpopular because of their impact on social welfare, causing governments to postpone implementation until negative revenue shocks are confirmed to be lasting or permanent. Second, research shows that even positive revenue shocks from oil price volatility do not guarantee a favourable multiplier effect in most OPEC countries (Sohag et al., 2024). This situation is often due to spending oil boom proceeds on non-tradable commodities, shifting resources between the non-tradable and tradable sectors. The result is increased unemployment, decreased production, and eventual de-industrialisation. Industries that generate positive spillovers to other sectors and attract capital tend to divert resources away from the industrial sector, which can have long-term negative effects on economic growth. Third, various scholars have documented that oil-exporting countries typically have a high capacity for borrowing during oil booms. However, weak institutions, corruption, and a lack of accountability in many of these nations often lead to excessive foreign borrowing during these periods, which becomes difficult to repay during downturns in oil prices and revenues (Sohag et al., 2024). This can result in larger adjustments if fiscal policies are tightened and borrowing capacity is constrained, leading to long-term negative impacts on development programmes.

There are implications on revenue shocks resulting from oil price fluctuations and the uncertainty surrounding the future of fossil fuels. This is due to increasing demand for environmentally friendly and renewable source of energy are the reason so many the literature often recommends the diversification of the economy and revenue source for oil-exporting countries. Holistically, the diversification attempt by OPEC member countries can be said to be successful as their economy are becoming less dependent on oil export revenues as indicated by the charts below (OPEC, 2019).

Figura 2

OPEC Members oil Export Revenue as % GDP



The charts above represent the contributions of oil and non-oil revenues to the GDP of OPEC member countries. According to the first graph, the percentage contribution of petroleum revenue to OPEC member countries' GDP has reduced by six percent over the last decades. This decline is witnessed in all OPEC member countries, albeit in varying magnitudes. This can be attributed to various economic initiatives such as investment in manufacturing and service sectors, tourism, entertainment and sports, sovereign wealth and so on. This trend is also echoed by the second graph, which

demonstrates the contribution of non-oil revenue to the GDP of OPEC member countries. It indicated a 15 to 20 percent increment compared to the preceding decade (OPEC, 2019)

However, the above graph does not tell the whole story as some OPEC members are more successful in their diversification attempt than others. Saudi Arabia and the United Arab Emirates appear to be the most successful in their diversification quest with the introduction of VAT and corporate taxes in their economy, returns from investment of their Sovereign wealth funds, income from the fees on visas, tourism, and pilgrimage. An analysis for individual members of OPEC revealed that some of these countries, like Iraq, Equatorial Guinea, Congo, Venezuela, etc., still have over 80 percent of their export revenue made up of oil revenue (Sohag *et al.*, 2024). Regardless of the level of success, attempts are being made in other OPEC member countries to develop other sources of revenue for other sectors like mining, agriculture, privatization, foreign aid/grants, and deficit financing. As the world continues to direct enormous resources in the search for alternative and more environmentally friendly sources of energy, it is pertinent for OPEC member countries to accelerate their diversification efforts. The 2025 OPEC demand forecast projects a demand reduction, pointing to a potential downward swing in global oil prices in the next decades. The soundness of their fiscal policy will be tested in line with their ability to adjust to lower oil revenue due to lower demand projections, climate pressures and technological disruptions.

2.2 Review of empirical literature

The linkages between oil price volatility and other macroeconomic variables have been widely captured in different literature, particularly as it pertains to oil-exporting economies, whose fiscal stability is significantly susceptible to oil revenues. The findings of many research works across various geographical and economic contexts reveal a common thread; oil price fluctuations have significant effects on the revenue, industrial productivity, sectoral development, exchange rate, fiscal stability and ultimately the economic growth and development of oil-producing nations. Starting with its broad macroeconomic effects, Nyangarika *et al.* (2018) investigated the nexus between oil prices and GDP in major oil-producing countries such as Saudi Arabia and Russia. The study discovered a strong positive relationship and emphasized that the emergence and increasing demand for alternative and environmentally friendly sources of energy will

necessitate structural reforms and diversification to avoid vulnerability to oil price shocks. In line with this, Sanwar *et al*. (2017) conducted a global study involving 210 countries employing panel vector error correction models with findings that suggest directional relationships between oil prices, electricity consumption, and GDP. Similarly, Nasir et al. (2018), using a time-varying structural vector autoregressive estimation technique, found significant relationships between oil price movements and economic performance in BRICS nations. While oil-exporting members like Russia and Brazil were significantly affected, importing countries like China and India exhibited more resilience, with India showing greater vulnerability. Vandyck et al. (2018) further highlighted that countries with diversified economies tend to demonstrate more resilience to oil price shocks, whereas undiversified oil-exporting nations in the Gulf region remain economically fragile.

As aforementioned, the fiscal stability of most oil-exporting countries relies on oil revenue. Given the volatile nature of global oil prices and their high susceptibility to geographical tensions, it is clear why it is a common theme among the recommendations from so many research work exploring the impact of oil prices on oil-exporting countries. Most of these scholars, such as Fattouh *et al. (2019)*, Omitogun *et al.*, Hassan (2021), Balakeffi *et al*. (2019), Cemerek and Bayrac (2021), Aimer (2018), and Al-Maamary *et al.* (2017), emphasizes the need for economic diversification as a means of mitigating against the adverse effects of oil price fluctuations. Aimer (2018) showed that oil rents have a one-way causal effect on economic growth and foreign direct investment (FDI) in OPEC countries. The study argued that relying solely on oil revenue amounts to fiscal suicide due to the fluctuating nature of its price and therefore recommended the need for economic diversification. Omitogun et al.(year) found that while oil prices positively influence growth in Nigeria in the short run, the long-run effect of oil revenue on growth is negative, attributing this to the misallocation of oil funds. The impact of oil prices on government revenue forms another key area of inquiry. Hassan (2021) found that government expenditures in oil-exporting countries react asymmetrically to oil revenue shocks in the long term, implying fiscal instability. He recommends the establishment of stabilization funds. Afangideh (2018) used ARDL techniques to show that oil prices negatively impact government revenue in Nigeria in both the short and long run, exacerbating fiscal fragility due to the mono-structured economy and insecurity. This aligns with Yang *et al*. (2017), who observed a negative relationship between oil prices

and exchange rates in oil-exporting countries, suggesting that oil booms might suppress the incentive to diversify. These findings, who echoed by the work of As Cemerek and Bayrac (2021), stated that the fiscal sustainability of OPEC countries depends strongly on oil revenue, and without investing in R&D, it only increases macroeconomic instability. Some of the scholars indicated that diversification provides the oil-producing nations with institutional capability in dealing with the oil price fluctuations. For OPEC+ countries, Samargandi et al. (2024) observed that these countries tend to be extremely sensitive to cyclical oil price shocks, yet countries such as Saudi Arabia, UAE, Iraq, Russia, Gabon, and Kazakhstan tend to be relatively better equipped because of economic buffers and fiscal discipline. Conversely, Anshasy (2019) clarified that the volatility of oil prices does not necessarily negatively impact long-term growth, but the transmission channels to government revenue and economic performance are primarily via the fiscal policy.

From the sectoral perspective, the impact of the oil price volatility on other areas like agriculture and industrial production is also high. According to Abdlaziz and Ahmad (2018), there was a negative and significant correlation between oil prices, exchange rates and agricultural value added in oil-exporting countries, indicating that a possible crowding out of investment in oil booms could occur in the agricultural sector. In the same vein, Alao, and Payaslioglu (2021) demonstrated that in the case of emerging oil exporters, industrial production is a covariate of oil prices, which also reflects economic sensitivity and the absence of alternatives to the generation of non-oil revenues.

Energy transition and its implications for oil-exporting countries have also garnered scholarly attention. Al-Maamary et al. (2017) contended that the exhaustible characteristic of fossil fuels warrants investment in alternative sources, such as solar, wind, and nuclear energy. Their results indicate that the GCC countries are vulnerable due to their non-diversified economy but note that there have been improvements in recent years in terms of investments in clean technologies and transportation, particularly in the area of public transportation. Fattouh et al. (2019) wrote about the strategies of adaptation under the conditions of the renewable energy transition and reached the conclusion that effective economic diversification is key to the sustainability of oil economies, as well as the determination of the global energy transition dynamics. Mukhtarov et al. (2021) discovered that high oil prices in Iran have a detrimental

influence on renewable energy consumption because of the satisfaction caused by increased oil earnings, which postpones the adoption of renewable energy sources.

