

Do Oil Rents Affect Unemployment Rates in Net Oil Exporting African Countries?

Dennis Amponsah Baidoo

School of Business and Economics

Atlantic International University

Honolulu, USA

Abstract: The positive impact of oil rents on the general outlook of economic performance in oil-rich African economies cannot be overemphasised. Unemployment has over the years been a critical macroeconomic indicator of economic performance that represents a huge thorn in the flesh to policy makers in oil-rich African countries. The rate of unemployment is probably one of the key areas in which government's accountability for the equitable management of the abundant natural oil resource may be assessed either directly or indirectly by the citizenry. What is the relationship between oil rents and unemployment rates in Africa, using the top 8 net oil exporters as the yardstick? This paper therefore aimed at testing the impact of oil rents on unemployment in 8 oil-abundant, top oil net exporting African countries, (Nigeria, Algeria, Angola, Egypt, Tunisia, South Sudan, Gabon, and the Democratic Republic of Congo) spanning the period 1999-2018, using the Pooled Mean Group (PMG) estimator. The PMG estimator was preferentially chosen over the Mean Group (Estimator) based on the outcome of the Hausman Specification Test. The main outcome of the study indicated that oil rent in the 8 top oil net exporting African countries had a significantly negative influence on unemployment rate in the long-run. However, crude oil price significantly and positively impacted on the unemployment rates of these countries in the long-run. Oil rents however, exhibited no causal impact on unemployment in the short-run at the country specific-level except for Egypt. This research is particularly useful for policy makers in countries that have recently discovered and commenced the production and exportation of crude oil in commercially viable quantities. Policy makers in any oil producing and exporting country can also benefit from the outcome of this research.

Keywords: Pooled Mean Group ; panel ARDL ; oil rents ; unemployment rate; crude oil price; net oil exporting countries.

Digital Object Identifier (DOI): <https://doi.org/10.5281/zenodo.7486579>



This work is licensed under a [Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License](https://creativecommons.org/licenses/by-nc-nd/4.0/).

<http://www.woasjournals.com/index.php/ijesm>

1. Introduction

Net oil exporting economies in Africa have abundant reserves of oil and gas and are able to produce highly commercialised quantities, more of which are exported for revenue. The oil rich countries in Africa under review collectively account for about a little over 90% of Africa's crude oil production (African Development Bank, 2009). Oil rents are obtained from revenues after discounting the cost of production. They are of immense benefit to these economies at the microeconomic and macroeconomic levels. It is therefore incumbent on these economies to manage their rents effectively to eschew the emergence of a resource curse (Fattah, 2017). However, available literature on most oil-rich economies, show the existence of the resource curse conundrum. The resource curse opines that countries that are well endowed with natural resources such as oil and gas appear to be worse off economically than those who are less endowed with these natural resources (Arinze, 2011).

Annual historical trends of the contribution of oil rents to the GDP of these countries have been very significant (Meijia and Castel, 2012). Fig.1 confirms this assertion with Angola contributing the highest % to GDP of 56.14% in 2008, whereas the lowest contribution of 0.32% of GDP was made by the Democratic Republic of Congo in the year 2016. Fig. 1 also shows that all the 8 countries recorded sharp decline in oil rents in 2009, at the peak of the famous great global economic recession marked by a 36.33% fall in global crude oil price. This evidently indicates the vulnerability of the economies of these oil-rich countries to the fluctuations in crude oil price. Indeed, the monetary value of oil rents are significantly influenced by crude oil price volatility.

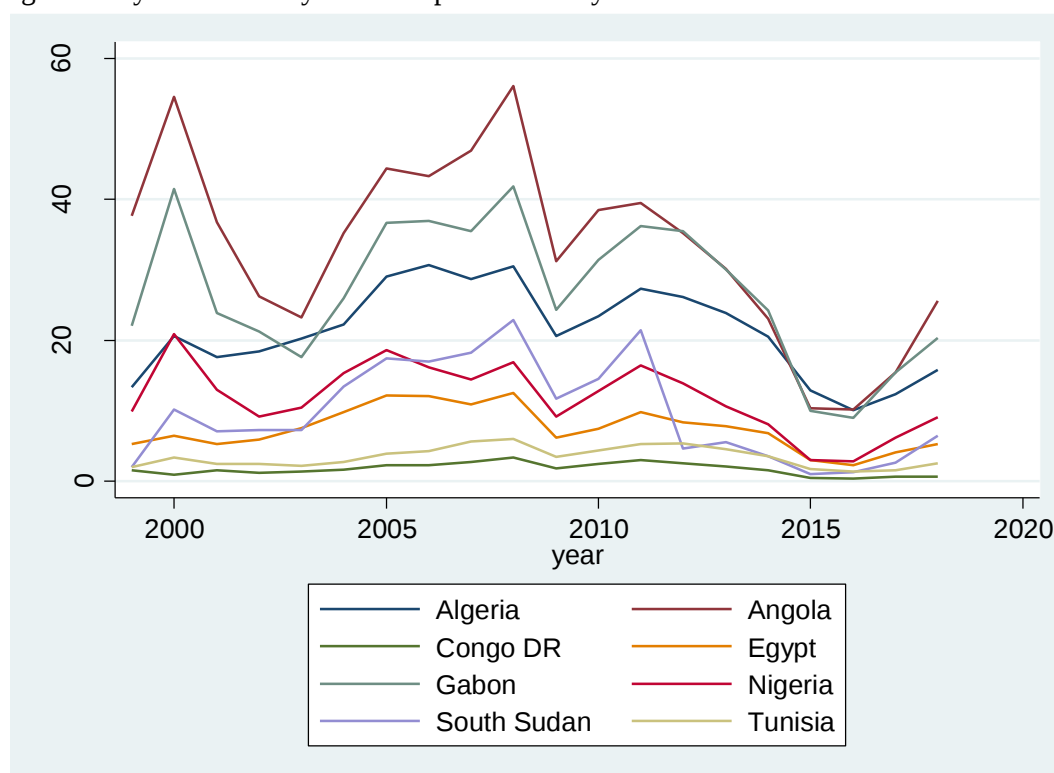


Figure 1 : Oil Rents (% GDP) Profile of 8 Top Oil producing African Countries.

