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Does Oil Rent Increase Happiness? A Partial Efficiency Analysis of Selected African Countries

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Abstract

Purpose of the article: To investigate and ascertain the impact of oil rent on happiness in selected African countries.
Methodology/methods: This study employed the trend analysis to graphically illustrate some major data. It also employed the fixed effect to analyse the model and the partial efficiency analysis to rank the countries studied in terms of their efficiency in the use of oil rent to produce happiness.
Scientific aim: This study examines the relationship between oil rent, the oil price, the GDP growth, the mineral rent and happiness.
Findings: The results show that oil rent does not significantly increase happiness in the countries studied with Cameroun being the happiest country in the panel. Oil prices however significantly increased happiness. The study also found that the economic growth reduces happiness.
Conclusions: The study provides evidence that the economic growth alone does not lead to happiness in the country if citizens are not employed and the rate of inflation continues to spiral upward. The study thus concludes that the economic growth must be inclusive in nature through government use of rents to invest in sectors that create value additions and job opportunities for citizens. The study also recommends the setting of the social safety net, as well as ensuring that inflation is properly managed.

Keywords: oil rent, mineral rent, inflation, unemployment, happiness

JEL Classification: M15, M21

Introduction

Oil plays a very important role in the world today. It plays an important role in the level of growth and development in countries where it is found and countries where is it used. Today, oil can be used to assess the level of economic stability due to the importance and level of dependence ascribed to it. Due to the demand, volume and value of oil traded in the international market; the price of oil serves as an economic signal. However, it is subject to the laws of demand and supply. Generally, the findings show that increases in oil price mirrors increases in the world economic growth, as well as an increase in demand for oil. Oil prices moved from $55 per barrel in the first quarter of 2007 to $95 per barrel in the last quarter of the same year. This increase was as a result of a strong world economic growth which drove demand in oil use. All things being equal, when the price of oil decreases, it negatively affects most oil--producing countries, leading to a reduction in the oil receipts and thus a decrease in real national income. Similarly, when the price rises, oil exporting countries witness huge foreign exchange inflows and experience the economic growth. The reverse is the case for oil importing countries; if the price of oil keeps rising, it tends to dampen demand and the GDP growth. A number of studies show that oil influences economic growth in countries. Boheman, Maxen (2015) showed that a 1% increase in oil price increases the GDP growth in the economy of members of the organisation of oil exporting countries (OPEC) by 0.145% the following year and 0.141% in non-OPEC member countries the following year as well. Several scholars have studied the relationship between oil and the growth of the economy using sophisticated econometrics and statistical tools leading to various discoveries such as the Dutch disease. The Dutch disease refers to a re-allocation of resources from less profitable tradable sectors to non-tradable sectors. The Dutch disease came into the spotlight in the 1970s following the discovery of oil and gas in the North Sea. The term Dutch was used in reference to the decline of the agricultural and manufacturing sector with a corresponding increase in the oil sector of the Netherlands. While the reduction in the GDP composition of other sectors fell with the rising component in the oil and gas sector, it is however yet unclear the extent to which this decline can be attributed to oil discovery alone. In the 1970s when the United Kingdom began hydrocarbon exploration, they began to notice gradual fall in the size of their manufacturing sector as well. Experience from these two countries spread fear of similar incidence to other industrial countries with hydrocarbon resources. This led to several studies investigating the existence and extent of the Dutch disease in oil-producing countries with the aim of mitigating or managing the "disease" (*e.g.* Bature, 2013; Mironov, Petronevich, 2015). Beyond the Dutch disease, scholars were also interested in investigating the various ways through which oil price increase or decrease affect economic growth in oil producing countries and non--oil producing countries alike. The reason for this is simple. Volatility in oil prices affects both the oil producers and consumers as it creates uncertainty and makes planning difficult. Behind this deification of oil, very little is said about its effect on the socio-economic psychological conditions of people where oil is found. While the effect of oil on manufacturing, agriculture, the financial sector, *etc.* abound, little is known about the empirical effect of oil on the psychological welfare of the citizens.

