OIL RENTS AND UNEMPLOYMENT IN AFRICA: EVALUATING THE MEDIATING EFFECTS OF TRADE OPENNESS

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ABSTRACT
The persistence of high unemployment in some African countries necessitates this evaluation of the mediating effects of trade openness in the oil rents and unemployment relationship in oil rent receiving Africa countries. Using the two-step system generalized method of moments on data for 27 of these countries from 2000 to 2023, this study analysed interactions of oil rents and different measures of trade openness. The analysis found a significant inverse relationship between oil rents and unemployment. However, the respective interactions of the total trade and import measures of trade openness with oil rents indicated significant direct relationships with unemployment. The study, therefore, concluded that while oil rents are associated with lower unemployment in oil rent receiving countries in Africa, the outcome is not necessarily the result of openness to trade, as openness to trade, especially import trade, in fact, increases unemployment among these countries. The formation of capital through investment of rents is the more plausible means for reducing unemployment. The study, therefore, recommended the investment of oil rents in building infrastructure to enhance the growth of gross fixed capital formation and foreign direct investments. To achieve this, improvements in transparency and accountability in public finance should be encouraged.
Keywords*: Oil rents; Trade openness; Unemployment; Africa*
JEL Classification*: E24; F41; O13; O55; Q35; Q37*

1. Introduction

High unemployment rates have continued to be recorded in major oil producing and/or oil rent receiving countries in Africa. Over the period from 2000 to 2023, unemployment rates averaged 10% in Egypt, Mauritania and Morrocco, 12% in Rwanda, 14% in Sudan, 15% in Algeria and Tunisia, 16% in Angola, 19% in Gabon and Libya, and 20% in Congo Republic (World Bank, 2025). Despite the high rents received from the production of oil in these countries that have, as a percentage of GDP, averaged 20% in Algeria, 26% in Gabon 31% in Equatorial Guinea, 33% in Angola, 36% in Congo Republic and 41% in Libya over the same period, and which would have infused capital into the productive sectors of their economies, unemployment rates have remained persistently high. In some cases, unemployment rates are increasing as have been recorded in South Africa where the unemployment rate between 2000 and 2023 averaged more than 25% and annual rates have hovered above 30% since 2021 (World Bank, 2025).

Oil rents provide certain benefits to the economies of oil producing countries in several ways. First, oil rents and indeed natural resource rents in general reduce the need for taxation from other sources (Daude, Gutiérrez & Melguizo, 2012). Given the high net profits accruable from the production of oil relative to those from other economic activities (World Bank, 2025), and the oftentimes easier means of assessment of oil firms for tax by government given their fewer numbers and centralized accounting systems, taxation of oil rents quickly substitutes taxes from other economic activities that are geographically widespread and involve larger numbers of people and (formal and informal) firms. The ensuing lower taxation of the non-oil firms increases retained profits, which when reinvested, expands business activity and hence expand employment opportunities.

Another benefit derived from rents is the financial resources provided through taxation of these rents to provide infrastructure and social overheads (Matallah & Matallah, 2016; Malicha, 2018). Funding for massive government spending on infrastructure, which have promoted rapid economic growth in especially the Gulf Cooperation Council (GCC) countries, have resulted largely from oil rents. When coupled with the financial resources provided by oil rents for private investments in plant, machinery and equipment purchases, oil rents and the taxes therefrom raise gross fixed capital formation (Amahalu & Okafor, 2023; Chen, Xu, Zhang, Wei, & Li, 2023). The resulting expansion in economic activity has a positive impact on employment. A limitation in the capacity of oil rents to enhance gross fixed capital formation arises when there are institutional deficiencies (Matallah & Matallah, 2016) or through the destruction of capital and infrastructure when violent conflict ensues (Matallah & Matallah, 2016) given the propensities for greater political instability and conflict engendered by having large oil rents (Dalyop, 2023).

Another channel through which oil rents impact unemployment is through trade. Since oil rents are essentially external phenomena according to Beblawi (1987), oil producing countries are to varying degrees inherently open to trade. However, the overvaluation of their currencies and higher real wages resulting from oil extraction and exportation results in increased importation of commodities from abroad with the consequence that demand for local goods falls leading to an increase in unemployment (Matallah & Matallah, 2016).

The literature on the relationship between oil rents and unemployment has largely reported an inverse relationship between oil rents and unemployment. These include Baidoo (2022) studying 8 net oil exporting African countries (Nigeria, Algeria, Angola, Egypt, Tunisia, South Sudan, Gabon, and the Democratic Republic of Congo) for the period 1999 to 2018 and Raifu & Aminu (2022) studying Nigeria from 1970 to 2018. Oil rents have been shown to reduce unemployment in oil producing countries in Africa. However, the high and persisting unemployment rates in the oil rent receiving countries in the continent begs the question why this is the case despite the supposed benefits oil rents bring to these countries. Their inherent openness to trade from which they earn the rents, therefore, necessitates an evaluation on whether trade has a mediating effect in the oil rent-unemployment relationship in the oil rent receiving countries.