Source: Author's computation based on data from WDI and WBCPD (The Pink Sheet) 2019

Unemployment is one of the important macroeconomic issues that all governments and economies face (Ahmad, 2013). It has both social and economic implications for all economies; therefore, governments try to adopt policies that help in increasing employment rate. Furthermore, policy makers study various factors and phenomena that may have effect on increasing unemployment rates and come up with new suggestions and policies to improve employment rate. It is believed that developed countries have lower unemployment rates than developing economies, due to the

government policies to increase employment, higher product demands and resources for production and higher per-capita income.

Fig. 2 shows trends of unemployment rates among the top 8 net oil exporting African countries. The trends generally show that more than a significant number of these countries have their unemployment levels below 20%. Gabon has the lowest unemployment rate (< 5%) consistently throughout the period of study. However, it must be noted that Gabon has one of the smallest populations in Central Africa. As of 2018, Gabon's population was 1,811,000. It can therefore be inferred with reference to the determination of unemployment rate that, the total labour force of Gabon is less than her population. The economy of Gabon is highly dependent on the oil sector. In 2010, the country launched a strategy aimed at diversifying the economy through the provision of a skilled national workforce to attract foreign direct investment, job creation and improved business productivity. This strategy seems to be working and is evidenced by the relatively low unemployment rates. Algeria recorded the highest level of unemployment rate (29.77%) in 2000, but by the close of 2018, unemployment rate had dropped to 11.88%, representing about 60% reduction. Algeria's economy is also significantly reliant on the oil and gas industry. Unfortunately, the economy was initially associated with low competitiveness and productivity. This probably accounted for the initially high rate of unemployment. The economic sector diversification initiative of the Algerian government focused on Agriculture and industry as the main investment avenues, leading to the gradual attenuation of unemployment rates year on year.

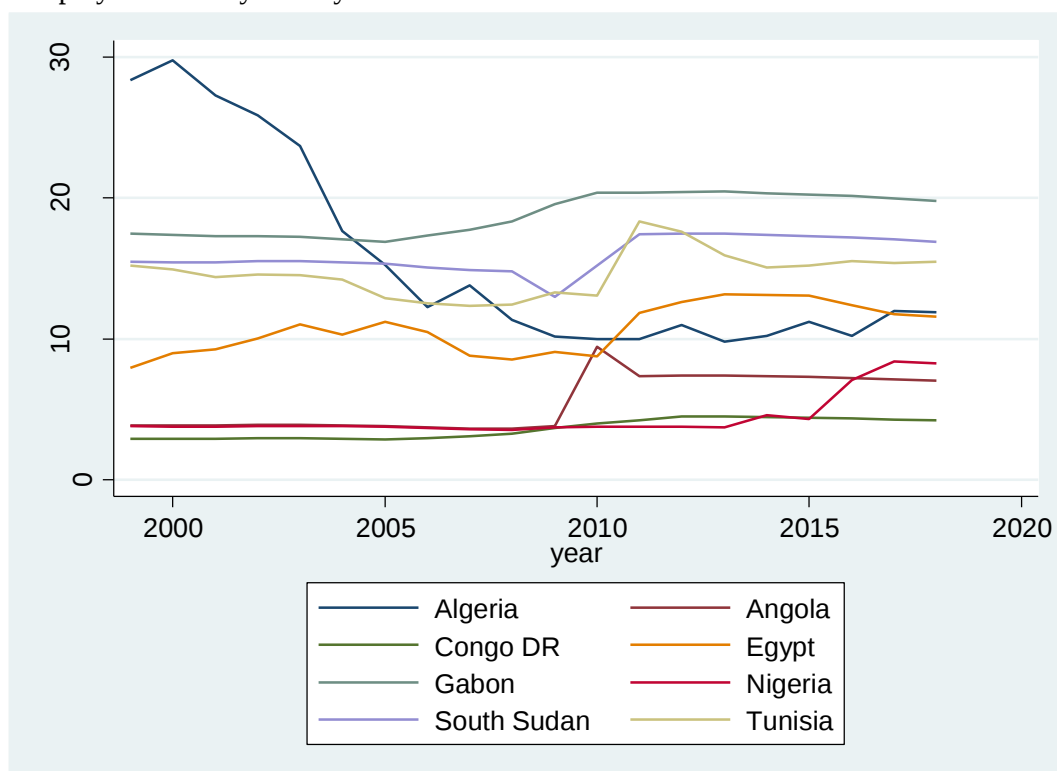


Figure 2 : Unemployment Rate (% Total Labour Force) Profile of 8 Top Oil producing African Countries.

Source: Author's computation based on data from WDI and WBCPD (The Pink Sheet) 2019

Oil rents relate to unemployment rate through economic growth or output. This portends that there is a probability that variations in oil rents can indirectly influence the unemployment rates in African economies that are heavily dependent on the oil. Most oil endowed African economies rely on oil as an input for almost every economic activity; namely, Energy production and consumption Manufacturing, Agriculture, Health, Hospitality etc.