This study attempts to fill this gap by assessing the relationship between oil and happiness. The reason for this is not far-fetched. The institutional structure of a society as a concept is wide and complex, combining the political, economic and social & psychological elements that form a society. This study, therefore, intends to empirically investigate

the relationship between oil and happiness in selected African countries. Numerous studies on oil often use oil price as their focal variable in analysing the relationship between oil and various economic indicators. This study uses oil rent as the focal variable. Oil rent is the difference between the value of crude oil production at world prices and total costs of production. Natural resource rents are the revenues that a country earns when it engages in resources extraction less the cost of extraction. This includes oil rents, coal rents, mineral rents, and forest rents. They are called rents because these resources are not manufactured or man-made but extracted. Since their supply is limited, these natural resources command high returns. Undoubtedly, the use of resource rents is an improvement because they take into account the world price of the resource and their local cost of production/extraction which differs amongst countries. One danger associated with resources rents is that resource-rich countries are in fact liquidating their capital. This principally explains why oil rent is a better variable to use in ascertaining the impact of oil on an economy because countries relying on rents are basically borrowing from their future. Investigating what this profit from diminishing natural resources is used for opens a new vista in the oil literature.

Statement of the problem

The oil sector accounts for a significant amount of revenue in oil-producing countries in Africa. The sector over the years has become a major contributor to GDP, economic growth and development, foreign exchange and reserves to these countries in the past decades. This is noticeable with the importance with which governments' in Africa place on oil through state ownership, control and active participation in the sector through organisations such as the Nigeria National Petroleum Corporation (NNPC), National Company for Research, Production Transport Transformation and Commercialization of Hydrocarbon (Sonatrach) in Algeria, Sociedade Nacional de Combustiveis de Angola (SONANGOL) in Angola and the Egyptian General Petroleum Corporation (EGPC) as examples. In Nigeria, for instance, oil contributes 90% of foreign exchange earnings and 95% of foreign exchange earnings in Angola in 2014. In terms of foreign reserves, Algeria tops the list in African with US$ 121.9 bn in 2016, Libya comes second US$ 70 bn in 2015; Angola, Nigeria and Egypt with reserves of US$ 24 bn, US$ 30 bn and US$ 19 bn respectively as of 31 December 2015, 8 March 2017 and 31 October 2016 respectively all of which are thanks to earnings from oil export. If these enormous revenues and resources were efficiently utilized, we would expect that the continent and in particular oil-producing countries would perform at par with countries in Europe & North America in terms of developmental indices. Unfortunately, this has not happened, as Africa seems to be the continent with the highest number of poor and underdeveloped countries in the world. Revenue earned from the export of oil from Africans supposed to serve as the continents' launch pad to economic prosperity and development. The continent has failed to launch into this expected growth and prosperity for her citizens. It is more alarming that oil-producing countries in the continent, rather than basks in the euphoria of foreign revenue for the development of their society, are unfortunately suffering under the resource curse which is evidenced by the emphasis placed on the sector to the detriment of other productive sectors in these countries. Resource--rich countries such as Angola and Nigeria have 54.5% and 76.5% of their population living on less than US$ 3.10 per day as of March 2017. The effects of poverty have a similar consequence. The low GDP leads to a low standard of living and ultimately a low quality of life. Unsurprisingly, the country with the highest GDP per capita in Africa ranks 41st in the world (Equatorial Guinea,

US$ 16,507), being an oil-producing country. The GDP per capita of other oil-producing countries reaches less than 50% of that of Equatorial Guinea; Algeria (US$ 7,095), Egypt (US$ 4,282), Angola (US$ 2,829), or Nigeria (US$ 2,688) ranking very low on the world scale despite enormous earnings from oil, implying lower standards of living. The low living standard reduces the quality of life and also impacts health negatively with consequences for the economy. The main factor contributing to the high rate of mortality in Africa arises from preventable waterborne diseases which affect infants and young children greater than any other group. The principal cause of these diseases is the lack of access to clean water. In most part of Africa, clean and potable water is rare to come across despite being surrounded by rivers and having some of the largest freshwater lakes in the world. There is no gainsaying that sub-Saharan Africa has 24% of the global burden of disease but only 3% of the workforce in the health sector. The ratio of medical personnel to population is 18 per 100,000 people continent-wide. 3,000 Africans die each day of AIDS and an additional 11,000 get infected with less than 1% getting treated. The lack of clean water, a low ratio of healthcare personnel to population and the prevalence of diseases imply a high incidence of mortality, a low life expectancy, *etc.* With the scenario painted, it can be argued that citizens in most oil-producing countries may not be happy. This study is therefore geared towards answering the question: does oil rent and oil price increase happiness?