The challenges of oil price volatility are aggravated by economic policy uncertainty. Chen et al. (2024) concluded that the oil price and economic policy uncertainty (EPU) are the determinants of food prices and that such interaction is mediated through the national economic structures and transmission channels in developing countries. On the same note, Balakeffi et al. (2019) noted the negative impact that global economic policy uncertainty has on Nigeria in terms of export earnings, as it exposes oil-dependent countries to external shocks. This was further highlighted by Lin et al. (2021), who demonstrated that economic policy uncertainty in oil-exporting nations is more unfavourable when responding to oil price volatility as compared to importing nations. Wang et al. (2022) found that the relationship between oil price and EPU is heterogeneous across the BRICS countries. There was a huge negative effect of EPU on oil prices in the long term in BRICS countries that are also oil importers. According to a study by Farooq et al. (2024), the presence of oil policy uncertainty has adverse effects on resource rents of OPEC countries, leading to volatility of oil prices and the risk of unsustainable generation of revenues. In their investigation of the effects of EPU on oil price and the revenues of the OPEC countries, Parvaneh, and Marziyeh (2024) found that EPU has a significant impact on oil prices. They advised on the necessity of sound economic policies to avoid uncertainty created by fluctuations in oil prices. Adekoya and Oliyide (2021) also studied the effect of EPU and oil price shocks on business confidence, where the link is found to be unfavourable. In their publication, their study suggests that oil-importing regions like the Eurozone are also affected, though oil exporters face more direct fiscal risks. Onoh et al. (2018) have found that economic diversification makes the performances of some OPEC countries more resilient (e.g., Saudi Arabia and the UAE), but, at the same time, that of others (such as Iraq) is highly vulnerable. This was further reinforced by Sohag et al. (2024) reinforced who showed that fiscal consolidation helps certain OPEC nations (e.g., Saudi Arabia, UAE, Kazakhstan) better withstand oil price fluctuations. However, the long-term effectiveness of fiscal policies diminishes, necessitating structural reforms to sustain stability.

Although so many researchers have explored oil price fluctuations and their impact on OPEC members and other oil exporting countries, few of these studies specifically looked at the vulnerability of OPEC member countries' revenue profile to

global economic policy uncertainty. Scarcer are the ones that looked at the contractual vulnerability and the complex dynamics of the major global oil pricing benchmarks with the revenue of OPEC members. To the best of the authors' knowledge, no literature has combined the above variables and their relationship with each other in a single research work. This research work directs effort into filling the above research gaps.

2.3 Theoretical framework

This study was anchored on the resource curse theory and the real option theory. The main theses of these theories aligned with the objectives of this research work. OPEC member countries, being heavily reliant on oil revenue, the volatile nature of the oil sector and the elasticity of the revenue to price fluctuations and their implications can be assessed through the lens of resource curse theory. The apriori expectations of this study will be to reveal the structural weaknesses in the fiscal frameworks of OPEC member countries and therefore echo the theory's call for diversification and economic reform to mitigate against the resource curse trap.

The concept of resource curse theory, also known as the "paradox of plenty," was first used by Gelb in 1988 to explain the observed phenomenon where the endowment of natural resources proved inadequate in facilitating economic success (Manzano and Gutiérrez, 2019). There exists a paradox in resource-rich countries, particularly in Africa, South America, and the Middle East, where despite the abundance of natural resources, consistently has low per capita income and prevailing poverty. Relative to other countries with fewer natural resources like Singapore and Japan, these resource-rich countries are observed to achieve poor development outcomes, a contraction that has been referred to as 'natural resources curse' by scholars, most prominently Gleb in 1988 and Auty in 1993 (Manzano andGutiérrez, 2019). The resources curse theory posited that there is a correlation between the abundance of natural resources like oil and minerals to stunted economic growth, heightened political instability, and increased corruption (Mignamissi and Kuete, 2021). These scholars attribute the presence of the resource curse not to the resources themselves but to the inherent institutional quality and structural economic imbalances in these countries. Two primary mechanisms explain this phenomenon: the "Dutch disease," where resource exports cause currency appreciation that harms other export sectors, and the "rentier-state" effect, where governments become reliant on

resource revenues instead of taxation, reducing their accountability to citizens (Badeeb et al., 2017). In essence, the resource curse is not an argument that countries are better off without resources, but rather an explanation for the counterintuitive underperformance that so often plagues them (Vahabi, 2018). The revenue and thus fiscal stability of most OPEC members are dependent on the oil price (Ross, 2018). The vulnerability of oil prices to geopolitical tension or crisis exacerbates the resource curse challenges by exposing OPEC members to external shocks such as conflicts, global market fluctuations, sanctions, and so on, which can destabilize countries that are overly reliant on oil and other mineral exports. This will have a multiplier effect of deterring foreign direct investment, disrupting supply chains, and increasing commodity price fluctuation and therefore exacerbate the resource curse problems. (Ross, 2018).

The concept of Real options was first recognized by Myers in 1977, who opined that real options originated from financial options (Trigeorgis and Reuer, 2017). A financial option grants its holder the right, without imposing an obligation, to purchase or sell an underlying stock at a pre-agreed exercise price within a specified time frame (Anzilli and Villani, 2023). Financial options enable holders to capitalize on significant upside potential while limiting downside risk, creating an asymmetrical payoff profile. This asymmetry, which stems from the right without the obligation to exercise, is the fundamental source of an option's value (Anzilli and Villani, 2023). Real option theory is an important concept when analyzing investment decision theory under the condition of uncertainty, especially in a volatile and capital-intensive industry like the oil sector (Kim *et al.*, 2017). It recognizes the value of flexibility in investment strategies when facing an uncertain future outcome. It acknowledges the fact that investment opportunities contain embedded flexibility value, that is, the ability to delay, expand, reduce, or abandon projects as new market information arises (Kim *et al.,* 2017). According to the theory, when an investment opportunity appears under the effect of uncertainty, its value can be enhanced by leaving the option open as opposed to exercising the option soon (Fan et al, 2019). This is the reason why some OPEC members delay final production decisions or spare capacity even when the current prices are favourable (Fonseca et al, 2017). It can be referred to as maintaining a production option. That is, they still have the choice or flexibility to step up their production level in case the market turns out to be more certain and appealing (Shafiee et al, 2019). This production option will be beneficial when there is a spike in demand or there is a disruption in supply, just like in 2022 when the western

sanctions against Russia resulted in a deficit in the oil market, which allowed the key producers to act strategically instead of having to operate at the maximum production limits.

3 METHODOLOGY

3.1 Data and model

The variables for this study are government revenue (GOVR), which is the dependent variable and the explanatory variables, which are oil price fluctuations and the global economic uncertainty index (GEPU). The oil price are disaggregated into the three major global oil benchmarks which are; Intercontinental Exchange Brent (ICEB), NYMEX West Texas Intermediate (NWTI) and the DME Oman (DMEO) along with OPEC spot price which enable us to captured the complex dynamics that affects the revenue of OPEC member States and facilitated evaluation of the distinct impact of various oil benchmarks on OPEC members' revenues, accounting for their unique exposures, vulnerabilities, and contractual ties to specific pricing standards. Additionally, this study uniquely investigates the interactive effect of all the oil price benchmarks and economic policy uncertainty on the revenue profile of OPEC member countries. This will be done by generating the principal component index of all the oil pricing benchmarks and multiplying it by the global policy uncertainty index. The combined effect (OPEU) will form the last independent variable. This was done by multiplying the global economic policy uncertainty index by the derived principal component index of the oil benchmarks. The data for the oil price benchmarks were obtained from the OPEC Annual Statistical Bulletin. While that of government revenue was generated from the International Monetary Fund (IMF) database. The data on global economic policy uncertainty were obtained from the global economic policy uncertainty index. All the variables spanned the period from 1990 to 2024, except the global economic policy uncertainty index, which ranges from 1997 to 2024 due to the availability of data. The data for global economic policy uncertainty were in a monthly format and were converted to an annual format by averaging.

As aforementioned, to address the associated aggregation bias with panel estimation, this study carried out a country-by-country analysis. The relationship between the variables in this research work is econometrically presented as:

$$GOVR_t = \mathcal{F}_0 + \mathcal{F}_1 NWTI_t + \mathcal{F}_2 ICEB_t + \mathcal{F}_3 DMEO_t + \mathcal{F}_4 OPEC_t + \mathcal{F}_5 GEPU_t + OPEU + V_t \quad (1)$$

where:

$\mathcal{F}_0$ is the constant term,

$\mathcal{F}_1 \ldots \mathcal{F}_5$ are the coefficients of the explanatory variables, t represents the time series dimension, while V_t represents the error terms.

While the static panel model will be presented as:

$$= \alpha_i + \beta X_{it} + \mu_{it} \quad (2)$$

where:

γ_{it} is the dependent variable, and X_{it} represents a vector of the independent variables. The subscripts i and t denote the cross-sectional and time series dimensions, respectively.