This study on oil rents and unemployment, therefore, analyses the relationship unemployment in African oil rents receiving countries has with oil rents while also evaluating the mediating effect of trade openness on the relationship between oil rents and unemployment. To the best of our knowledge, no other study on the relationship between oil rents and unemployment in Africa, has evaluated the mediating effects of trade openness on the relationship. The study covers the period from 2000 to 2023 for which data is available for these countries. Findings from the study show that although oil rents are associated with lower unemployment in oil rent receiving countries in Africa, the outcome is not necessarily the result of openness to trade, as openness to trade, especially import trade, in fact, increases unemployment among these countries.

The study is presented in five sections. In the second section, the study reviews the literature on the relationship between oil rents and unemployment and the relationship between trade openness and unemployment. The relationship between oil rents, trade openness and unemployment in Africa is discussed in the third section with the methodology presented in the fourth section. Results of analyses are presented in the fifth section while the conclusion and recommendations are presented in section six.

2 Literature Review

2.1 Conceptual and Theoretical Considerations

Oil Rents

The difference between the revenue accrued from the production of oil and the cost of production is what is referred to as oil rents (Ofori-Sasu, Adu-Darko, Asamoah & Abor, 2023). They are essentially the profits generated from the extraction of oil. Changes in oil rents occur due to changes in global oil prices resulting from shortfalls in production arising from natural disasters and/or political uncertainties or conflict.

The taxation of these oil rents constitutes a major source of revenue for governments of oil producing countries. In Nigeria, for example, these taxes, referred to as the petroleum profit tax (PPT), range from 50% of the oil rents for operations under production sharing contracts (PSC) with the national petroleum company to 85% of non-PSC operations after the first five years (PwC, 2025). Oil, and more generally, natural resource, rents have been found to have a dampening effect on taxes, as governments substitute taxes from other non-oil (or non-natural resource) sources with taxes from oil rents while increasing spending and savings (James, 2015).

Oil rents and Unemployment

The theme of unemployment has been explored by various schools of thought which have proffered theories to address it. Being inherently tied to the subject of economic growth, reducing unemployment would come by way of enhancement of economic growth and, therefore, imply the achievement of economic growth objectives. In the same vein, the growth of the economy would imply the employment of resources, including human resources, thus the reduction in unemployment levels (Okun, 1962; Hjazeen, Seraj & Ozdeser, 2021). Classical theory holds that disturbances in the economy are temporary phenomena that automatically correct in the long run (Edwards, 1959). As a result, unemployment will disappear on its own without needing intervention by the government.

Opposed to the classical view is the Keynesian theory which holds the view that unemployment results from the lack of aggregate demand (Keynes, 1936). The application of expansionary fiscal or monetary policy, therefore, becomes necessary to address the unemployment and foster economic growth.

Emphasizing the importance of capital in addressing the challenges of fostering economic growth and reducing unemployment, the Harrod-Domar theory asserts that the first step to economic growth and employment is capital formation. Higher saving, which leads to more investment and, which in turn, increases the capital stock and enhances production, is fundamental to fostering economic growth. Developed by Harrod (1939) and Domar (1946), the Harrod-Domar theory

proposes that economic growth is directly related to the savings rate and inversely related to the capital-output ratio, which reflects the efficiency in capital usage as a lower capital-output ratio signifies more efficient capital utilization.

Related to the Harrod-Domar theory in the requirement of investment in boosting economic growth, the balanced growth theory developed by Nurkse (1953) and Rosenstein-Rodan (1943) argues for the simultaneous comprehensive development of industries to achieve economic growth. Rosenstein-Rodan (1984: 211) commenting on his conceptualization of the "big push" stated that "the theory of growth must be very largely a theory of investment." However, the requirement for a balanced growth of several industries to achieve full and rapid development of all these industries simultaneously would imply not small-scale investments but large-scale investments, thus the "big push". An important source of the investment in resource rich countries is the rents they receive from the production of oil which provides financial and physical capital.

Oil rents impact the economy through several mechanisms. First, because oil rents, and natural resource rents in general, are essentially external phenomena (Beblawi, 1987), reflecting the extent to which rents are derived through foreign trade, increasing oil prices while holding oil production constant, effects a wealth transfer between trading nations. For oil-importing countries, this implies higher input cost, which reduces output and, thus, increases unemployment – a situation that is compounded by reduced consumer demand given the increased household spending on oil-derived products for any given fixed household income. The contrary is true for the oil-exporting countries when oil prices, hence oil rents, rise for any given level of oil production and exports. Here, the transferred wealth from the oil importing countries raises consumer demand, thus raising output and employment (Chuku, Effiong & Sam, 2010).