There has been a cornucopia of studies conducted by many researchers on the impact of oil rents/revenues on the economic growth and development of these African countries. Studies conducted by Mavrotas (2011); Ahmed *et al.*, (2016); Eregha & Mesagan (2016) and Olungunde *et al.*, (2020) form part of the numerous studies in this research area. Many of these studies focussed mainly on economic growth (GDP) and human development (HDI). Fattah (2017) looked at the relationship between natural resource rents and unemployment with reference to the Organisation of the Petroleum Exporting Countries (OPEC) and the organisation of Arab Petroleum Exporting Countries (OAPEC). This study did not specifically talk about oil rents, just as it did not place emphasis on African net oil exporting countries. It therefore remains unclear how oil rents relate to unemployment in the top oil exporting African countries. This research therefore focusses on the oil rents and unemployment rates nexus in the top 8 African net oil exporting countries. This relationship can be a bench mark for policy makers in promising economies in Africa that have discovered commercial quantities of oil and gas.

The study's organisation is as follows : A summary of the main underpinning theory and the body of related empirical research are highlighted in section two. The methodology to be used to accomplish the study's goal is explained in section three. Section four presents the findings, followed by sections five and six, which respectively provide a summary of the study's conclusion and suggestions.

2.0 Literature Review

2.1 The Resource Curse Hypothesis

The resource curse, sometimes referred to as the paradox of plenty, is the situation in which countries with abundant natural resources such as crude oil and natural gas experience poor economic growth, poor democracy and poor development than countries with fewer or no such natural resources. There are myriads of literature and academic debates about the reasons for, and exceptions to this unfortunate situation. Most experts opine that the resource curse is not a ubiquitous or unavoidable phenomenon, but affects certain types of countries or regions under certain conditions.

Africa's oil belt lies mainly along its Western coast in the countries adjoining the Gulf of Guinea. One third of the world's new discoveries of oil since 2000 have taken place in Africa (Ghazvinian,2008). Ghazvinian is a historian and a journalist who pictures the African region as a place gradually becoming famous in the economic and political debates of advanced countries as a result of her oil wealth and presumed weakening poverty. According to him, Africa is doomed in the midst of her vast oil wealth. In an era of ballooning petroleum prices, African oil is drawing new interest from major companies around the globe. They see the continent as the most promising place in the world for new production. It doesn't have the huge deposits that the Middle East and Russia do, but what it does have is accessible and largely unexploited. Also, the oil's high quality makes it relatively inexpensive to refine. Africa's investment in petroleum exploration and production has been more than \$20 billion since 1990. It is anticipated that an additional \$50 billion will be spent between this moment and the close of the decade, representing the largest investment in the history of the African continent .

Sadly, most Africans, who are naturally, the custodians of these rich oil deposits have realised only a minuscule good from this incursion of oil drilling companies and investment. In fact, because of the resource curse, they are frequently disadvantaged by the exportation of crude oil from their countries. According to Ghazvinian, in the middle of 1970 and 1993, non-oil producing countries achieved economic growth four times faster than the economic growth of the oil producing countries. Additionally, oil exports blow up currency value and as a result, become preferentially competitive. Eventually, other exports of the country are rendered uncompetitive. The flourishing petroleum industries also end up discriminately attracting workers from the other sectors of the economy, a situation which drains these sectors significantly. It is believed that once a country's agricultural and other traditional industries are exterminated by the proliferation of oil and gas operations, the country

eventually becomes heavily dependent on imports. This is the situation faced by many net oil exporting African countries.

Moreover, oil rents tend to expose the corruption among African politicians. They eventually contest to amass proportions of limited petroleum wealth, instead of exploring various means of investing in the nation's future well-being. It is believed that these governments do not fulfil the wishes of the citizenry due to their non-dependence on income tax. In reality, the country is best described as an entity that exploits sources of easy money, instead of engineering economic growth. Oil rents eventually do not trickle down to the masses. Presently, there are no incentives for the resource-rich governments to ensure that oil rents are converted into wealth for the well-being of the people.

1.1 Empirical Review

Fattah (2017) conducted a related study aimed at examining the short-run and long-run relationships between natural resource rents and unemployment rate in OPEC and OAPEC countries from 1991 to 2016, using the Pooled Mean Group (panel-ARDL) model. The outcome of the study among others, showed that causality moves from total natural resources rents to unemployment. Furthermore, the influence of natural resource rents on unemployment rate is positively significant in the long-run, irrespective of the use of either the composite data for natural resource rents or the disaggregated (oil and natural gas) resource rents. Nearly all the variables had no significant impact on unemployment in the short-run.

Ologunde *et al.*, (2020) investigated the relationship between sustainable development and crude oil revenue (COR) in selected oil-producing African countries from 1992–2017 using the Pooled Mean Group panel autoregressive distributed lag model (PMG panel-ARDL). Sustainable development was proxied by the Human Development Index (HDI). This study explored the relevance of Africa to escape from the fiscal over dependence on natural resource revenue, especially crude oil due to its high volatility and to rectify the permeable institutional outlook. Empirical results revealed the absence of a long-run relationship between COR and sustainable development. In other words, excessive dependence on COR is likely to produce zero impact on economic growth in these countries in the long run.

Mavrotas *et al.*, (2011) examined the relationship between natural resource dependence and growth in developing countries. Using panel data analysis, they established differences among the diverse types of natural resources. They discovered that the flow of revenue from natural resources such as oil and minerals are concerted, whereas flows from agricultural resources are rather dispersed. The study further revealed that mineral resource abundance did not hinder economic growth. A pellucid line of distinction was made between resource dependence and resource abundance with the conclusion that resource dependence had no significant impact on growth.

Eregba and Mesagan (2016) studied the effect of various institutional quality strategies and oil-resource abundance on economic growth aimed at determining whether good institutions could decrease the dreaded resource curse syndromme or not in African oil-rich countries. The study revealed that institutional quality insignificantly enhanced per-capita income growth. However, the interactive variables were found to be negative and significant, alluding to the fact that institutions of these countries were unable to attenuate the impact of the resource curse paradox in these countries due to poor quality delivery. Institutional quality reinforcement was recommended for the sustenance of growth.