3.2 Estimation technique

The analysis in this study started with the pre-estimation test to verify the properties of the data employed in our model, which is essential in determining the fitness of the adopted model. This involves the descriptive analysis to measure the central tendency, dispersion, skewness and kurtosis, the test for linear association and the test for stationarity or the unit root properties of the data. To analyse the elasticity of the revenue profiles of OPEC member countries to oil price fluctuations and economic policy uncertainty, we adopted the Autoregressive Distributed Lag (ARDL) techniques. ARLD has been proven to be a flexible and robust estimation technique in time series analysis. It accommodates variables at mixed orders of integration and captures both the short-run and long-run dynamics within a single equation. It can also accommodate a limited number of observations without producing spurious results compared to other regression

models. Therefore, our time series ARDL, adopted from the work of Kalu *et al.* (2020) in line with Pesaran, Shin and Smith (2001), will be presented as:

$$\phi(L,p)y_t = \sum_{i=j}^{k} \beta_i(L,p)x_{it} + \delta w_t + \mu_{t,} \quad (3)$$

where:

$$\beta,\phi(L,p) = 1 - \phi_1 L - \phi_2 L - \cdots - \phi_p Lp \quad (4)$$

and:

$$\beta_1(L,p) = \beta_{i1} + \beta_{i1}L + \beta_2 + \cdots + \beta_{iqi}L_i^q i = 1,2,\ldots,k \quad (5)$$

L is the lag operator with Ly =$y_{t-1,}$ and w_t is an *s* x 1 vector of deterministic variables like intercept term, dummy variables, time trends or exogenous 1(1) variable with fixed lags. The unrestricted error correction terms are estimated to further confirm co-integration among the variables as presented thus:

$$GOVR_t = \pi_{ip} + \sum_{i=1}^{k} \delta_{ip}\Delta GOVR_{t-i} + \sum_{i=1}^{k1} \delta_{1p}\Delta NWTI_{t-i} + \sum_{i=1}^{k2} \delta_{2p}\Delta ICEB_{t-i} + \sum_{i=1}^{k3} \delta_{3p}\Delta DMEO_{t-i} + \sum_{i=1}^{k4} \delta_{4p}\Delta OPEC_{t-i} + \sum_{i=1}^{k5} \delta_{5p}\Delta GEPU_{t-i} + \sum_{i=1}^{k6} \delta_{6p}\Delta OPUE_{t-1} + \sum_{i=1}^{k8} \gamma_{1p}\Delta COLP_{t-i} + \sum_{i=1}^{k9} \gamma_{2p}\Delta EXCR_{t-i} + \theta_{ip}GOVR_{t-1} + \theta_{2p}NWTI_{t-1} + \theta_{3p}ICEB_{t-1} + \theta_{4p}DMEO_{t-1} + \theta_{5p}OPEC_{t-1} + \theta_{6p}GEPU_{t-1} + \theta_{7p}OPEU_{t-1} + \vartheta_{1p}COLP_{t-1} + \varepsilon_t \quad (6)$$

Where: $\delta_{ip}, \pi_p, \sigma_{ip}$ are short-run coefficients and $\theta_{1,}\ \theta_2,\ \theta_{3,}\ \theta_4, \theta_{5,} and\ \theta_6$ are the long-run estimators. Other terms remain as defined above.

4 RESULTS

The datasets were subjected to some pre-estimation test, which includes: the descriptive statistics, correlation test and stationarity test. The result of the basic descriptive statistics is presented in both panel and country-specific form in Table 1 below.

There is an observed adequate distributional characteristic of the datasets for this study. This is shown by the coefficient of variation, which falls below unity (1), except for the interactive effect of global oil pricing benchmarks and the global economic policy uncertainty index (OPEU), which are both greater than one. The increasing level of global uncertainties as a result of various geopolitical conflicts, such as the Russia/Ukraine war and the Iran/Israel crisis and the associated uncertainties, risks, and shocks, offers the best explanation for the distributional features of (OPEU).

Table 1

Basic Descriptive Statistics

Variables	Panel	Algeria	Congo	E. Guinea	Gabon	Iran	Iraq	Kuwait	Libya	Nigeria	Saudi Arabia	UAE	Venez
GOVR	30.05	31.01	28.48	13.41	24.62	15.4	44.31	60.93	40.98	19	33.34	29.72	19.22
NWTI	51.01	51.01	51.01	51.01	51.01	51.01	51.01	51.01	51.01	51.01	51.01	51.01	51.01
ICEB	52.76	52.76	52.76	52.76	52.76	52.76	52.76	52.76	52.76	52.76	52.76	52.76	52.76
DMEO	50.97	50.97	50.97	50.97	50.97	50.97	50.97	50.97	50.97	50.97	50.97	50.97	50.97
OPEC	51.72	51.72	51.72	51.72	51.72	51.72	51.72	51.72	51.72	51.72	51.72	51.72	51.72
GEPU	143.70	143.7	143.70	143.70	143.70	143.70	143.70	143.70	143.7	143.70	143.70	143.70	143.70
OPEU	121.01	121.01	121.01	121.01	121.01	121.01	121.01	121.01	121.01	121.01	121.01	121.01	121.01
COLP	2214.6	1005.92	248.33	154.91	190.37	3414.27	2558.3	2258.9	1223.12	1813.0	8858.4	2483.8	2310.4
Standard Deviation													
GOVR	16.44	4.86	7.99	5.66	5.56	4.55	9.26	10.27	22.53	13.54	7.87	4.58	8.35
NWTI	28.37	28.37	28.37	28.37	28.37	28.37	28.37	28.37	28.37	28.37	28.37	28.37	28.37
ICEB	31.96	31.96	31.96	31.96	31.96	31.96	31.96	31.96	31.96	31.96	31.96	31.96	31.96
DMEO	31.51	31.51	31.51	31.51	31.51	31.51	31.51	31.51	31.51	31.51	31.51	31.51	31.51
OPEC	31.99	31.99	31.99	31.99	31.99	31.99	31.99	31.99	31.99	31.99	31.99	31.99	31.99
GEPU	71.97	71.97	71.97	71.97	71.97	71.97	71.97	71.97	71.97	71.97	71.97	71.97	71.97
OPEU	278.47	278.47	278.47	278.47	278.47	278.47	278.47	278.47	278.47	278.47	278.47	278.47	278.47
COLP	2328.3	215	44.50	115.3	30.12	505.03	1287.28	609.59	390.6	299.57	1009.4	382.4	793.7
Coefficient of Variation													
GOVR	0.55	0.16	0.28	0.42	0.19	0.3	0.21	0.17	0.55	0.71	0.24	0.15	0.43
NWTI	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56
ICEB	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
DMEO	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
OPEC	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
GEPU	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
OPEU	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
COLP	0.05	0.21	0.18	0.744	0.16	0.15	0.5	0.27	0.32	0.17	0.11	0.15	0.34

The result of the correlation matrices revealed evidence of positive and negative linear association with the outcome variable (GOVR) sharing a positive correlation with most of the global oil pricing benchmarks. This suggests that an increase in the prices of these benchmark prices results in increase in government revenue. Also, the outcome variables share a negative correlation with global economic policy uncertainty index in

most of these countries, which suggests that government revenue in OPEC countries decreases as global uncertainty increases.

Panel and country-specific ARDL accommodate variables that are integrated at 1(0) and 1(1), the unit root test was carried out to ascertain the stationarity of the data. The Augmented Dicky Fuller framework was used for the country-specific data, while the cross-section dependence test (table 2) for the panel data aided the determination of the appropriate type of unit root test.

Table 2

Cross-Sectional Dependence Test Result

Variables	Breusch-Pagan LM	Pesaran scaled LM	Bias-corrected scaled LM	Pesaran CD	Inference
GOVR	323.84 (0.00)	22.44 (0.00)	22.27 (0.00)	11.54 (0.00)	**
NWTI	2310.00 (0.00)	323.84 (0.00)	195.32 (0.00)	195.14 (0.00)	**
ICEB	2310.00 (0.00)	323.84 (0.00)	195.32 (0.00)	195.14 (0.00)	**
DMEO	2310.00 (0.00)	323.84 (0.00)	195.32 (0.00)	195.14 (0.00)	**
OPEC	2310.00 (0.00)	323.84 (0.00)	195.32 (0.00)	195.14 (0.00)	**
GEPU	1848.00 (0.00)	155.10 (0.00)	154.88 (0.00)	42.99 (0.00)	**
OPEU	1848.00 (0.00)	155.10 (0.00)	154.88 (0.00)	42.99 (0.00)	**
COLP	588.93 (0.00)	45.52 (0.00)	45.34 (0.00)	9.92 (0.00)	**

Note: ** denote the presence of cross-sectional dependence.