A second mechanism is the real balance transmission mechanism which comes into effect through a change in the demand for money when oil prices change. For the oil-importing country, an expectation that a short-term rise in oil prices will exceed its long-term impact on output will make consumers borrow or dissave to smoothen consumption. This will raise interest rates and reduce the demand for money (Chuku, Effiong & Sam, 2010). Higher interest rates will raise the cost of investment and reduce producers' profit, thus dampening investments. The opposite comes into play in the oil-exporting countries as the higher oil prices increase liquidity thus lowering interest rates with the effect that investment expenditure as well as consumer demand for goods and services increase, thus increasing the demand for labour.

Negative outcomes, commonly referred to as the "resource curse", have, however, been reported in the literature about resource rich countries (Rosser, 2006; Weinthal & Luong, 2006; Stevens & Dietsche, 2008). These countries have

widespread underdevelopment indicated by weak institutions, authoritarian regimes and/or conflict, and poor economic performance (Dalyop, 2023). Weak political institutions have been shown to worsen the effect of increasing oil rents on income inequality in sub-Saharan African countries (Timba, Djamen & Meka'a, 2025). In petroleum exporting countries, oil rents lower total factor productivity due to the inducement of individuals and firms to engage in rent-seeking behaviour by money inflows arising from oil price increases when the rule of law is compromised, and anti-corruption policies are not effective (Cuevas Ahumada & Calderón Villarreal, 2022). Consequently, oil rents have not produced the expected growth and development goals that would be expected.

Trade Openness and Unemployment

By affording access to markets, modern technology and specialization, trade has been an important means of enhancing growth and economic development. Differences in labour productivity and in natural endowments, including soil, climate and geographical location, were posited by the Ricardian comparative advantage theory (Siddiqui, 2018), are the main reason countries engage in trade. Beside differences in relative factor endowments and factor intensities in products, the Hecksher-Ohlin-Samuelson theory of trade holds that although every country has, at least in the long run, access to common information and knowledge of production technology, this access to technology does not inherently imply having the capacity to effectively use the knowledge (Kurose & Yoshihara, 2018). Having the necessary capital formation and labour force will determine the effective use of this knowledge.

Trade openness, which is the degree to which a country is exposed to trade with other countries, therefore, confers on countries without (or with lower) natural and technological endowments the ability to access products they would otherwise be unable to consume, while offering countries with relatively larger endowments an opportunity of sell their surpluses. Additionally, the effects of market dynamics, imperfect competition and economies of scale on global trade as posited by the new trade theories developed in the 1980s by economists like Krugman (1980) enhance trade and specialization and thus promote employment in the producing countries.

2.2 Empirical Review

Several studies have considered the relationship between trade openness and unemployment. These include Wang, Li and Zhao (2024), who, studying a panel of 180 countries, found a significant inverse relationship between trade openness and unemployment in upper middle-income countries but a direct relationship in lower middle-income countries. For low-income countries, they found a direct but insignificant relationship. In another study by Anjum and Perviz (2016), a

significant inverse relationship between trade openness and unemployment was found in 44 capital-abundant countries from 1990 to 2012 although the same study found the opposite – a positive relationship – for labour-abundant countries.

Studying the Organization of Islamic Cooperation (OIC) countries, Liu, Ngo, Saydaliev, He and Ali (2022) and Ali, Yusop, Kaliappan, Chin and Meo (2023) found mixed results in the relationship between trade openness and unemployment. While the latter found a statistically significant inverse relationship between trade openness and unemployment, the former found the same relationship to be true for a panel that included all members of the organization and for low-income countries but a positive relationship for higher income countries within the organization. For the D-8 Organization for Economic Cooperation countries, which are also referred to as the Developing-8 and are also member countries of the OIC, Ulima (2022) found a positive relationship. The results for the G7 countries of Canada, France, Germany, Italy, Japan, the United Kingdom and the United States indicated a significant inverse relationship between four different measures of trade openness and unemployment (Gozgor, 2014).

On the African continent, trade openness was found to have a significant inverse relationship with youth unemployment in a panel of 41 sub-Saharan countries (Kpognon, Ondoa & Bah, 2020). The same relationship between trade openness and unemployment was found for selected Southern African Development Community (SADC) countries between 1980 and 2019 by Gonese, Sibanda and Ngonisa (2023). However, Addul-Mumuni, Amakye, Abukari and Indaidoo (2023) found for 34 sub-Saharan countries between 1991 and 2020 that trade openness had an asymmetric impact on unemployment, whereby, positive shocks in trade openness had a greater impact on unemployment than negative shocks did in the long run.