Mehlum *et al.*, (2006) also conducted a related study to identify the reasons for the disparities discovered in the impact of resource abundance on economic growth among countries. Their study outcomes, being in sync with that of Eregba and Mesagan (2016), concluded that in countries with sufficient quality of institutions, natural resource rents can foster long-term economic development.

James and Aaland (2011) investigated the impact of natural resource dependence on the growth of an economy. The research contributed to literature by highlighting the resource curse paradox at a more

disaggregated country level. They found out that resource dependent economies had weaker economic growth.

Fuinhas *et al.*, (2015) in their paper, explored the relationship between income per capita and oil rents per capita and the ratio of oil production to primary energy consumption using a dynamic Driscoll - Kraay estimator with fixed effects in a multivariate oil-growth nexus framework for a panel of oil producing countries from 1970-2012. The outcome of the study indicated that oil consumption propelled economic growth only under short-run considerations. Furthermore, the ratio of oil production to primary energy consumption imposed a positive impact on growth under both short-run and long-run considerations. Oil prices had a positive effect on economic growth only in the short-run. Oil rents were found to depress economic growth in both the short and long-run, indicating that the oil resource endowment is more of a curse than a blessing for the economies under consideration.

In another related research, Siham and Matallah (2016) presented a paper that aimed at partly testing the impact of oil rents on economic growth and examining the principal indicators of the resource curse paradox in oil-rich Middle East and North African (MENA) countries, and partly conducting an investigation into the role of governance in the prevention of the dreaded resource curse paradox as well as transforming oil rents into a tool for economic diversification in 11 MENA net oil exporters (Algeria, Bahrain, Iran, Iraq, Kuwait, Libya, Oman, Qatar, Saudi Arabia, United Arab Emirates, and Yemen) from 1996 to 2014, using pooled OLS, fixed effects, random effects and generalised method of moments (GMM) estimators. The main findings showed that economic growth in MENA oil producing and exporting countries was notably and positively influenced by oil rents. These economies are known to be suffering from resource curse. The results also showed that governance is an integral component in the diversification strategy, while, noting that oil rents have the potential to hinder economic diversification by encouraging rent-seeking activities. In conclusion, the study asserted that oil rents can only promote economic diversification in the atmosphere of good governance.

Mulwa *et al.*, (2016) conducted a study on 47 African countries using OLS regressions and Seemingly Unrelated Regressions (SUR). The study aimed at arriving at a valid explanation for the impact of natural resources on Africa's economic growth and other factors that account for economic growth in Africa in the midst of the abundant natural resource commercialisation. The outcome of the study indicated that there was a negatively insignificant relationship between the share of total natural resource endowment and per capita GDP growth. Nevertheless, when this natural resource endowment was disaggregated into its respective components; namely, the share of primary production, share of oil production and share of mineral production, the share of primary production and the share of mineral resources both had a negatively significant relationship with per capita GDP growth. But, the share of oil production, had a positive relationship with per capita GDP growth. The results clearly shows the existence of the natural resource curse paradox, specifically for economies endowed with vast primary resources and mineral resources to the exclusion of oil rich countries. The study also explored the possibility or otherwise of elucidating the natural resource curse using market mechanisms (Dutch disease) or institutional quality mechanisms. The outcome of this analysis indicated that improved institutional quality and the minimisation of corruption, lead to improvement in the property rights index and the per capita GDP.

3. Materials and Methods

3.1 Variable Definition, Data Description and Model Specification

The variables employed for the model of this study are defined as follows:

- **Dependent variable**

- *Unemployment Rate (UER)*

The unemployment rate is the proportion of the total labour force that is presently without jobs. Data was obtained from World Bank Development Indicators (2019).

- **Independent variables**

- *Oil Rents (OLR)*

Oil rent is defined by Ravallion (2012) as the difference between the value of produced crude oil and the total cost of its availability in the market, at world prices. It is expressed as a percentage of GDP because of its contributions and was obtained from the World Bank Development Indicators (2019).

- *Inflation Rate (IFR)*

Inflation is defined as a general increase in prices representing a fall in the purchasing value of currency. Since the study looks into the impact of currency devaluation on the GDP of the top 8 net oil-exporting African countries, the GDP deflator is employed as the metric for inflation.

The GDP deflator, also known as the implicit price deflator, measures the impact of inflation on the gross domestic product during a specified period, usually a year. The GDP price deflator takes into consideration both the nominal GDP and the real GDP of an economy. The nominal GDP represents the value of the finished goods and services that an economy has produced, unadjusted for inflation, whereas the real GDP represents the value of the finished goods and services that an economy has produced, adjusted for inflation. Therefore, if there was no inflation involved, the GDP would equal the real GDP. The GDP price deflator calculates the impact of inflation on the finished goods and products by converting an economy's output into current prices, thereby demonstrating the impact of inflation on the GDP change. Data was obtained from World Bank Commodity (2019).

$$GDP \text{ price deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100$$

- *Crude Oil Price (COP)*

Crude Oil Price is used to measure the spot price of the several barrels of oil. The most common oils are Brent Blend, West Texas Intermediate (WTI) and Dubai whose spot prices are measured. The prices of the crude oil from which various petroleum products like gasoline are derived are dependent on several factors that affect the demand and supply of the crude oil. Equally weighed, average spot price of Brent, Dubai and West Texas Intermediate, adjusted for inflation were used in the study. It is measured in US\$ per barrel of oil (\$bbl). Data was obtained from World Bank Commodity Price Data (WBCPD) Pink Sheet (2019).