1. Literature review

1.1 The resource curse

The resource curse is one of the frustrations faced by resource rich countries today. Most of these countries are developing countries that tend to have high incidence of poverty, widening inequality and deprivations. Oil and other natural resources are usually associated with insecurity, tyranny and misery in these countries rather than being associated with inclusive economic growth that leads to development and peace in society. The paradox of plenty is another name for the resource curse. It refers to the undeveloped state of affairs in resource rich countries wherein they are unable to maximize benefits from their resources (Sachs, Warner 1995; Auty, 1998). With the enormous revenue earned from resource export, resource rich countries are expected to post improvements in general welfare, and health of citizens, increase in literacy rate, reduction in inequality and poverty *etc.* unfortunately the reverse is the case and experience. Studies show that countries rich in natural resources tend to be prone of highly volatile conflict and violence, political tyranny, high inequality and poverty rates (Collier, 2008). What should be a launching pad for growth and development turns to be the leading cause of conflict and wars, underdevelopment and corruption and, when found and controlled by the wrong people, it becomes a source of general societal ruin. It refers to the situation whereby the exploration of natural resources causes significant environmental, social and economic harm rather than fostering economic growth, development and societal peace and happiness. This is said to happen in many different forms. To some scholars, the resource curse can be avoided. This is because it occurs under a number of circumstances, thus it is not universal. The lottery analogy is often used in explaining the resource curse. Lottery winners often fall into multifarious difficulties due to inability to manage the enormous sudden wealth. According to the International Monetary Fund (IMF, 2012), countries that derive a minimum of twenty per cent of its revenue from natural resources are resource rich countries. There are fifty--one resource rich countries and twenty-nine of them are classified as low and lower mi-

ddle-income countries. Political instability, poor governance and conflicts are a major characteristic in these countries. People aspire to leadership and public offices with the aim of plundering revenues from oil. Enormous oil revenue most often serve as gunpowder for violence and conflict between various faction and rivals struggling to capture the revenue. Thus, we find that most oil rich countries are bedridden with violent conflicts and instability under many guises. According to Bannon, Collier (2003), "a country that is otherwise typical but has primary commodity exports around five per cent of GDP has a six per cent risk of conflict, but when exports are 25% of GDP the chance of conflict rises to 33%. Ethno--political groups are more likely to resort to rebellion rather than using nonviolent means or becoming terrorists when representing regions rich in oil." Sudan, for example, has not only divided into two countries based on disagreement arising from resource control but also schism exists internally in the currently resource-rich southern Sudan; Nigeria is a perfect example of a country that practices a skewed form of federalism where revenues from the resource-rich Niger Delta is extracted and shared to the whole country while the people of the Niger Delta where oil is found do not benefit from the resource but rather suffer environmental degradation and unhappiness. This has also led to increase political violence in Nigeria because whoever becomes the President has access to the huge resources found in the Niger Delta and can do as he pleases with it. Thus, public office is viewed as a means to an end, which is unlimited access to the public purse, hence the bitter struggle to get there. This tendency erodes the government's capacity to effectively function as the public authority and political leadership are used for vested and primordial interests. With this sort of problems bedevilling resource rich countries, happiness will seem far from their citizens.

1.2 Empirical literature

Okun (1970) developed what is today known as the misery index which explains how happy an individual is economically and socially at any given point in time. The index is derived by the summation of the rates of inflation and unemployment in an economy; the higher the index, the higher the gloom and misery in the economy and vice versa. Thus, when the index begins to fall, the opposite of misery, *i.e.* happiness, begins to set in. We can therefore infer that the higher the rent from oil, the higher the level of happiness through the channels of low inflation and unemployment. We will thus examine the relationship between oil rent and happiness by probing the reaction of unemployment and inflation to changes in oil prices. The price of oil has grown from a modest $40 pb in 1998 to almost $140 pb in 2008 and has thus led to enormous foreign exchange income in oil-producing countries, it is expected that if judiciously utilised in pursing economic growth, there will be development and increased overall happiness for the citizens. For this reason, we shall review some publications that investigate the impact of oil on factors that increase happiness which in our view here is inflation and employment. In the light of the above, Abounoori, Asgarizadeh (2013) studied the macroeconomic factors affecting happiness using panel data for 58 countries over a 9-year period using data from the Massachusetts Institute of Technology. They were of the view that every good government working towards development reflexively aims towards raising people's happiness by providing economic opportunities. They used inflation and unemployment as a channel to measure happiness and found that an employed individual is happier than an unemployed individual and when there is inflation, the poor and the rich are not happy. This is because the little the poor have is becoming worthless and welfare is falling while the rich are nervous and thus trying to balance their assets to reduce the impact of