Empirical studies have also shown that the significant determinants of unemployment include trade openness (Ogbeide, Kanwanye & Kadiri, 2015) and natural resource rents, of which oil rents is one (Ogbeide, Kanwanye & Kadiri, 2015). Gross fixed capital formation (Alozie, Nwaiwu & Iwueke, 2017) and foreign direct investment (Ogbeide, Kanwanye & Kadiri, 2015; Azolibe, Dimnwobi & Uzochukwu-Obi, 2022) have also been shown to determine unemployment.

3. Oil Rents, Trade Openness and Unemployment in Africa

Figure 1 shows the distribution of oil rents receiving countries in Africa from 2000 to 2023 with regards to average unemployment, average oil rents and average (imports and exports) trade. The countries are arranged in the order of increasing magnitude of average unemployment from the left to the right. Chad, Niger and Benin have the lowest average unemployment rates while Gabon, the

Republic of the Congo and South Africa have the highest average unemployment rates over the period.

The average oil rents suggest a direct relationship with average unemployment. This is indicated by the taller average oil rents bars for the countries of Algeria, Angola, Libya, Gabon and the Republic of the Congo on the right-hand side of figure 1 which have high average unemployment rates. Except for Chad, countries on the extreme left-hand side which have very low average unemployment rates also have very small average oil rents.

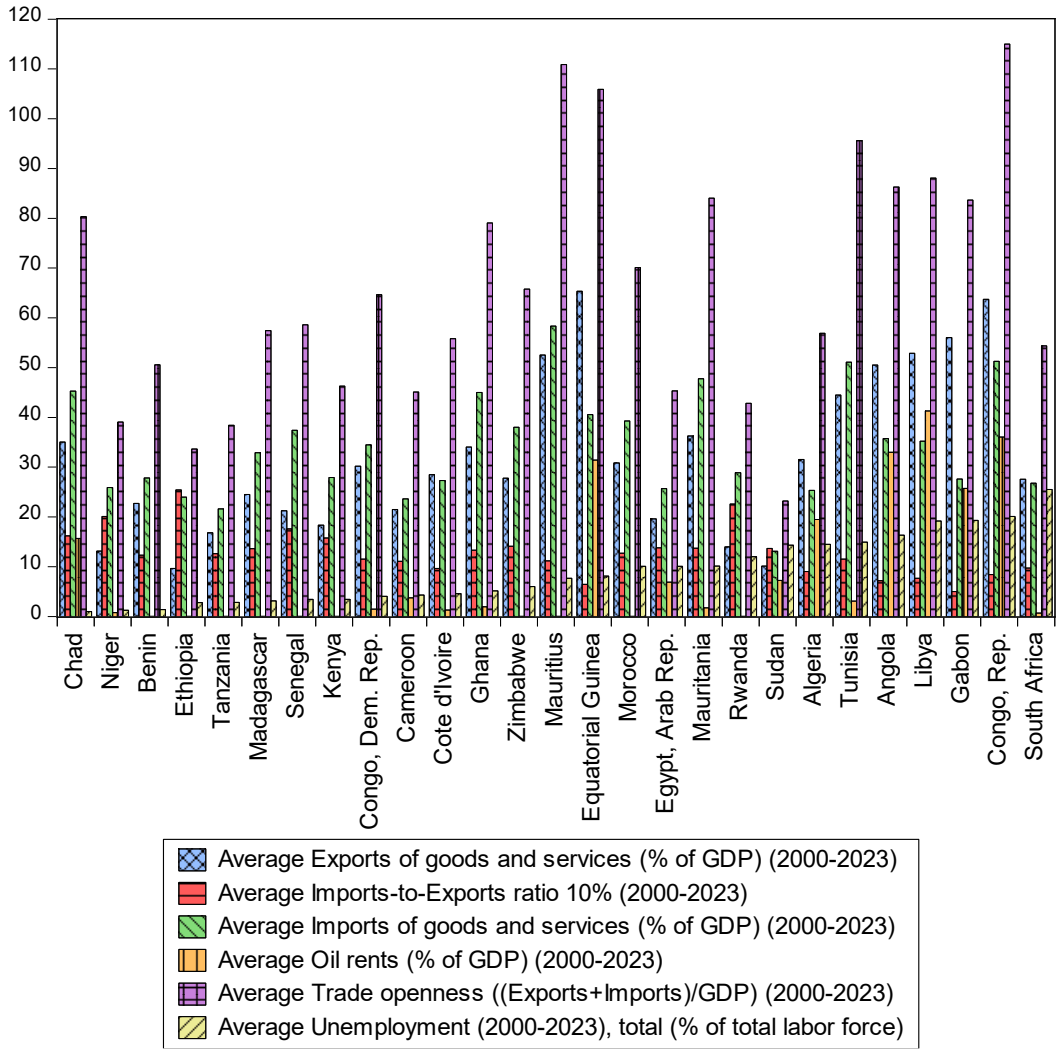

Figure 1: Average unemployment, oil rents and trade (2000–2023)
Source: Data from World Bank (2025) using EViews 10

Figure 1 indicates a direct relationship between average trade openness (measured as $\frac{Imports+Exports}{GDP}$) between 2000 and 2023 and average unemployment over the same period. This is shown by the taller bars indicating the average trade openness and average unemployment moving from the left to the right of Figure 1.