The main objective of this study is to examine the relationship between oil rents and unemployment in the 8-top net - oil exporting African countries from 1999 to 2018. A PMG –ARDL estimation was employed in order to estimate both long-run and short-run relationship in this study. The ARDL model was preferentially selected on the grounds of its applicability, irrespective of the order of integration of study variables. This means that the panel ARDL model makes room for the variables to be either integrated of order I(0), I(1), or both (Maddala and Wu, 2002). In addition, it can be employed in case of small samples (Badeeb, *et al.*, 2017). Meanwhile, in the PMG ARDL analysis, the cynosure is the group analytics and not only the analysis of individual units in the group. Therefore, very scanty or no information is missed by consideration for the panel outlook. The use of panel data minimises the possibility of problems such as heteroscedasticity. It also increases the number of observations and their variations. Panel ARDL is best suited for countries where data administration and warehousing pose as challenges. Moreover, it is known to work well with unbalanced panel data. Notable among its attributes is the heterogeneity of the cross-sectional units. Hence, it allows for subject-specific variables.

Panel ARDL is also appropriated for the investigation of dynamic variations arising from unremitting cross-sectional observations. In line with similar studies conducted by Fattah (2017) and Ologunde *et. al.*, (2020), the generalized ARDL ($r, s, s, \dots, s$) model is specified as follows:

$$P_{it} = \sum_{j=1}^r \delta_i P_{i,t-j} + \sum_{j=0}^s \beta'_{ij} Q_{i,t-j} + \varphi_i + \varepsilon_{it} \dots \dots \dots (1)$$

Where P_{it} represents the dependent variable (unemployment), $(Q'_{it})'$ denotes a $k \times 1$ vector of regressors which are required to be wholly **I(0)** or **I(1)** or **cointegrated**; δ_{ij} represents the coefficient of the lagged dependent variable known as scalars; β_{ij} are known as the $k \times 1$ coefficient vectors; φ_i is the unit-specific fixed effects; $i = 1, \dots, N$; $t = 1, 2, \dots, T$; r, s are optimal lag orders; ε_{it} is the error term.

The **re-parameterised ARDL ($r, s, s, \dots, s$) error correction model** is accordingly specified as follows :

$$\Delta P_{it} = \partial_i [P_{i,t-1} - \lambda'_i Q_{i,t}] + \sum_{j=1}^{r-1} \gamma_{ij} \Delta P_{i,t-j} + \sum_{j=0}^{s-1} \beta'_{ij} \Delta Q_{i,t-j} + \varphi_i + \varepsilon_{it} \dots \dots \dots (2)$$

Where:

- $r - 1$ and $s - 1$ represent losses of a lag due to the application of the difference operator .
- $\partial_i = -(1 - \delta_i)$, group - specific speed of adjustment coefficient (∂_i is expected to be less than 0)
- λ'_i = vector of long - run relationships
- $ECT = [P_{i,t-1} - \lambda'_i Q_{i,t}]$, indicated as the error correction term
- γ_{ij}, β'_{ij} represent the dynamic short - run coefficients

4. Results and Discussion

4.1 Descriptive Statistics and Unit Root Tests

Table 1 displays the summary statistics for the variables of the study.

Table 1: Summary Descriptive Statistics of Panel Data

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
UER	160	11.14776	6.258965	2.849	29.77
OLR	160	14.453627	12.72151	0.3176844	56.14003
IFR	160	60.64229	28.69357	-18.07139	2630.123
COP	160	39.74648	216.5784	18.07454	105.0096

Source: Author's computation based on data from WDI and WBCPD (The Pink Sheet) 2019

An average unemployment rate of 11.15% total workforce for the 8 net oil exporting countries was obtained over the period of study. Under general considerations, a high unemployment rate refers to any unemployment rate greater than 10%. This implies that unemployment was generally high across the 8 African countries under the period of study. 14.45% of GDP represented the average oil rent of these countries within the period. An average of 60.64% representing the GDP Deflator revealed that there was an averagely significant price inflation annually determined based on consumption and investment dynamics in these 8 countries. An average crude oil price of US\$ 39.75 was obtained over the period of study. This means that all the oil rents of the 8 countries throughout the period of the study were exposed to an equal measure of vulnerability to crude oil price variations.

The minimum and maximum value for UER were 2.85% and 29.77% of total workforce respectively, while the minimum and maximum values of OLR were 0.32% and 56.14% of GDP respectively.

4.2 Correlation Analysis

This analysis was carried out to investigate the existence or otherwise of exact linear dependence among the independent variables. In other words, multicollinearity in the model can be detected through correlation analysis. Table 2 showed the correlation matrix of the variables in the study. The outcome variable UER, had a very weak positive correlation with OLR, while it showed a weak negative correlation with COP and IFR.

Table 2: Correlation Analysis of Panel Data

	UER	OLR	COP	IFR
UER	1			
OLR	0.0635	1		
COP	-0.0355	0.1489	1	
IFR	-0.1814	-0.0152	-0.1559	1

Source: Author's computation based on data from WDI and WBCPD (The Pink Sheet) 2019

4.3 Levin-Lin and Chu Unit Root Test

Table 3 shows the outcome of the LLC test. The results indicate that UER, COP and IFR are integrated of order 0, while OLR is integrated of order 1.

Table 3: Results of Levin-Lin-Chu Unit Root Test for Panel Data

LEVEL				FIRST DIFFERENCE			
Default lag length =1							
Variable	Statistic			Statistic			Order of Integration
	Unadjusted t	Adjusted t*	P-Value	Unadjusted t	Adjusted t*	P-Value	
UER	-4.4982	-2.6689	0.0038	N/A	N/A	N/A	I(0)
OLR	-5.1748	-0.8409	0.2002	-9.6344	-3.3853	0.0004	I(1)
COP	-5.2706	-2.0146	0.0220	N/A	N/A	N/A	I(0)
IFR	-1.50E+02	-1.60E+02	0.0000	N/A	N/A	N/A	I(0)

Source: Author's computation based on data from WDI and WBCPD (The Pink Sheet) 2019

4.4 Hausman Specification Test

In Table 4, the p-value obtained from the Hausman (1978) test was 0.2019. This p-value was found higher than the 5% conventional critical level. Therefore, under the null hypothesis of homogeneity, PMG was found to be more efficient as an estimator than the Mean Group estimator (MG). The rejection of the alternative hypothesis is an indication that the MG is an undesirable estimator as far as this model is concerned. Therefore, the model statistically supports PMG estimator for the estimation of the panel regression.