The unit root test results follow a combination of time-series based and panel forms. The panel datasets were tested using the cross-sectional dependence test based

Table 3a

Panel and Time Series Unit Root Result

Variables	Panel	Algeria	Congo	E. Guinea	Gabon	Iran	Iraq
GOVR	1.77 P<0.05 1(0)	-7.53 P<0.05 1(1)	-7.76 P<0.05 1(1)	-4.55 P<0.05 1(0)	-5.17 P<0.05 1(1)	-5.06 P<0.05 1(1)	-5.41 P<0.05 1(1)
NWTI	9.01 P<0.05 1(0)	-6.09 P<0.05 1(1)	-6.09 P<0.05 1(1)	-6.09 P<0.05 1(1)	-6.09 P<0.05 1(1)	-6.09 P<0.05 1(1)	-6.09 P<0.05 1(1)
ICEB	9.26 P<0.05 1(0)	-5.38 P<0.05 1(1)	-5.38 P<0.05 1(1)	-5.38 P<0.05 1(1)	-5.38 P<0.05 1(1)	-5.38 P<0.05 1(1)	-5.38 P<0.05 1(1)
DMEO	9.45	-5.30	-5.30	-5.30	-5.30	-5.30	-5.30

	P<0.05 1(0)	P<0.05 1(1)	P<0.05 1(1)	P<0.05 1(1)	P<0.05 1(1)	P<0.05 1(1)	P<0.05 1(1)
OPEC	9.76 P<0.05 1(0)	-5.56 P<0.05 1(1)	-5.56 P<0.05 1(1)	-5.56 P<0.05 1(1)	-5.56 P<0.05 1(1)	-5.56 P<0.05 1(1)	-5.56 P<0.05 1(1)
GEPU	9.27 P<0.05 1(0)	-6.76 P<0.05 1(1)	-6.76 P<0.05 1(1)	-6.76 P<0.05 1(1)	-6.76 P<0.05 1(1)	-6.76 P<0.05 1(1)	-6.76 P<0.05 1(1)
OPEU	9.38 P<0.05 1(0)	-5.43 P<0.05 1(1)	-5.43 P<0.05 1(1)	-5.43 P<0.05 1(1)	-5.43 P<0.05 1(1)	-5.43 P<0.05 1(1)	-5.43 P<0.05 1(1)
COLP	7.22 P<0.05 1(0)	-3.94 P<0.05 1(1)	-4.78 P<0.05 1(1)	-4.20 P<0.05 1(1)	-5.11 P<0.05 1(1)	-5.01 P<0.05 1(1)	-6.94 P<0.05 1(1)

Table 3b

Panel and Time Series Unit Root Result (continuation)

Variables	Panel	Kuwait	Libya	Nigeria	Saudi Arabia	UAE	Venezuela
GOVR	1.77 P<0.05 1(0)	-4.19 P<0.05 1(1)	-3.93 P<0.05 1(0)	-5.4 P<0.05 1(1)	-7.63 P<0.05 1(1)	-6.51 P<0.05 1(1)	-3.89 P<0.05 1(1)
NWTI	9.01 P<0.05 1(0)	-6.09 P<0.05 1(1)	-6.09 P<0.05 1(1)	-6.09 P<0.05 1(1)	-6.09 P<0.05 1(1)	-6.09 P<0.05 1(1)	-6.09 P<0.05 1(1)
ICEB	9.26 P<0.05 1(0)	-5.38 P<0.05 1(1)	-5.38 P<0.05 1(1)	-5.38 P<0.05 1(1)	-5.38 P<0.05 1(1)	-5.38 P<0.05 1(1)	-5.38 P<0.05 1(1)
DMEO	9.45 P<0.05 1(0)	-5.30 P<0.05 1(1)	-5.30 P<0.05 1(1)	-5.30 P<0.05 1(1)	-5.30 P<0.05 1(1)	-5.30 P<0.05 1(1)	-5.30 P<0.05 1(1)
OPEC	9.76 P<0.05 1(0)	-5.56 P<0.05 1(1)	-5.56 P<0.05 1(1)	-5.56 P<0.05 1(1)	-5.56 P<0.05 1(1)	-5.56 P<0.05 1(1)	-5.56 P<0.05 1(1)
GEPU	9.27 P<0.05 1(0)	-6.76 P<0.05 1(1)	-6.76 P<0.05 1(1)	-6.76 P<0.05 1(1)	-6.76 P<0.05 1(1)	-6.76 P<0.05 1(1)	-6.76 P<0.05 1(1)
OPEU	9.38 P<0.05 1(0)	-5.43 P<0.05 1(1)	-5.43 P<0.05 1(1)	-5.43 P<0.05 1(1)	-5.43 P<0.05 1(1)	-5.43 P<0.05 1(1)	-5.43 P<0.05 1(1)
COLP	7.22 P<0.05 1(0)	-5.82 P<0.05 1(1)	-3.17 P<0.05 1(0)	-6.43 P<0.05 1(1)	-4.31 P<0.05 1(0)	-3.20 P<0.05 1(0)	-4.53 P<0.05 1(1)

The result of the cross-sectional dependency test revealed that there is a cross-sectional dependency between the panel data variables the necessitating the adoption of Hadri's Z-stat for the panel unit root test, while the Augmented Dickey Fuller was utilized for the country-specific data set. The result revealed that all datasets were integrated at

either 1(0) or 1(1), which justifies the adoption of both linear and non-linear ARDL for both our panel and country-specific estimation.

4.1 ARDL short and long run elasticities

The results of both the short and long-run estimates are displayed in Table 4 below, along with the diagnostic test. The diagnostic test includes the Error Correction form, the BGLM serial correlation test, the Ramsey reset test and the Heteroscedasticity test. As aforementioned, a country-by-country discussion approach is adopted as our analysis model.

Table 4

Summary of the Short-run and Long-run Estimates

Algeria								
	Short run				**Long run**			
Variable	Coefficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.
NWTI	0.32	0.26	1.19	0.27	-0.14	0.29	0.49	0.64
ICEB	0.33	0.63	0.53	0.61	-1.04	1.67	0.62	0.55
DMEO	0.49	0.61	0.80	0.45	-2.58	1.65	1.57	0.16
OPEC	2.97	0.75	3.94	0.01	4.77	0.84	5.65	0.0008
GEPU	-0.07	0.02	4.27	0.0037	-0.06	0.02	3.09	0.02
OPEU	-0.05	0.02	3.12	0.02	-0.12	0.02	7.24	0.0002
COLP	-0.005	0.006	0.93	0.38	-0.01	0.01	0.91	0.39
Diagnostic Test								
ECM	R^2	Adj. R^2	F-Stat	LM	HET		RESET	
-0.75 -6.87 (0.0002)	0.93	0.82	4.14	F-Stat=1.96 P= 0.23	F-Stat= 1.07 P= 0.51		F-Stat= 0.91 P= 0.37	
Congo								
	Short run				**Long run**			
Variable	Coefficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.
NWTI	-0.13	0.15	0.89	0.42	-0.07	0.073883	0.90	0.42
ICEB	0.66	0.62	1.06	0.35	0.34	0.32	1.05	0.35
DMEO	2.29	0.46	4.92	0.01	-1.52	0.44	3.47	0.03
OPEC	3.27	0.86	3.81	0.02	1.67	0.42	4.01	0.02
GEPU	-0.19	0.02	9.44	0.0007	-0.10	0.01	16.01	0.0001
OPEU	-0.06	0.02	3.46	0.03	-0.03	0.01	3.74	0.02
COLP	-0.07	0.04	1.83	0.14	0.03	0.01	2.10	0.10
Diagnostic Test								
ECM	R^2	Adj. R^2	F-Stat	LM	HET		RESET	
-0.96 -6.87 (0.0002)	0.99	0.98	17.07	F-Stat= 9.10 P= 0.10	F-Stat= 1.68 P= 0.33		F-Stat= 19 P= 0.86	
Equatorial Guinea								
	Short run				**Long run**			
Variable	Coefficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.
NWTI	-0.60	0.28	2.16	010	-0.42	0.59	0.71	0.52

ICEB	1.65	2.05	0.80	0.4675	1.69	1.85	0.92	0.41
DMEO	-2.69	2.06	1.31	0.2613	-2.77	1.81	1.53	0.20
OPEC	2.31	1.04	2.21	0.0917	1.94	0.89	2.19	0.09
GEPU	-0.061	0.04	1.43	0.2261	-0.03	0.02	1.17	0.31
OPEU	-0.06	0.03	1.88	0.1337	-0.05	0.01	3.78	0.02
COLP	0.01	0.04	0.39	0.7153	-0.03	0.02	1.35	0.25
Diagnostic Test								
ECM	R^2	Adj. R^2	F-Stat	LM	HET		RESET	
-0.97 -16.16 (0.0001)	0.99	0.91	11.88	F-Stat=0.66 P= 0.60	F-Stat= 1.50 P= 0.42		F-Stat= 3.67 P= 0.37	
Gabon								
	Short run				**Long run**			
Variable	Coefficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.
NWTI	3.27	0.59	5.50	0.01	-3.61	0.35	10.36	0.002
ICEB	0.71	0.56	1.26	0.30	-0.78	0.58	1.34	0.27
DMEO	0.70	0.47	1.49	0.23	-0.77	0.48	1.62	0.20
OPEC	2.37	0.73	3.23	0.05	6.25	0.62	10.12	0.002
GEPU	0.14	0.03	4.9	0.02	-0.15	0.01	18.78	0.0003
OPEU	0.13	0.03	4.92	0.02	-0.15	0.01	10.91	0.002
COLP	0.10	0.05	2.02	0.14	-0.45	0.06	7.07	0.01
Diagnostic Test								
ECM	R^2	Adj. R^2	F-Stat	LM	HET		RESET	
-0.91 -25.27 (0.0001)	0.99	0.99	19.35	F-Stat=27.96 P= 0.10	F-Stat= 0.48 P= 0.86		F-Stat=0.55 P= 0.53	
Iran								
	Short run				**Long run**			
Variable	Coefficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.
NWTI	0.06	0.13	0.43	0.67	0.07	0.18	0.41	0.68
ICEB	0.71	0.43	1.63	0.12	0.94	0.62	1.52	0.16
DMEO	0.20	0.37	0.53	0.61	0.26	0.51	0.51	0.61
OPEC	-1.18	0.57	2.06	0.05	-1.58	0.92	1.71	0.10
GEPU	-0.02	0.01	2.32	0.03	-0.03	0.01	2.20	0.04
OPEU	0.03	0.01	2.147	0.05	0.03	0.02	1.73	0.10
COLP	0.0001	0.001	0.08	0.93	0.0002	0.002	0.086	0.93
Diagnostic Test								
ECM	R^2	Adj. R^2	F-Stat	LM	HET		RESET	
-0.75 -7.09 (0.0000)	0.85	0.78	3.93	F-Stat=1.35 P= 0.29	F-Stat= 0.48 P= 0.86		F-Stat= 0.14 P= 0.71	
Iraq								
	Short run				**Long run**			
Variable	Coefficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.
NWTI	-0.22	0.34	0.64	0.53	-0.58	0.94	0.61	0.554
ICEB	0.79	1.23	0.63	0.54	2.09	3.45	0.60	0.55
DMEO	-3.38	1.31	2.58	0.02	-8.95	3.45	2.59	0.02
OPEC	3.27	1.37	2.38	0.03	8.65	2.88	3.00	0.01
GEPU	-0.01	0.03	0.334	0.75	-0.03	0.07	0.34	0.74
OPEU	-0.05	0.02	2.61	0.02	-0.17	0.05	3.78	0.002
COLP	-1.46	1.20	1.21	0.24	-0.01	0.005	1.13	0.27
Diagnostic Test								
ECM	R^2	Adj. R^2	F-Stat	LM	HET		RESET	
-0.38 -4.48 (0.0004)	0.84	0.74	3.74	F-Stat= 0.58 P= 0.57	F-Stat=0.95 P= 0.52		F-Stat= 0.18 P= 0.86	
Kuwait								