For the measure of trade openness that uses export as a proportion of GDP, $\frac{Exports}{GDP}$, there is a similar indication of taller bars for Tunisia, Angola, Libya, Gabon and Republic of the Congo on the right-hand side of figure 1, suggesting larger average exports-to-GDP ratios are associated with higher average unemployment. The exceptions here are Mauritius and Equatorial Guinea in the middle of figure 1 having tall average exports-to-GDP bars with moderate average unemployment bars.

The average imports as a proportion of GDP, $\frac{Imports}{GDP}$, measure of trade openness does not show a clear relationship with average unemployment over the period 2000 to 2023 as indicated in figure 1. Here, Chad which has the lowest average unemployment is shown in figure 1 to have an average imports-to-GDP bar that is only slightly shorter than that of the Republic of the Congo which has the second highest average unemployment after South Africa.

For the average imports-to-exports ratio, $\frac{Imports}{Export}$, there is an indication of an inverse relationship with the average unemployment as there is a greater density of taller bars of the average imports-to-exports ratio on the left-hand side compared to the shorter bars on the right-hand side. The countries of Chad, Niger, Benin, Ethiopia, Tanzania, Madagascar, Senegal and Kenya, all having greater average imports-to-exports ratios than the countries of Algeria, Tunisia, Angola, Libya, Gabon, the Republic of the Congo and South Africa, have lower average unemployment rates than the latter. This suggests that greater imports relative to exports is associated with higher unemployment in the countries under study. The data also show that on the average 19 out of these 27 countries import more than they export and of these countries, Niger, Rwanda and Ethiopia import more than twice as much as they export on the average.

4. Methodology

4.1 Data

The paper analysed data from a panel of 27 oil rent receiving countries in Africa for the period 2000 to 2023 for which data is available from the World Development Indicators by the World Bank (2025). Due to unavailable data on the growth rate of gross fixed capital formation for Mozambique, Nigeria and South Sudan in the World Bank (2025) World Development Indicators, these oil rents receiving countries are excluded from the analysis.

The analysis uses, as a measure of unemployment, the total unemployment as a proportion of total labour force from the World Development Indicators. Other variables that are used in the analysis include trade openness and oil rents. Gross fixed capital formation is included in the model because the accumulation of capital increases production capacity which results in the employment of more people and in effect reduces the unemployment rate (Pasara & Garidzirai, 2000). A similar effect on capital accumulation is brought about foreign direct investment which is an inflow of resources from abroad that supplements inadequacies in domestically available capital, hence its inclusion in the model (Chike & Okeke, 2024). Through the destruction of physical and human capital during war and policy inconsistency during peacetimes, political instability has a deleterious effect on economic performance hence exacerbating unemployment in the affected country (Azeng & Yogo, 2013). Political stability and absence of violence/terrorism is, therefore, included in the model. Data for all these variables are also sourced from the World Development Indicators.

4.2 Econometric Model

The dynamic econometric model estimated using the System Generalized Method of Moments (SGMM) is:

$$Unemp_{it} = \alpha_i + \gamma_1 Unemp_{it-1} + \gamma_2 OilRents_{it} + \gamma_3 TOP_{it} + \gamma_4 OilRents * TOP_{it} + \gamma_5 GFCF_{it} + \gamma_6 FDI_{it} + \gamma_7 PSAV/T_{it} + \varepsilon_{it} \quad (1)$$

for $i = 1, \dots, N$, $t = 1, \dots, T$, where $Unemp_{it}$ is unemployment for country i in the year t. Using data from the panel of 27 African countries, the SGMM model uses a one-year lag of the dependent variable ($Unemp_{it-1}$) as an explanatory variable, and a maximum of one lag of the dependent variable as an instrument.

For the respective countries i in year t, $OilRents_{it}$ denotes oil rents. It is expected that larger oil rents will lower unemployment.

TOP_{it} is trade openness measured as the ratio of the sum of imports and exports-to-gross domestic product (GDP). Different measures of trade openness are used and these include $TOP_{it} = \frac{Imports+Exports}{GDP}$, $TOPi_{it} = \frac{Imports}{GDP}$, $TOPe_{it} = \frac{Exports}{GDP}$ and $TOPi/e_{it} = \frac{Imports}{Export}$. These measures are used interchangeably in the respective models to ascertain their respective effects on unemployment. It is expected that the greater the openness measure is, the lower the level of unemployment.