Table 4: Hausman Test

	Coefficients			$\sqrt{\text{diag}(V_b - V_B)}$
	(b) mg	(B) pmg	(b-B) Difference	Standard Error
OLR	-0.7146	-0.0955	-0.6191	0.3167
IFR	0.0567	0.0003	0.0564	0.1609
COP	0.0779	0.0489	0.0290	0.0445

b = consistent under H_0 and H_a ; obtained from *xtpmg*

B = inconsistent under H_a , efficient under H_0 ; obtained from *xtpmg*

Test: H_0 : difference in coefficients not systematic

$$\text{Chi}^2(3) = (b - B)'[(V_b - V_B)^{-1}](b - B)$$

$$\text{Chi}^2(3) = 4.62$$

$$\text{Prob} > \text{Chi}^2 = 0.2019$$

Source: Author's computation based on data from WDI and WBCPD (The Pink Sheet) 2019

4.5 Pooled Mean Group Long-Run and Group Short-Run Cointegration Estimates

Table 5 showed a presentation of the long-run estimates of the model. The upper portion of the table highlighted specifically, the long-run statistics of the Pooled Mean Group (PMG) estimation. Cointegration was deduced from the outcome of the PMG regression with the conclusion on the presence of long-run homogeneity in the model. In principle, the PMG estimator exhibits heterogeneity as a property as it presupposes that the short-run coefficients and the error correction terms vary across each of the countries. The second or lower portion of the table presented the short-run coefficients of the variables and the error correction term, that showed a combined long-run cointegration.

In terms of long-run considerations, table 5 indicated a negative sign for the elasticity of Oil Rent (OLR) as well as a statistically significant long-run association with Unemployment Rate (UER). This means that 1% increase in oil rent among the 8 net oil exporting African countries is associated with a decline of 0.095% in unemployment rate at 1% significance level (p-value = 0.0000) *ceteris paribus*. This result is inconsistent with the resource curse paradox. This outcome is also inconsistent with studies conducted by Fattah (2017) for OPEC and AOPEC countries. This is a strong indication that although oil rent is positively associated with unemployment in OPEC and AOPEC countries according to Fattah (2017), it is negatively associated with unemployment in the top 8 net oil exporting countries in the long-run in Africa. This sounds like a good piece of news for Africa, nevertheless, a recent research conducted by Ologunde *et al.*, (2020) indicates that oil revenue from the top 10 net oil exporting Africa countries has no relationship with sustainable development in the long, a situation which could be a precursor to the resource curse paradox in the absence of any remedial initiatives such as substantial oil rent diversification.

Inflation Rate (IFR) showed a negatively insignificant relationship with UER, while Crude Oil Price (COP) had a positive and statistically significant relationship with unemployment rate (UER). Thus, 1% increase in crude oil price is associated with 0.049% increase in UER in these net oil exporting African countries. Crude oil price volatility therefore remains a thorn in the flesh to oil producing African countries as far as the proper management of oil rents in the quest to reduce unemployment rate is concerned.

Table 5: Pooled Mean Group Regression (Long Run Estimates)**Number of groups: 8**

Long-run Coefficient ARDL (1,1,0,0)

Response variable: UER

	D.UER	Coefficient	Std. Error	T-Statistic	P-Values
LR					
	OLR	-0.0955	0.0259	-3.69	0.0000
	IFR	-0.000341	0.00062	0.55	0.5800
	COP	0.0489	0.1148	7.21	0.0000
SR					
	ECT	-0.3082	0.09309	-3.31	0.0010
	OLR				
	D1	0.1305	0.0835	1.56	0.1180
	IFR				
	D1	-0.1679	0.0139	-1.21	0.2280
	COP				
	D1	-0.0206	0.01304	-1.58	0.1140
	_cons	3.0127	0.73107	4.12	0.0000

Source: Author's computation based on data from WDI and WBCPD (The Pink Sheet) 2019

The lower portion of table 5 using the PMG group estimator consists of the error correction term (ECT) and the group short - run elasticities. The coefficient of the ECT represents the speed of adjustment of the model to long-run convergence. At 1% significance level, the coefficient of the ECT was -0.3082. This inferred long-run convergence with the consequence that deviations from the long-run equilibrium position were rectified at an adjustment speed of 30.82%. This constitutes an inference of long-run causality from oil rent to unemployment due to the significance of the PMG estimator.

According to the key assumptions of the PMG estimator, the long-run elasticities are the same or homogenous for all the 8 African countries selected, but their respective short-run elasticities differ with their different ECTs. The full PMG estimator captured the heterogeneity of the variances of the ECT as well as the country-specific short-run estimates. Therefore the full PMG estimator coefficients are presented to indicate heterogeneity of the ECT variances and the short-run coefficients.

4.6 PMG Heterogeneous Short-Run Estimates

Table 6 shows the presentation of the short-run error correction terms for each of the countries. The table also indicates the coefficients, representing the speed of adjustment to equilibrium and the corresponding p-values that suggest statistical significance or otherwise. The table showed that only two countries; namely, Gabon and Nigeria had insignificant ECT's in the short-run. In the case of Nigeria, the ECT was positive. The model for Nigeria would have been described as having an explosive model, if the positive ECT were significant. The other 6 countries recorded significant ECT's. These individual error correction terms (ECT) were determined in order to comprehend the magnitudes of the speed of adjustment for each of the 8 countries in the event of a deviation from the long-run equilibrium. Except for Gabon and Nigeria, joint causality was inferred from the other 6 countries in terms of the short-run ECT's due to the significance of the PMG estimator.