	Short run				**Long run**			
Variable	Coefficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.
NWTI	-1.43	0.83	1.73	0.13	-1.57	0.81	1.95	0.09
ICEB	4.00	3.23	1.24	0.26	-5.54	3.83	1.45	0.19
DMEO	-1.37	2.45	0.56	0.59	-1.51	2.86	0.53	0.61
OPEC	10.00	4.42	2.26	0.06	11.01	2.88	3.82	0.01
GEPU	-0.13	0.05	2.40	0.05	-0.13	0.08	1.68	0.14
OPEU	-0.27	0.09	3.04	0.02	-0.29	0.07	4.35	0.003
COLP	-0.07	0.03	2.87	0.02	-0.01	0.01	0.68	0.52
Diagnostic Test								
ECM	R^2	Adj. R^2	F-Stat	LM	HET		RESET	
-0.91 -6.30 (0.0004)	0.86	0.75	2.47	F-Stat= 3.98 P= 0.90	F-Stat= 1.35 P= 0.37		F-Stat= 1.72 P= 0.4	
Libya								
	Short run				**Long run**			
Variable	Coefficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.
NWTI	-2.57	1.2	2.12	0.06	-181.75	3269.00	0.06	0.96
ICEB	0.37	2.72	0.14	0.89	26.38	516.76	0.05	0.96
DMEO	2.05	2.71	0.76	0.46	144.88	2637.53	0.05	0.96
OPEC	1.35	3.12	0.43	0.67	95.76	1673.46	0.06	0.96
GEPU	0.03	0.09	0.35	0.74	2.10	35.94	0.06	0.96
OPEU	0.06	0.08	0.85	0.41	-13.22	234.73	0.06	0.96
COLP	0.05	0.01	6.04	0.0001	0.88	15.57	0.06	0.96
Diagnostic Test								
ECM	R^2	Adj. R^2	F-Stat	LM	HET		RESET	
0.014 -9.13 (0.0000)	0.93	0.90	10.44	F-Stat= P= 0.27	F-Stat= P= 0.99		F-Stat= P= 0.44	
Nigeria								
	Short run				**Long run**			
Variable	Coefficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.
NWTI	-1.52	0.58	2.62	0.03	-0.83	0.29	2.86	0.02
ICEB	4.11	1.97	2.08	0.08	-5.31	1.83	2.90	0.03
DMEO	6.58	2.22	2.97	0.02	-5.95	1.39	4.29	0.003
OPEC	24.44	4.23	5.78	0.001	13.30	1.76	7.58	0.0001
GEPU	-0.33	0.07	4.82	0.002	-0.18	0.03	5.19	0.001
OPEU	-0.29	0.08	3.76	0.01	-0.16	0.04	3.74	0.01
COLP	-0.01	0.01	1.20	0.27	-0.01	0.01	1.16	0.28
Diagnostic Test								
ECM	R^2	Adj. R^2	F-Stat	LM	HET		RESET	
-0.84 -12.96 (0.0000)	0.97	0.90	10.40	F-Stat= 1.50 P= 0.93	F-Stat= 0.23 P= 0.10		F-Stat= 0.51 P= 0.07	
Saudi Arabia								
	Short run				**Long run**			
Variable	Coefficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.
NWTI	1.16	0.25	4.73	0.0011	0.17	0.36	0.46	0.66
ICEB	1.08	0.83	1.30	0.22	-3.18	2.06	1.54	0.16
DMEO	-0.27	0.84	-0.32	0.75	-0.45	1.38	0.35	0.75
OPEC	2.83	1.35	2.09	0.07	4.68	1.73	2.70	0.02
GEPU	-0.02	0.02	-0.92	0.38	-0.04	0.04	1.04	0.33
OPEU	-0.08	0.03	-2.69	0.02	-0.13	0.03	3.83	0.004
COLP	-0.001	0.001	-1.39	0.20	-0.002	0.001	50	0.17
Diagnostic Test								
ECM	R^2	Adj. R^2	F-Stat	LM	HET		RESET	
-0.60	0.96	0.94	4.30	F-Stat= 3.68	F-Stat= 1.60		F-Stat= 0.06	

-7.82 (0.0000)				P= 0.15	P= 0.25		P= 0.97
United Arab Emirates							
	Short run				**Long run**		
Variable	Coefficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.
NWTI	1.03	0.19	5.30	0.0001	1.581	0.35	4.56	0.0005
ICEB	1.66	0.95	1.74	0.11	2.55	1.57	1.62	0.13
DMEO	1.08	0.67	1.62	0.13	1.65	1.01	1.64	0.13
OPEC	-4.38	1.31	3.3	0.005	-6.72	2.26	2.97	0.01
GEPU	0.05	0.02	2.77	0.02	0.08	0.03	2.84	0.01
OPEU	0.09	0.03	3.44	0.004	0.14	0.05	3.02	0.01
COLP	0.003	0.004	0.83	0.42	0.006	0.006	0.80	0.44
Diagnostic Test							
ECM	R^2	Adj. R^2	F-Stat	LM	HET		RESET
-0.65 -11.23 (0.0000)	0.89	0.87	9.63	F-Stat=0.52 P= 0.60	F-Stat= 0.25 P= 0.99		F-Stat= o.38 P= 71
Venezuela							
	Short run				**Long run**		
Variable	Coefficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.
NWTI	0.14	0.10	-1.42	0.22	-0.27	0.19	1.42	0.22
ICEB	0.64	0.11	5.91	0.002	-3.675	0.90	4.07	0.01
DMEO	0.40	0.74	0.54	0.61	0.80	1.37	0.58	0.59
OPEC	2.09	0.45	4.74	0.01	4.16	1.34	3.12	0.03
GEPU	0.07	0.01	-4.68	0.005	-0.13	0.03	4.11	0.01
OPEU	0.06	0.012	-4.79	0.005	-0.12	0.03	4.88	0.005
COLP	0.01	0.002	3.83	0.01	-0.002	0.002	0.98	0.37
Diagnostic Test							
ECM	R^2	Adj. R^2	F-Stat	LM	HET		RESET
-0.50 -5.05 (0.0000)	0.99	0.99	11.8	F-Stat= 2.37 P= 0.24	F-Stat= 0.35 P= 0.95		F-Stat= 1.65 P= 0.31

4.2 Algeria

The Algerian revenue profile is found to adjust considerably to the shocks and dynamics of crude oil benchmark prices and economic policy uncertainty. The error correction representation shows that 75% of deviation from short-run equilibrium is corrected over the long run, showing that revenue adjusts significantly to movement in oil prices and changes in economic policy uncertainty levels. The error correction term entered with the correct sign and falls below unity, which makes oil price and economic policy uncertainty plausible predictors of revenue in the Algerian economy.

The long-run parameters affirm that revenue is a significant function of the OPEC oil price benchmark, while all the other benchmark prices exert no significant influence on revenue. A unit increase in the OPEC oil price benchmark exerted about 5 units of increasing impact on the revenue profile of the Algerian economy. Global economic policy uncertainty, as well as its interaction with the OPEC oil price benchmark, adversely

affects the revenue profile of the Algerian economy. While economic policy uncertainty reduced revenue by 6% for every unit change, the interactive term had a higher reducing effect of 12%.