$OilRents * TOP_{it}$ is the interaction of oil rents and trade openness in the basic model. The other interactions are $OilRents * TOPi_{it}$, $OilRents * TOPe_{it}$, and $OilRents * TOPi/e_{it}$. These interaction terms, which are used interchangeably

in the respective models, are derived as follows: $OilRents * TOP_{it} = OilRents \times \frac{Imports+Exports}{GDP}$, $OilRents * TOPi_{it} = OilRents \times \frac{Imports}{GDP}$, $OilRents * TOPe_{it} = OilRents \times \frac{Exports}{GDP}$ and $OilRents * TOPi/e_{it} = OilRents \times \frac{Imports}{Export}$, respectively.

The resulting models that account for the different measures of trade openness and their respective interactions with oil rents are outlined as follows:

$$Unemp_{it} = \alpha_i + \gamma_1 Unemp_{it-1} + \gamma_2 OilRents_{it} + \gamma_3 TOPi_{it} + \gamma_4 OilRents * TOPi_{it} + \gamma_5 GFCF_{it} + \gamma_6 FDI_{it} + \gamma_7 PSAV/T_{it} + \varepsilon_{it} \quad (2)$$

$$Unemp_{it} = \alpha_i + \gamma_1 Unemp_{it-1} + \gamma_2 OilRents_{it} + \gamma_3 TOPe_{it} + \gamma_4 OilRents * TOPe_{it} + \gamma_5 GFCF_{it} + \gamma_6 FDI_{it} + \gamma_7 PSAV/T_{it} + \varepsilon_{it} \quad (3)$$

$$Unemp_{it} = \alpha_i + \gamma_1 Unemp_{it-1} + \gamma_2 OilRents_{it} + \gamma_3 TOPi/e_{it} + \gamma_4 OilRents * TOPi/e_{it} + \gamma_5 GFCF_{it} + \gamma_6 FDI_{it} + \gamma_7 PSAV/T_{it} + \varepsilon_{it} \quad (4)$$

The other variables in the model are $GFCF_{it}$, which is the annual growth rate of gross fixed capital formation and FDI_{it}, which is the foreign direct investment net inflow as a percentage of gross domestic product (GDP). Lastly, $PSAV/T_{it}$ is the political stability and absence of violence/terrorism estimate.

The country-specific characteristics that are unchanged over time are captured by α_i. $\gamma_1, \gamma_2, \ldots, \gamma_7$ are the parameters to be estimated, while ε_{it} is an error term that is independently and identically distributed (i.i.d.). Robust standard errors are used in the estimation of the covariance matrix to avoid the bias of the system GMM two-step standard errors.

5. Results

Summary statistics of the data are presented on Table 1. Unemployment has a mean value of 9.29 and a standard deviation of 7.41, while oil rents have a mean value of 7.99 and a standard deviation of 13.98. Their respective minimum and maximum values, skewness and kurtosis are 0.32, 35.36, 1.03 and 3.45 for unemployment and 0, 82.78, 2.10 and 6.99 for oil rents. While both variables are leptokurtic with a skew to the right, only unemployment approximates a normal distribution.

Table 1: Summary statistics

Variable	Obs	Mean	Std. dev.	Min	Max	Skewness	Kurtosis
Unemployment	797	9.2944	7.4045	.316	35.359	1.0269	3.4447
Oil rents	682	7.9950	13.976	0	82.777	2.0967	6.9890
TOP	662	66.973	27.751	2.4737	164.28	.6119	3.0474
TOPi	662	34.933	14.084	1.1277	113.66	1.0653	4.9910
TOPe	662	32.040	17.427	1.1081	92.055	.94935	3.5917
TOPi/e	662	1.2858	.6199	.36051	8.9568	3.7109	39.254
Oil rents*TOP	602	748.40	1500.7	0	9262.0	2.5373	9.1958
Oil rents*TOPi	602	304.38	580.10	0	4072.2	2.6021	10.526
Oil rents*TOPe	602	444.02	940.19	0	5189.9	2.6630	9.8131
Oil rents* TOPi/e	602	6.4161	9.579	0	56.113	1.7067	5.6979
GFCF	576	6.8794	17.188	-50.033	108.25	1.4319	10.21
FDI	737	3.6714	6.0542	-17.292	64.38	3.7640	26.550
PSAV/T	726	-.70353	.82015	-2.6653	1.1167	-.32094	2.4102

Source: World Bank. (2025, April 15). World Development Indicators
Panel: Algeria, Angola, Benin, Cameroon, Chad, Democratic Republic of Congo, Republic of Congo, Cote d'Ivoire, Arab Republic of Egypt, Equatorial Guinea, Ethiopia, Gabon, Ghana, Kenya, Libya, Madagascar, Mauritania, Mauritius, Morocco, Niger, Rwanda, Senegal, South Africa, Sudan, Tanzania, Tunisia & Zimbabwe