Table 6: Short-run Error Correction (ECT) Terms by country

Country	Coefficients	P-Value
Algeria	-0.1398	0.0100
Angola	-0.8120	0.0010
Congo DR	-0.0982	0.0020
Egypt	-0.5356	0.0000
Gabon	-0.2429	0.0560
Nigeria	0.1134	0.9030
South Sudan	-0.3113	0.0130
Tunisia	-0.3369	0.0330

Source: Author's computation based on data from WDI and WBCPD (The Pink Sheet) 2019

4.7 Oil Rents: Heterogenous Dynamic Panel Model Estimates (Panel-ARDL)

This section separately highlighted the coefficients of the model with respect to oil rent across the panel. Table 7 below showed the outcome of the decision rule, following a comparison of the p-values of the heterogeneous PMG estimated short-run elasticities of oil rent according to the countries under review. The results showed that only Egypt had a p-value at 1% significance level with a positive short-run coefficient. The PMG panel ARDL model yielded a heterogeneous outcome that made it possible for the assessment of each country's performance under short-run considerations. The table shows that 1% increase in oil rents was associated with an appreciation of 0.654% in unemployment rates in the short-run *ceteris paribus*. This outcome was statistically significant at 1%. This bad news for Egypt was as a result of the popular discontent attributable to the negative political and economic ramifications from the heavy reliance on crude oil and natural gas. The attainment of high economic growth rates in Egypt were confined to the capital-intensive and oil and gas dependent sectors, without the distribution of the returns to the larger segments of the labour force of the population (Adly, 2016). Over reliance on oil and gas, prevented the development of a broader and more vibrant private sector, which could have created the employment avenues required to absorb the increasing labour force. It is believed that this failed policy of running an oil and gas dependence based Egyptian economy accounted for the eventual revolt against the regime of President Hosni Mubarak of Egypt. Therefore, short-run causality was inferred for only Egypt due to the significance of the PMG estimator.

With respect to the other countries as shown below: Algeria, Angola, Gabon and South Sudan recorded statistically insignificant positive relationship between oil rent and unemployment rate, whiles Congo DR and Tunisia recorded statistically insignificant negative relationship between oil rent and unemployment. These results are a true indication that unemployment rates in these oil rich countries are not affected by oil rents in the short-run. Dabeeb *et al.*, (2017) and Alley *et al.*, (2014) acknowledged that political leadership in these oil rich African countries are typically characterised by profligate use and over exploitation of oil rents.

Table 7: Panel ARDL Oil Rent, short-run elasticities

Country	Coefficients	Std. Error	P-Value	Decision
Algeria	0.3021	0.2195	0.1690	SIS
Angola	0.0525	0.0375	0.1620	SIS
Congo DR	-0.0263	0.1203	0.8270	SIS
Egypt	0.6542	0.1906	0.0010	SS
Gabon	0.0021	0.0184	0.9080	SIS
Nigeria	0.0263	0.0488	0.5900	SIS
South Sudan	0.0560	0.0350	0.1090	SIS
Tunisia	-0.0232	0.5515	0.9670	SIS

Where SIS =Statistically Insignificant at 5% significance level; SS=Statistically Significant at 5% significance level:
Source

Source: Author's computation based on data from WDI and WBCPD (The Pink Sheet) 2019

Other studies such as Iyke (2017) and Oeppen & Vaupel (2002) specifically discovered that if the current state of oil rent over-exploitation does not cease, oil rent in oil rich African countries will progressively become less significant at the regional and national levels in the short-run and consequently have no significance in the long-run, as far as economic development is concerned.

5. Conclusion

This paper investigated the impact of oil rents on unemployment in 8 oil-abundant, top oil net exporting African countries, (Nigeria, Algeria, Angola, Egypt, Tunisia, South Sudan, Gabon and the Democratic Republic of Congo) spanning the period 1999-2018, using the Pooled Mean Group (PMG) estimator under panel ARDL. The main outcome of the study indicates that unemployment rate in the 8 top oil net exporting African countries is notably and negatively influenced by oil rents in the long-run. This suggests that oil rent has a long-run causal impact on unemployment in these net oil exporting African countries. However, crude oil price significantly and positively impacts on the unemployment rates of these countries in the long-run, similarly suggesting a long-run causal impact of crude oil price on unemployment. This outcome confirmed that the potential of crude oil price volatility to derail the positive benefits of oil rents as far as the reduction of unemployment rate is concerned cannot be ignored. All the independent variables exhibited no causal impact on unemployment in the short-run at the country specific-level except in Egypt.

6. Recommendations

The outcome of the study shows that oil rents are valuable ingredients in the attenuation of unemployment rates in the long-run across the 8 net oil exporting African countries in the study. However, the absence of tangible effect of oil rent on unemployment in the short-run indicates that if nothing is done at this stage by the powers that be in the respective countries, there is likely to be zero tangible effect of oil rent on unemployment in the long-run. It is therefore recommended that governments of these countries need to undertake comprehensive economic policy on the diversification of oil rent through its indiscriminate distribution to develop the larger sectors of the labour force. This will broaden the private sector and make it more vibrant enough to absorb a significant proportion of the unemployed work force. In the case of Egypt, unemployment rates were found to increase with increasing oil rents in the short-run. Egypt therefore needs to gradually reduce her focus on running her economy solely on oil rents because oil rents are vulnerable to fluctuations in crude oil prices. Policy makers in Egypt need to invest significantly in other non -oil sectors of the economy