The validity of the estimated model for the Algerian economy is confirmed by the diagnostic tests. The bound test results confirm the existence of cointegration, thereby affirming the revenue adjustment profile shown by the error correction representation. The model shows a high goodness of fit as revealed by the R^2 and adjusted R^2 of 98% and 85%, respectively. The possible presence of higher order autocorrelated residuals as well as heteroscedasticity is ruled out by the results of the serial correlation LM test (P-value of 0.3) and the BPG HET test (P-value of 0.51), and the Ramsey RESET test (P-value of 0.37) confirmed the stability of the model.

4.3 Congo

The result also revealed that Congo's revenue profiles demonstrate a significant long-run relationship with the OPEC oil price benchmark and global economic policy uncertainty (EPU). An error correction model which is the lag of the residual is entered with the right sign and is statistically significant. This is an indication of the return long-run equilibrium of the revenue profile of OPEC member countries after short-run disequilibrium triggered by changes in the oil pricing benchmarks, global economic policy uncertainties, and their interactions. The error correctional value of 96% implies a high speed of adjustment, as it takes less than 2 years for full equilibrium to be restored.

The long-run estimate reveals that the government revenue of Congo is influenced by the DME Oman and OPEC benchmarks, while the other benchmarks show no statistically significant effect. Specifically, a unit increase in Dubai Mercantile Exchange spot price will result in a 1.52 unit decrease in the government revenue of Congo. Whereas a unit increase in the OPEC price raises revenue by approximately two units. Also, both global economic policy uncertainty and its interaction with the oil price benchmarks have adverse effects: a unit rise in global economic policy uncertainty reduces government revenue of Congo by 10%, while the interactive effect of high global economic policy uncertainty and fluctuations in the oil price benchmarks causes a 3% decline.

The validity of these findings is supported by strong diagnostic tests. The result of long-term cointegration shown by the error correction representation was affirmed by

the bound test. The high R^2 and adjusted R^2 values (99% and 98%, respectively) indicate an excellent model fit. Furthermore, tests for serial correlation (LM test), heteroscedasticity (BPG test), and model specification (Ramsey RESET test) all returned non-significant p-values, confirming the model's stability and reliability.

4.4 Equatorial Guinea

The revenue profile of Equatorial Guinea adjusts significantly to shocks and dynamics of crude oil benchmark prices and economic policy uncertainty. The error correction model indicates that 97% of deviations from short-run equilibrium are corrected over the long term, showing that revenue responds notably to changes in oil prices and levels of economic policy uncertainty. The error correction term has the correct sign and remains below unity, suggesting that oil price and economic policy uncertainty are plausible predictors of revenue in Equatorial Guinea's economy.

Long-term analysis confirms that Equatorial's revenue is significantly driven by the OPEC oil price benchmark, with other benchmarks showing no significant influence. A unit increase in the OPEC price leads to an approximate two-unit rise in revenue. Conversely, global economic policy uncertainty and its interaction with the OPEC price negatively impact revenue. While uncertainty does not exert a significant influence, the combined effect of high prices and high uncertainty results in a 6% decline in Equatorial Guinea's government revenue.

The model's reliability is affirmed by diagnostic tests; the presence of cointegration validates the long-run equilibrium relationship, and a high goodness-of-fit is shown by R^2 and adjusted R^2 values of 99% and 91%. Furthermore, tests for autocorrelation, heteroscedasticity, and model stability all returned non-significant results, confirming the model's robustness.

4.5 Gabon

The joint short-run statistic, which is the error correction terms entered with the correct sign (negative) and statistically significant, confirmed the return to long-run equilibrium after short-run disequilibrium in the revenue profile of Gabon due to changes in global oil pricing benchmarks and economic policy uncertainties. The error correction

representation of 91% implies a speedy adjustment and restoration of equilibrium of less than 2 years. This signifies that the government revenue of Gabon is significantly influenced by fluctuations in the oil pricing benchmarks and changes in global economic policy uncertainties.

This is also reflected in the long-run estimates, which revealed that the revenue profile of Gabon is significantly impacted by fluctuations in two of the adopted global oil pricing benchmarks. A unit change in the NYMEX West Texas Intermediate spot price will cause a 3.61 decline in the government revenue of Gabon, while a unit increase in the OPEC spot price will improve Gabon's revenue profile by 6.25 units. Conversely, while changes in global economic policy uncertainty do not significantly affect the revenue profile of Garbon, its interaction with fluctuations in the oil price benchmarks exerts a significant influence. A unit increase in their interaction will cause a 15% decline in Gabon's government revenue.

The validity of these results is confirmed by some diagnostic tests. The bound test confirmed the existence of long-run cointegration, affirming the result of the error correction representation. The model was also proven to be of good fit, as shown by the R^2 and the adjusted R^2 of 99% each. Tests for higher-order autocorrelation and heteroscedasticity, including the serial correlation LM test (p-value of 0.1) and the BPG HET test (p-value of 0.48), as well as the Ramsey RESET test (P-value of 0.55), indicate the model's stability.

4.6 Iran

The Iranian revenue profile is found to adjust considerably to the shocks and dynamics of crude oil benchmark prices and economic policy uncertainty. The error correction representation shows that 75% of deviation from short-run equilibrium is corrected over the long run, showing that revenue adjusts significantly to movement in oil prices and changes in economic policy uncertainty levels. The error correction term entered with the correct sign and falls below unity, which makes oil price and economic policy uncertainty plausible predictors of revenue in the Iranian economy.

The long-run estimates reveal that the revenue profile of Iran is only significantly affected by uncertainty in global economic uncertainty. A unit increase in uncertainty will result in 3% decline in government revenue of Iran. All other parameters exert non non-

significant impact. The validity of the estimated model for Iran's economy is confirmed by the diagnostic tests. The bound test results confirm the existence of cointegration, thereby affirming the revenue adjustment profile shown by the error correction representation. The model shows a high goodness of fit as revealed by the R^2 and adjusted R^2 of 85% and 78%, respectively. The possible presence of higher order autocorrelated residuals as well as heteroscedasticity is ruled out by the results of the serial correlation LM test (P-value of 0.29) and the BPG HET test (P-value of 0.86), and the Ramsey RESET test (P-value of 0.71) confirmed the stability of the model.

4.7 Iraq

The revenue profile of Iraq adjusts significantly to shocks and dynamics of crude oil benchmark prices and economic policy uncertainty. The error correction model of 38% indicates a speed of adjustment of approximately 3 years for the restoration of long-run equilibrium from the deviation of short-run disequilibrium. The error correction term has the correct sign and remains below unity, suggesting that oil price and economic policy uncertainty are plausible predictors of revenue in the Iraqi economy.

Long-term analysis confirms that Iraq's revenue is significantly driven by the Dubai Mercantile Exchange and OPEC spot price, with other benchmarks showing no significant influence. A unit increase in the OPEC price leads to an approximate 9-unit rise in revenue, while a unit increase in the Dubai Mercantile Exchange will lead to a decline in Iraqi government revenue. Although the global economic policy uncertainty does not significantly affect the Iraqi government's revenue, its interaction with the oil price benchmarks negatively impacts revenue. The combined effect of high prices and high uncertainty results in a 17% decline.

The model's reliability is affirmed by diagnostic tests; the presence of cointegration validates the long-run equilibrium relationship, and a high goodness-of-fit is shown by R^2 and adjusted R^2 values of 84% and 74%. Furthermore, tests for autocorrelation, heteroscedasticity, and model stability all returned non-significant results, confirming the model's robustness.

4.8 Kuwait

The joint short-run statistic, which is the error correction terms entered with the correct sign (negative) and statistically significant, confirmed the return to long-run equilibrium after short-run disequilibrium in the revenue profile of Kuwait due to changes in global oil pricing benchmarks and economic policy uncertainties. The error correction representation of 91% implies a speedy adjustment and restoration of equilibrium of less than 2 years. This signifies that the government revenue of Kuwait is significantly influenced by fluctuations in the oil pricing benchmarks and changes in global economic policy uncertainties.

This is also reflected in the long-run estimates, which revealed that the revenue profile of Gabon is significantly impacted by fluctuations in the OPEC spot price while the other oil price benchmarks exert non non-significant influence. A unit increase in the OPEC spot price will improve the government revenue of Kuwait by eleven units. Also, the interactions of the oil benchmarks and the economic uncertainty exert a significant but negative impact on the government revenue of Kuwait. A rise in oil price fluctuations and increased uncertainty will result in a 29% decline in the revenue profile of Kuwait.

The validity of these results is confirmed by some diagnostic tests. The bound test confirmed the existence of long-run cointegration, affirming the result of the error correction representation. The model was also proven to be of good fit, as shown by the R^2 and the adjusted R^2 of 86% and 75%, respectively. Tests for higher-order autocorrelation and heteroscedasticity, including the serial correlation LM test (p-value of 0.90) and the BPG HET test (p-value of 0.37), as well as the Ramsey RESET test (P-value of 0.4), indicate the model's stability.

4.9 Libya

An error correction model confirms that Libya's fiscal revenue converges to a long-run equilibrium following short-term shocks from oil price benchmarks and economic policy uncertainty. The significant negative error correction term of 14% indicates a slow adjustment speed, with 91% of any disequilibrium corrected within 7 years.