The measures of trade openness, viz TOP, $TOPi$, $TOPe$ and $TOPi/e$, respectively have mean values of 66.97, 34.93, 32.04 and 1.29; standard deviations of 27.75, 14.08, 17,43 and 0.62; minimum values of 2.47, 1.23, 1.11 and 0.36; maximum values of 164.28, 113.66. 92.06 and 8.96; skewness of 0.61, 1.07, 0.95 and 3.71; and kurtosis of 3.05, 4.99, 3,59 and 39.25. Although all these variables approximate normally distributions and are skewed to the right, only TOP is mesokurtic while $TOPi$, $TOPe$ and $TOPi/e$ are leptokurtic.

For the interactions of oil rents and the respective measures of trade openness, mean value, standard deviation, minimum value, maximum value, skewness and kurtosis are, respectively, 748.4, 1500.7, 0, 9262, 2.54 and 9.2 for $OilRents * TOP$; 304.38, 580.1, 0, 4072.15, 2.60 and 10.53 for $OilRents * TOPi$; 444.02, 940.19, 0, 5189.85, 2.66 and 9.81 for $OilRents * TOPe$; and 6.42, 9.58, 0, 56.11, 1.71 and 5.7 for $OilRents * TOPi/e$. All these variables are leptokurtic and are skewed to the right. They are not normally distributed.

The other variables, $GFCF$, FDI and $PSAV/T$, respectively, have mean values of 6.88, 3.67 and -0.70; standard deviations of 17.19, 6.05 and 0.82; minimum values of -50.03, -17.29 and -2.67; maximum values of 108.25, 64.38 and 1.12; skewness of 1.43, 3.76 and -0.32; and kurtosis of 10.21, 26,55 and 2.41. While

all the variables approximate normal distributions, $GFCF$ and FDI are leptokurtic and are skewed to the right while $PSAV/T$ is platykurtic and is skewed to the left.

The results of the SGMM analyses are presented in Table 2 with the columns labelled (1) to (4) being respectively the results of the respective models in equations (1) to (4). The Sargan-Hansen test for over identifying restrictions (Arellano & Bond, 1991) for the respective columns indicate statistically nonsignificant results thus satisfying the hypothesis that the instruments are uncorrelated with the error term hence valid instruments, and that the instruments that have been excluded are correctly excluded from the estimated equation. On the other hand, the statistically significant Wald Chi-squared test results indicate that the explanatory variables in the model have a statistically significant effect on the model.

The statistically significant autoregressive (AR) process, AR(1), indicates, in line with expectations, the presence of first-order serial correlation resulting from the inclusion in the model of the lag of the dependent variable (unemployment). Also, as expected, are statistically nonsignificant AR(2) and AR(3), indicating the absence of second- and third-order autocorrelation.

All columns show $Unemp_{it-1}$, the lag of unemployment, has a statistically significant direct relationship with $Unemp_{it}$. This indicates that higher unemployment in a given year is associated with higher unemployment in the succeeding year. Unemployment is, therefore, persistent over time.

Oil rents are shown to have a statistically significant inverse relationship with unemployment. This result is consistent across all four columns even though it is decreasing in magnitude and statistical significance moving from column (1) to (4). Higher oil rents are, therefore, associated with lower unemployment in these countries.

Although trade openness indicates mixed results across the columns, only column 4, where the import-to-export ratio is used, presents a statistically significant relationship with unemployment. While the $TOP_{it} = \frac{Import+Export}{GDP}$ and $TOPi_{it} = \frac{Import}{GDP}$ measures of trade openness indicate inverse relationships, these relationships are statistically nonsignificant. A similarly statistically nonsignificant relationship is shown for the $TOPe_{it} = \frac{Export}{GDP}$ measure although there is an indication of a direct relationship here. For the $TOPi/e_{it} = \frac{Import}{Export}$ measure, a statistically significant direct relationship with unemployment is shown. This indicates that unemployment increases when imports increase relative to exports.

Table 2: Two-Step (Robust) SGMM Regression: Unemployment (lags (1) maxldep (1)), Trade Openness, Oil Rents (% of GDP), Gross Fixed Capital Formation (% of GDP), Foreign Direct Investment (FDI), net inflows (% of GDP), Political Stability and Absence of Violence/Terrorism (PSAV/T) – 2000–2023