inflation on their liquid assets. From their data, they concluded by stating that low levels of unemployment and inflation tend to increase economic happiness. Similarly, Scitovsky (1992) and Clark, Oswald (1994) showed that unemployment negatively influences happiness. Di Tella, MacCulloch (2005) found that an individual is happy when they are gainfully employed and enjoy the full purchasing power of their income which is not affected by inflation, noting the differential settings in several publications show that oil price shocks results in increases in the general price level. Using an augmented Phillips curve framework, LeBlacc, Chinn (2004) found that a 10% increase in oil price increases the price level by 0.1 to 0.8% in the US and European Union (EU). Employing a nonlinear autoregressive distributed lag (NARDL), a study on the Algerian economy shows that oil price increase causes inflation while oil price decrease seems unrelated to inflation both in the long and short run periods (Lacheheb, Siraj 2016). Hooker (2002) stated that oil prices significantly affect inflation in his study in two different time periods. For G7 nations, oil price shocks not only increase inflation, but it also reduces economic productivity (Cologni, Mattei, 2005). In a rather interesting study, Seka *et al.* (2015) disaggregated heavily oil dependent countries and low oil dependent countries and found that shocks in oil prices had a direct impact on inflation in countries with low oil dependency, while in high oil dependent countries, the impact seem to be indirect. This is because oil price increase leads to the cost of production increase in the producing countries and this increase is passed on to importers, leading to an increase in the general price level in the country. Their results also show that a rise in the real exchange rate causes inflation and thus increases the exporters production cost most especially in countries with heavy oil dependence and the cost of production in exporters with low dependence on oil. There seems to be no specific resolution on the effect of oil prices and unemployment. While examining this link, Mellguist, Femermo (2007) stated that though they found a positive relationship between oil price and unemployment in Sweden, they cannot conclude if fluctuation in the price of oil will affect unemployment positively or negatively in the long run due to indeterminate results from their causality test. On another spectrum, Oberndorfer, Loschel (2009) employed the use of the vector autoregressive (VAR) model to investigate oil prices in the German economy. They showed that an oil price increase moves in the same direction as unemployment; they found this puzzling because Germany is an energy efficient country. The labour market in Germany depends on the oil market and thus reacts to resource re-allocation whenever the oil price begins to rise and to rational expectations when the oil prices falls. This confirms studies carried out by the German Council of Economic Experts (2006) suggesting that shocks in oil prices adversely impact industrial production. Using a VAR model to study the South African economy, Senzangakhona, Choga (2015) found that oil price significantly impacts unemployment in the long run. The impulse response function shows that unemployment returns to equilibrium in the long run when oil prices fluctuate, making it an important variable in determining the level of unemployment in the country. Since oil determines the level of unemployment, it invariably means that oil prices increases significantly reduce the potential output (Estrada, Hernandez de Cos, 2009). Gunu (2010) traced the effect of oil price volatility on the real GDP, inflation, money supply and the rate of unemployment in Nigerian using the vector VAR. His findings show a significant impact of oil on the real GDP, unemployment and money supply but no significant impact on inflation. Dogrul, Soytas (2010) argued that inflation; productivity and employment are negatively affected when the cost of production in-

creases due to an increase in oil price when a country is import dependent. This leads to a significant slowdown in the economic growth. Employing the GARCH model to panel data, long run relationship was found between a number of macroeconomic variables and oil price in the OECD countries. Katircioglı *et al.* (2015) found that oil price negatively affects unemployment, inflation and the economic growth. This therefore implies that there is a positive relationship between oil price and the misery index. Brini *et al.* (2016) studied the effects of shocks from the price of oil on inflation and the real exchange rate in MENA countries by employing the use of a structural VAR model. The impulse response function from the VAR model highlighted fluctuations in the price of oil having a strong effect in oil-importing countries through the exchange rate mechanism in the long run. Their findings also show that there is a small impulse response from oil shocks on inflation, but this impact is riveted by the rigidity of subsidized products prices.