Long-run estimates show that the government revenue of Kuwait is not significantly influenced by any of the parameters. The validity of these results is upheld by diagnostic tests. The bound test confirms cointegration, affirming the long-run relationship. The model demonstrates an exceptional fit, with both R^2 and adjusted R^2 at 93% and 90%, respectively. Furthermore, tests for serial correlation (LM test), heteroscedasticity (BPG test), and functional form (Ramsey RESET test) all yield statistically insignificant p-values, attesting to the model's stability and robustness.

4.10 Nigeria

An error correction model confirms that Nigeria's revenue profiles converge to a long-run equilibrium following short-term shocks from oil price benchmarks and economic policy uncertainty. The significant negative error correction term of -0.84 indicates a rapid adjustment speed, with 84% of any disequilibrium corrected in less than two years.

Long-run estimates show that the revenue profiles of Nigeria are significantly influenced by the specific oil benchmarks. Whereas the OPEC spot price exerts negative influence, increasing revenue by 13 units with a unit increase, West Texas Intermediate, ICE Brent, and Dubai Mercantile Exchange spot prices exert positive influences. A unit increase in these benchmarks will reduce the revenue profiles of Nigeria by 0.83, 5.31 and 5.95, respectively. Similarly, their interactions with the global economic policy uncertainty will significantly decrease revenue by 16%.

The validity of these results is upheld by diagnostic tests. The bound test confirms cointegration, affirming the long-run relationship. The model demonstrates an exceptional fit, with both R^2 and adjusted R^2 at 97% and 90% respectively. Furthermore, tests for serial correlation (LM test), heteroscedasticity (BPG test), and functional form (Ramsey RESET test) all yield statistically insignificant p-values, attesting to the model's stability and robustness.

4.11 Saudi Arabia

The Saudi Arabia revenue profile is found to adjust considerably to the shocks and dynamics of crude oil benchmark prices and economic policy uncertainty. The error

correction representation shows that 60% of deviation from short-run equilibrium is corrected over the long run, showing that revenue adjusts significantly to movement in oil prices and changes in economic policy uncertainty levels. The error correction term entered with the correct sign and falls below unity, which makes oil price and economic policy uncertainty plausible predictors of revenue in Saudi Arabia's economy.

The long-run parameters affirm that revenue is a significant function of the OPEC oil price benchmark, while all the other benchmark prices exert no significant influence on revenue. A unit increase in the OPEC oil price benchmark exerted about 5 units of increasing impact on the revenue profile of Saudi Arabia's economy. Although the global economic policy uncertainty does not significantly affect the revenue profile of Saudi Arabia, its interaction with the oil price benchmarks adversely affects its revenue. A heightened uncertainty and increased oil price fluctuations will result in a 13% decline in the revenue profile of Saudi Arabia

The validity of the estimated model for the Saudi Arabian revenue profile is confirmed by the diagnostic tests. The bound test results confirm the existence of cointegration, thereby affirming the revenue adjustment profile shown by the error correction representation. The model shows a high goodness of fit as revealed by the R^2 and adjusted R^2 of 96% and 94%, respectively. The possible presence of higher order autocorrelated residuals as well as heteroscedasticity is ruled out by the results of the serial correlation LM test (P-value of 0.15) and the BPG HET test (P-value of 0.25), and the Ramsey RESET test (P-value of 0.37) confirmed the stability of the model.

4.12 United Arab Emirates

The result also revealed that United Arab Emirate's revenue profiles demonstrate a significant long-run relationship with the OPEC oil price benchmark and global economic policy uncertainty. An error correction model which is the lag of the residual is entered with the right sign and is statistically significant. This is an indication of the return long-run equilibrium of the revenue profile of OPEC member countries after short-run disequilibrium triggered by changes in the oil pricing benchmarks, global economic policy uncertainties, and their interactions. The error correctional value of 65% implies a high speed of adjustment, as it takes less than 2 years for full equilibrium to be restored.

The long-run estimate reveals that the government revenue of UAE is influenced by the West Texas Intermediate and OPEC benchmarks, while the other benchmarks show no statistically significant effect. Specifically, a unit increase in the West Texas Intermediate benchmark will result in a 1.58 unit increase in the government revenue of UAE. Similarly, a unit increase in the OPEC price will improve revenue by approximately two units. Also, both global economic policy uncertainty and its interaction with the oil price benchmarks have adverse effects: a unit rise in global economic policy uncertainty reduces the government revenue of UAE by 8%, while the interactive effect of high global economic policy uncertainty and fluctuations in the oil price benchmarks causes a 14% decline.

The validity of these findings is supported by strong diagnostic tests. The result of long-term cointegration shown by the error correction representation was affirmed by the bound test. The high R^2 and adjusted R^2 values (89% and 87%, respectively) indicate an excellent model fit. Furthermore, tests for serial correlation (LM test), heteroscedasticity (BPG test), and model specification (Ramsey RESET test) all returned non-significant p-values, confirming the model's stability and reliability.

4.13 Venezuela

The revenue profile of Venezuela adjusts significantly to shocks and dynamics of crude oil benchmark prices and economic policy uncertainty. The error correction model indicates that 50% of deviations from short-run equilibrium are corrected over the long term, showing that revenue responds notably to changes in oil prices and levels of economic policy uncertainty. The error correction term has the correct sign and remains below unity, suggesting that oil price and economic policy uncertainty are plausible predictors of revenue in Equatorial Guinea’s economy.

Long-run analysis confirms that Venezuela is significantly driven by the ICE Brent and OPEC oil price benchmarks, with other benchmarks showing no significant influence. A unit increase in the ICE Brent spot price leads to an approximate four-unit decline in Venezuela’s revenue, while a unit increase in the OPEC price leads to four-unit rise in revenue. Also, both global economic policy uncertainty and its interaction with the oil price benchmarks have adverse effects: a unit rise in global economic policy uncertainty reduces the government revenue of UAE by 13%, while the interactive effect

of high global economic policy uncertainty and fluctuations in the oil price benchmarks causes a 12% decline.

The model's reliability is affirmed by diagnostic tests; the presence of cointegration validates the long-run equilibrium relationship, and a high goodness-of-fit is shown by R^2 and adjusted R^2 values of 99% each. Furthermore, tests for autocorrelation, heteroscedasticity, and model stability all returned non-significant results, confirming the model's robustness.

Table 5

Summary of Findings

Parameters	Algeria	Congo	E. Guinea	Gabon	Iran	Iraq	Kuwait	Libya	Nigeria	S. Arabia	UAE	Venezuela
NWTI	N.N.S	N.N.S	N.N.S	N.S	N.N.S	N.N.S	N.N.S	N.N.S	N.S	N.N.S	P.S	N.N.S
ICEB	N.N.S	N.N.S	N.N.S	N.N.S	N.N.S	N.N.S	N.N.S	N.N.S	N.S	N.N.S	N.N.S	N.S
DMEO	N.N.S	N.S	N.N.S	N.N.S	N.N.S	N.S	N.N.S	N.N.S	N.S	N.N.S	N.N.S	N.N.S
OPEC	P.S	P.S	N.N.S	P.S	N.N.S	P.S	P.S	N.N.S	P.S	P.S	N.S	P.S
GEPU	N.S	N.S	N.N.S	N.S	P.S	N.N.S	N.N.S	N.N.S	N.S	N.N.S	P.S	N.S
OPEU	N.S	N.S	N.S	N.S	N.N.S	N.S	N.S	N.N.S	N.S	N.S	P.S	N.S

Note: P.S= Positively significant, N.S = Negatively significant, N.N.S= Not significant

From the country-by-country analysis, it was revealed that the revenue profiles of nine (9) of the current 12 OPEC member countries (Algeria, Congo, Gabon, Iraq, Kuwait, Nigeria, Saudi Arabia, UAE, and Venezuela) respond significantly to the OPEC spot price. While 3 (Gabon, Nigeria, and UAE), 2 (Nigeria and Venezuela), 3 (Congo, Iraq, and Nigeria), 7 (Algeria, Congo, Gabon, Iran, Nigeria, UAE, and Venezuela), 10 (Algeria, Congo, Equatorial Guinea, Gabon, Iraq, Kuwait, Saudi Arabia, UAE, and Venezuela) responds significantly to NYMEX WTI benchmark, ICE Brent benchmark, DME Oman benchmark, global economic policy uncertainty index, and the interactive effect of oil price and global economic policy uncertainty, respectively.