REFERENCES

- [1] A. Adly, "Egypt's Oil Dependency and Political Discontent", August 2016.
- [2] F. Ahmad, "The Effect of Oil Prices on Unemployment: Evidence from Pakistan". *Business and Economics Research Journal*, 2013, pp.43-57.
- [3] K. Ahmed, M. Kumar, and M. Shahbaz, "Dynamics between Economic Growth, Labour, Capital and Natural Resource Abundance in Iran": An Application of the Combined Cointegration Approach. *Resources Policy*, 2016, pp.213–221.
- [4] I. Alley, A. Asekomeh, H. Mobolaji, and Y. Adeniran, "Oil Price Shocks and the Nigerian Economy". *European Scientific Journal*, 2014, pp.375-391.
- [5] A. Ando, and F. Modigliani, "The "Life Cycle" Hypothesis of Saving: Aggregate Implications and Tests". *Am Econ Rev*, 1963, pp.55–84.
- [6] P.E Arinze, "The Impact of Oil Price on the Nigerian Economy". *Journal of Research in National Development, Jos, Nigeria*, 2011
- [7] R. Badeeb, H. Lean, and J. Clark, "The Evolution of the Natural Resource Curse Thesis": A Critical Literature Survey. *Resources Policy*, 2016, pp.123–134.
- [8] R. Badeeb, H. Lean, and J. Clark, "The Evolution of the natural Resource Curse Thesis": A Critical Literature Survey. *Resources Policy*, 2017, pp.123-124.
- [9] A. D. Bank, "Oil and Gas in Africa". *Addis Ababa, Ethiopia*, 2009.
- [10] L. Barbieri, "Panel Unit Root Tests under Cross-sectional Dependence": An Overview . *Journal of Statistics Advances in Theory and Applications*, 2009, pp.1-43.
- [11] J. Duesenberry, *Income, Savings and the Theory of Consumer Behavior*. London: Harvard University Press, 1949.
- [12] P. Eregba and E. Mesagan, " Oil Resource Abundance, Institutions and Growth": Evidence from Oil Producing African Countries. *Journal of Policy Modelling*, 2016, pp.603–619.
- [13] E.A. Fattah, "NATURAL RESOURCE RENTS AND UNEMPLOYMENT IN OIL EXPORTING COUNTRIES". *Asian Economic and Financial Review*, 2017, pp.952-958.
- [14] M. Friedman, *Theory of the Consumption Function*. New York, 1957.
- [15] J.A. Fuinhas, A.C. Marques, A. P. Couto, "Oil Rents and Economic Growth in Oil Producing Countries from a Macro Panel". *Economic Change and Restructuring*, 48, 2017, pp.257–279.
- [16] A. Gelb and S. Grasmann, " How Should Oil exporters Spend their Rents"? *Centre for Global Development*, 2010, pp.1-30.
- [17] J. Ghazvinian, *Untapped: the Scramble for Africa's Oil*. Boston: Mariner Books, 2008.
- [18] B.N. Iyke, "Does Trade Openness Matter for Economic Growth in the CEE Countries". *Review of Economic Perspectives*, 2017, pp.3-24.
- [19] A. James, and D. Aadland, "The Curse of Natural Resources: An Empirical Investigation of U.S. Counties". *Resource and Energy Economics*, 33(2), 2011, pp. 440-453.
- [20] A.A. Kazmi, " National Savings Rates of India and Pakistan": A Macroeconometric Analysis [with Comments]. *The Pakistan Development Review* 32, 1993, pp.1313-1324.
- [21] A. Levin, C. Lin and J. Chu, "Unit Roots in Panel Data: Asymptotic and Finite-Sample properties". *Journal of econometrics* , 2002, pp.108:1-24.
- [22] G.S. Maddala and S. Wu, "A Comparative Study of Unit Root Tests with Panel Data and a New Simple Test". *Oxford Bulletin of economics and statistics*, 2002, pp.631–652.
- [23] G. Mavrotas, S.M. Murshed, and S. Torres, " Natural Resource Dependence and Economic Performance in the 1970-2000 Period". *Review of Development Economics*. 15(1), 2011, pp.124–138.
- [24] H. Mehlum, K. Moene and R. Torvik, "Institutions and the Resource Curse". *Economic Journal*, 2006, pp.1-20.

- [25] M. Mehrara, "The Asymmetric Relationship between Oil Revenues and Economic Activities": The Case Of Oil-Exporting Countries. *Energy Policy*, 2008, pp.1164–1168.
- [26] P. Meijia, and V. Castel, "Could Oil Shine like Diamonds? How Botswana Avoided the Resource Curse and its Implications for a New Libya". *Chief Economist Complex; Gaborone, Botswana*, 2012.
- [27] R. Mulwa, and J. Mariara, "Natural Resource Curse in Africa: Dutch Disease and Institutional Explanations": *AGRODEP Working Paper 0029. Washington D.C: International Food Policy Research Institute(IFPRI)*, 2016, <http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/>.
- [28] E. Ndirangu and W. Muturi, "Determinants of Gross Domestic Savings in Kenya" (1970–2013). *International Journal of Economic Commercial Management*, 2016, pp.157–178.
- [29] J. Oeppen, and J.W. Vaupel, "Broken Limits to Life Expectancy". *Science*, 2002, pp.1029-1031.
- [30] I.A. Ologunde, F.M. Kapingura, and K. Sibanda, "Sustainable Development and Crude Oil Revenue": A Case of Selected Crude Oil-Producing African Countries. *International Journal of Environment research and Public Health*, 2020, pp.1-30.
- [31] M. Ravallion, "Troubling Tradeoffs in the Human Development Index". *Journal of Development Economics, Volume 99, Issue 2*, 2012, pp.201-209.
- [32] M. Siham, and A. Matallah, "Oil Rents and Economic Growth in Oil-abundant MENA Countries: Governance is the Trump Card to Escape the Resource Trap". *Topics in Middle Eastern and African Economies, Vol. 18, Issue No. 2*, September 2016, pp. 87-111.
- [33] S. Snudden, S. "Cyclical Fiscal Rules for Oil-Exporting Countries". *Economic Modelling, volume 59*, 2016, pp. 473-483.