	(1)	(2)	(3)	(4)
L.Unemployment, total (% of total labor force) (modeled ILO estimate)	0.971***	0.955***	0.960***	0.974***
	(0.023)	(0.033)	(0.043)	(0.035)
Oil rents (% of GDP)	-0.107***	-0.0601***	-0.107**	-0.0229*
	(0.030)	(0.015)	(0.038)	(0.011)
TOP (Exports + Imports/GDP)	-0.00347			
	(0.005)			
Oil rents*TOP	0.000820*			
	(0.000)			
TOPi (Imports/GDP)		-0.00534		
		(0.012)		
Oil rents*TOPi		0.00102*		
		(0.000)		
TOPe (Exports/GDP)			0.00360	
			(0.008)	
Oil rents*TOPe			0.00116*	
			(0.001)	
TOPi/e (Imports-to-Exports ratio)				0.153*
				(0.075)
Oil rents* TOPi/e				0.00301
				(0.018)
GFCF (annual % growth)	-0.00837*	-0.00784*	-0.00814*	-0.00825*
	(0.003)	(0.003)	(0.003)	(0.004)
FDI, net inflows (% of GDP)	-0.0155	-0.0156	-0.0160*	-0.0144
	(0.009)	(0.009)	(0.008)	(0.008)
PSAV/T: Estimate	-0.227	-0.326	-0.340	-0.136
	(0.237)	(0.406)	(0.436)	(0.445)
Constant	0.674	0.619	0.443	0.140
	(0.467)	(0.700)	(0.358)	(0.260)
No. of observations	491	491	491	491
No. of countries	27[a]	27[b]	27[c]	27[d]
No. of instruments	47	47	47	47
Hansen (p-value)	0.9790	0.9695	0.9720	0.9847
AR1 (p-value)	0.0120	0.0130	0.0121	0.0112
AR2 (p-value)	0.7702	0.7639	0.7297	0.7225
AR3 (p-value)	0.1768	0.1464	0.1664	0.1373
Wald chi2	2527.59	1778.99	2472.77	3646.97
Chi2 (p-value)	0.0000	0.0000	0.0000	0.0000

Standard errors in parentheses
Source: World Bank. (2025, April 15). World Development Indicators
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
[a,b,c,d] Algeria, Angola, Benin, Cameroon, Chad, Democratic Republic of Congo, Republic of Congo, Cote d'Ivoire, Arab Republic of Egypt, Equatorial Guinea, Ethiopia, Gabon, Ghana, Kenya, Libya, Madagascar, Mauritania, Mauritius, Morocco, Niger, Rwanda, Senegal, South Africa, Sudan, Tanzania, Tunisia & Zimbabwe

The interaction terms between oil rents and all the respective measures of trade openness, except the interaction between oil rents and the import-to-export ratio ($OilRents * TOPi/e_{it}$), indicate a statistically significant direct relationships with unemployment. This indicates that increasing oil rents and openness to trade has an increasing effect on unemployment in these countries.

The annual growth rate of gross fixed capital formation ($GFCF_{it}$) is also shown to have a statistically significant inverse relationship with unemployment in these countries. This relationship is consistent across all the columns. Faster growth in gross fixed capital formation is, thus, associated with a reduction in unemployment.

A similar relationship is also found for the net inflows of foreign direct investment in column 3. Here, the net inflows of foreign direct investments are shown to have a statistically significant inverse relationship with unemployment. Hence, the inflow of foreign direct investments is associated with a reduction in unemployment.

There is a similar indication for the political stability variable ($PSAV/T_{it}$) which is shown to have an inverse relationship with unemployment across all four columns. The relationship is, however, shown to be statistically nonsignificant in all the columns.

6 Conclusion and Recommendations

6.1 Conclusion

This study was an evaluation of the mediating effects of trade openness on the relationship between oil rents and unemployment in Africa. Using data from 27 oil rent receiving African countries for the period 2000 to 2023, the analysis found a significant inverse relationship between oil rents and unemployment. Following the motivation of the study to determine how oil rents lower unemployment as reported in the literature, interactions of oil rents and different measures of trade openness were also analysed. However, contrary to expectations, the interaction of oil rents and the total trade measure of trade openness indicated a significant direct relationship with unemployment, while the interaction with the import measure of trade openness also indicated a significant direct relationship but in line with expectations.

The study, therefore, concludes that while oil rents are associated with lower unemployment in oil rent receiving countries in Africa, the result is not necessarily the result of openness to trade, as openness to trade, especially import trade, in fact, increases unemployment among these countries. The formation of capital through rents is the more plausible means for reducing unemployment.

6.2 Recommendations

Consequent upon the findings, it is recommended that the growth of gross fixed capital formation be encouraged through policies that boost investment and capital growth. To strengthen the effects of oil rents on employment, these rents should be invested in building infrastructure that provide the superstructure including energy, transportation and communication networks upon which private investments can thrive. This will encourage private investments that create jobs. Moreover, a thriving economy will encourage foreign direct investments which have also been shown in this study to reduce unemployment. Additionally, improvements in productivity of the domestic economy will reduce excessive dependence on imports that have been shown in this study to increase unemployment.

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