Given that it is well documented that oil revenue is the main source of government revenue for the majority of OPEC member countries, this result might seem contradictory at first glance. However, NYMEX WTI is the benchmark for oil produced and traded in America, which is based on the West Texas Intermediate exchange. A look at OPEC members' crude oil export reveals that the proportion of total exports destined for the American region was consistently low throughout the five years. Starting at less than 3% in 2019, the share remained under 5% for the subsequent three years, showing only a modest increase to precisely 5.2% in 2023 (1,027 of the 19,707 volume exported) (OPEC

ABS, 2024). Likewise, the ICE Brent benchmark is dominant in Europe and North America, and although OPEC members export to European countries (where ICE Brent is primarily prominent) is higher than that of America, it still stood at 16%, 16%, 17%, 18% and 18% for 2019, 2020, 2021, 2022 and 2023, respectively. This is still far below their export to Asia, which accounts for over 50% on average, with China and India the favoured destination (OPEC ABS, 2024). These statistics provide reasons as to why the responsiveness of revenue profiles of OPEC member countries to these benchmarks is not significant. Theoretically, these findings aligned with the main thesis of geographically segmented market theory, also known as the market relevance theory, which posits that commodity markets can be segmented geographically, and the relevance of a particular benchmark price depends on the market in which the goods are traded. OPEC countries do not primarily trade with the U.S and Europe, and as such, NYMEX WTI and ICE Brent, being U.S. and Europe-centric benchmarks, do not exert much influence. Empirically, these findings align with Christopher et al. (2023) and Samrgandi *et al* (2024), who investigated the nexus between oil prices and economic growth in OPEC member countries and discovered that oil prices have a non-significant impact on some economic growth and other economic variables.

Concerning DME Oman, though it has existed for a long time, it began gaining prominence in 2007, and its accessibility, adoption, and status as a major global benchmark were confirmed when it migrated to CME Globex in 2009 (Doshi, 2018). The study spanned the period from 1990 to 2024. A 34-year period during which DME Oman benchmark emerged as a major global oil pricing benchmark covers only 11 years. Therefore, their influence on the revenue profile of OPEC member countries within the years of influence might have diminished over the 24 years of its non-relevance.

Global economic policy uncertainty index and its interactions with the oil pricing benchmarks exert a negative and significant influence on revenue profiles of OPEC member countries. This is in line with the apriori expectation, as it is well documented that the oil market thrives on predictability and is highly susceptible to geopolitical events and shocks. Therefore, uncertainties will always exert a significant influence on oil prices and subsequently the revenue of oil-producing countries. The direction of such effects, however, will depend on whether the uncertainties affect the demand side or the supply side of oil. For instance, in the last decade, two major geopolitical events have occurred which affected both the demand and supply sides in the oil market. First was COVID-19,

whose preventive measures affected the demand side of oil, causing a crash in price and revenue of OPEC member countries. Another is the Russian/Ukrainian crisis, which affected the supply side and spike in the price of oil. Theoretically, the findings agree with the principle of the real option theory. The real option theory recognizes the value of flexibility in investment strategies when facing an uncertain future outcome. It acknowledges the fact that investment opportunities contain embedded flexibility value, that is, the ability to delay, expand, reduce, or abandon projects as new market information arises (Kim et al., 2017). The theory states that under the condition of uncertainty, the value of an investment opportunity increases by keeping the option open rather than exercising it immediately (Fan et al, 2019). This explains the production behaviour of some OPEC members who delay final production decisions or spare capacity despite favourable current prices (Fonseca et al, 2017). It can be referred to as keeping a 'production option.' That is, they retain the option or ability or rapidly increase their production should the market become more certain and favourable (Shafiee et al, 2019).

5 CONCLUSION

Crude oil remains the most traded and strategically significant commodity in the global economy, driving energy supply and industrial activity, and playing a crucial role in fiscal stability for both oil-exporting and importing countries. Despite decades of efforts and resources directed towards the research for alternative sources of energy to facilitate the transition toward renewable and sustainable energy sources, the world remains heavily dependent on fossil fuels, making oil price volatility a critical determinant of economic performance, particularly for OPEC member countries whose revenues are predominantly derived from petroleum exports. The historical fluctuations in oil prices as a result of geopolitical conflicts, supply-demand imbalances, and macroeconomic uncertainties have repeatedly demonstrated the vulnerability of oil-dependent economies to external shocks. The COVID-19 pandemic and the Russia-Ukraine war, for instance, triggered price swings, reinforcing the precarious nature of oil revenues and their implications for fiscal planning in OPEC nations.

This study evaluated the elasticities of the revenue profile of OPEC member countries to oil price fluctuations using different major global benchmarks (OPEC spot

price, NYMEX WTI, ICE Brent, and DME Oman), while also appraising the impact of economic policy uncertainty. The findings reveal that OPEC spot prices exert a significant and positive influence on member countries' revenues, aligning with the organization's role in stabilizing oil markets. However, other major benchmarks, WTI, Brent, and DME Oman, non-significant impact, which can be attributed to market segmentation and the geographical distribution of OPEC's oil exports, which are concentrated in Asia rather than the U.S. and Europe.

A critical insight from the findings is the revealed negative effect of global economic policy uncertainty on OPEC revenues. Periods of heightened uncertainty, whether from geopolitical tensions, financial crises, or regulatory unpredictability, lead to reduced investment, deferred consumption, and increased market volatility. These situations may have accounted for the revenue oscillation accentuated by movement in oil demand and prices. The combined interaction of oil price fluctuations and economic uncertainty further exacerbates fiscal instability, emphasizing the dual challenges faced by oil-dependent economies.

These findings carry significant policy implications. While OPEC's mechanisms for supply management help mitigate some price volatility, member countries must accelerate economic diversification to reduce their reliance on oil revenues. Nations like the UAE and Saudi Arabia, which have made strides in diversification, exhibit greater fiscal resilience compared to mono-economies. Additionally, strengthening sovereign wealth funds, improving fiscal governance, and investing in human capital and non-oil sectors are essential strategies for long-term stability. In an era of energy transition, decarbonization pressures, and shifting geopolitical dynamics, OPEC's ability to maintain market stability will be increasingly tested. The organization must adapt to these challenges by fostering cooperation with non-OPEC producers, enhancing market flexibility, and supporting member states in building sustainable economic frameworks. For policymakers, the study underscores the urgency of structural reforms to cushion against oil market shocks and ensure fiscal sustainability in a rapidly evolving global energy landscape.

Ultimately, while oil will remain a vital commodity in the near term, OPEC nations must prioritize diversification and fiscal resilience to navigate the uncertainties of the future. The lessons from past oil crises and the findings of this research highlight the

imperative for proactive economic planning, reducing vulnerability to external shocks, and securing long-term prosperity beyond the volatility of hydrocarbon revenues.

The inferences drawn from the findings of this study accentuate the persistent vulnerability of OPEC member countries to oil price fluctuations and global economic uncertainties. While OPEC has played a crucial role in stabilizing oil markets, the over-reliance on oil revenues, coupled with external shocks, emphasizes the need for structural reforms and strategic policy adjustments. To enhance fiscal resilience and long-term economic stability in OPEC nations, there us the need for accelerated economic diversification to reduce overdependence on oil This can be done through the prioritization of investment in the neglected sectors of the economy, such as manufacturing, technology, renewable energy, human capital, and services (e.g., tourism, finance, and logistics) to create alternative revenue streams. The encouragement of private participation (Public-Private Partnerships) in infrastructure, agriculture, and digital economies through tax incentives and regulatory reforms should also be prioritized. Other OPEC nations should follow the examples of countries such as Saudi Arabia and the United Arab Emirates in creating a sovereign wealth fund to channel oil revenues into high-growth sectors.

Also, OPEC members are advised to strengthen fiscal buffers to mitigate oil price volatility and adverse exposure to economic policy uncertainties. This can be done through the establishment and expansion of oil revenue stabilization funds to save windfall profits during price booms and utilize them during downturns. Also, the adoption of fiscal rules that link government spending to long-term oil price averages rather than short-term fluctuations. The reduction of reliance on oil-backed borrowing and maintaining sustainable debt-to-GDP ratios is encouraged to avoid fiscal crises. Market stabilisation mechanisms can be ensured through the improvement of OPEC's responsiveness to demand shocks by adopting real-time data analytics for production decisions and strengthening alliances with key non-OPEC producers (e.g., Russia, Kazakhstan) to ensure coordinated supply management. In addition, improved governance and management of the oil sector can also act as a buffer against the uncertainties of the oil market. This can be achieved through the implementation of stringent audits and digital tracking systems for oil revenues to curb mismanagement. And also, the implementation of measures to mitigate the resource curse challenges by adopting Norway's model of transparent oil fund management, ensuring revenues benefit

long-term development. Also, citizen engagement through accountability and public disclosure of oil contracts and revenue allocations should be encouraged.

As the world persists on the drift to alternative energy sources, OPEC countries should be taking cursory looks at renewable energy with increasing energy transition preparedness. This can be done through the allocation of oil revenues to solar, wind, and hydrogen projects to continue to position nations as energy-leading economies. Also, by partnering with global firms to develop carbon-neutral oil production methods, while preparing for workforce reskilling programs to shift labour from oil-dependent jobs to emerging industries.

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Authors' Contribution

All authors contributed equally to the development of this article.

Data availability

All datasets relevant to this study's findings are fully available within the article.

How to cite this article (APA)

Tijani, U. H., Kalu, E. U., Ukpere, W. I., & Monyei, F. E. (2025). UNDERSTANDING THE REVENUE PROFILES OF OPEC MEMBER COUNTRIES IN THE FACE OF OIL PRICE FLUCTUATIONS AND ECONOMIC POLICY UNCERTAINTY. Veredas Do Direito, 22(6), e224007. https://doi.org/10.18623/rvd.v22.n6.4007