2. Methodology

Four oil-producing countries in Africa were selected for the study based on geography and the volume of oil produced to enable us to make generalizations. In terms of the geography, the World Bank divides countries in Africa into two regions: Sub-Saharan Africa (SSA) and Middle East and North Africa (MENA). This classification guided us in choosing countries for this study. Using the volume of oil production, we decided to use major oil producers that produce over a million barrels of oil per day and minor oil producers that produce less than a million barrels per day. The countries are Nigeria and Cameroon (Sub-Saharan Africa), Algeria and Egypt (Middle East and North Africa). While Nigeria and Algeria produce over a million barrels of oil each, Egypt and Cameroon produce less than a million barrels of oil each. It is interesting to state that these selected countries share other important characteristics. Our data sample comes from the period from 1995 to 2015 amounting to 21 years for each country. To generate a more precise and accurate relationship between oil rent and happiness, an empirical study of the presumed reasoning becomes a necessity. This work employs the use of fixed and random effects, as well as a partial efficiency analysis of our data. The data used in the study were mainly secondary data sourced from the World Bank's data archive. The widely used econometric method to study dynamic panel data consists in the estimation of the random and fixed effects (*e.g.* Zagozina, 2014). Its advantage lies in its capacity to estimate models with omitted variables that maybe correlated to variables in the model, control for the effects of variables whose values do not change across time amongst others. The Hausman statistics is used to choose the best linear estimate from results of the fixed effect estimate and the random effect estimate. Since we are dealing with a number of countries, we employed the use of the partial efficiency analysis, which is a non-parametric approach. The efficiency frontier analysis methods are therefore mathematical programming optimisation tools used to measure the technical efficiency of multiple-input and/or multiple-output cases by constructing a relative score of technical efficiency.

2.1 Model Specification

$$HAPP = f(ORT, MINR, GDPG, OLP), \quad (1)$$

where:

HAPP this is happiness. It is derived from the inverse of the misery index. The misery index is the addition of the rates of inflation and unemployment in an economy. It is a useful

approximation of the economic wellbeing and prosperity or otherwise of citizens in a country. An increasing index means the worsening economic climate and thus misery for citizens while a reduction in the index implies an increase in happiness for citizens. We therefore extrapolate inflation and unemployment rates to get the miserly index for this study. The inverse of the misery index gives us an index for happiness. This inverse therefore is our proxy for happiness;

ORT Oil rent. It is the difference between the price of crude oil in the international market and the local cost of production;

MINR Mineral rent. It is the difference between the price of solid minerals in the international market and the local cost of production. Minerals included in the calculation are tin, gold, lead, zinc, iron, copper, nickel, silver, bauxite, and phosphate. The argument here is the realization that most oil rich countries have extensive quantities of a number of other natural minerals and resources which are often not provided with the desired attention or emphasis as oil;

G*DPG* the GDP growth is the annual percentage growth rate of GDP at market prices based on the constant local currency. Aggregates are based on constant 2000 U.S. dollars;

O*LP* Oil price. This is the price of crude oil in the international market and the data is soured from the data bank of the Organization of Petroleum Exporting Countries (OPEC).

Accordingly, the mathematical form of the models is stated as:

$$HAPP_t = \theta_0 + \theta_1 ORT_t + \theta_2 MINR_t + \\ + A\theta_3 GDPG_t + \theta_4 OLP_t + \mu_t, \qquad (2)$$

where:

HAPP, ORT, MINR, GDPG and *OLP* are as defined above,

θ_i means parameter estimates,

μ_t is the error term which is normally distributed.

3. Results and discussion

Trend analysis

In the figures, we will analyse the trend of the major variables for the four countries in our study.

From the Figure 1, we have found that Nigeria (OretN) posted the highest rent from oil in 1995 compared to the other three countries that seem to be on the same level within the period. Rent from oil slumped in 1998 due to the slowdown in the world economy which severely affected the oil-producing countries, as can shown above, but this quickly picked up in 2000, accounting for the peak period of Nigerian oil rent. In 2008, oil rent in Nigeria (OretN) and Algeria (OretA) was the same; however, Algeria began increasing, while Nigeria rent from oil began falling. Ultimately, we have a situation where the rents from oil have been falling for all countries studied.

Mineral rent is our check variable. The Figure 2 shows that between 1995–2005, rent from minerals was virtually non-existant. After 2005, all three countries aside Nigeria (MretN) began growing their mineral rent albeit not significantly. In 2008 however, Egypt (MretE) and Algeria (MretA) both witnessed their peak rent levels from minerals though this began to fall in 2010, but we can see that Cameroon (MretC) began making appreciable progress though marginal, making Nigeria the worst performer here. We can thus conclude that Egypt performs better in rents from minerals among the countries studied.

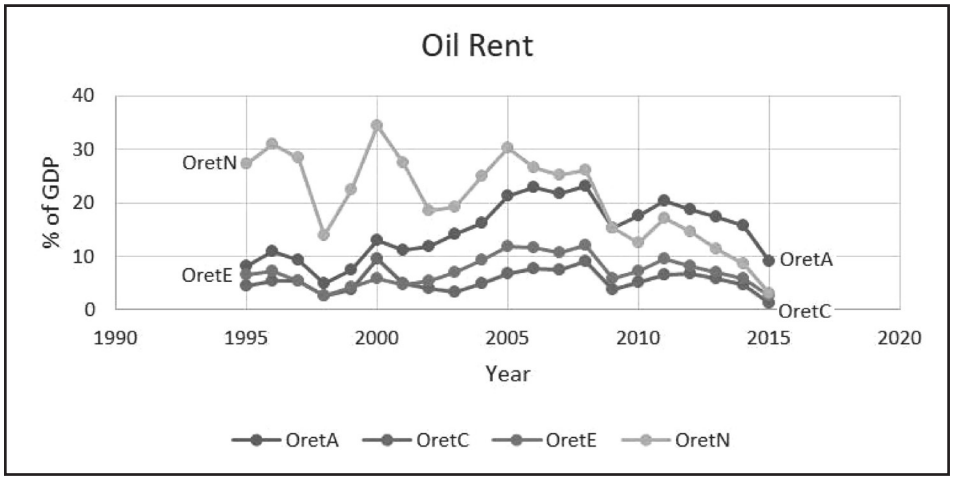

Figure 1. Trend analysis of oil rent. Source: Authors' computation (2018).

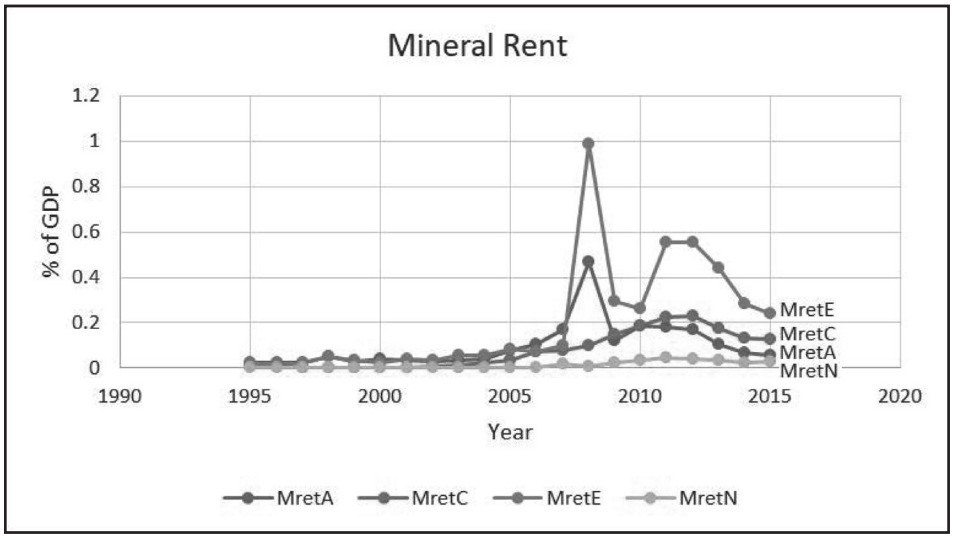

Figure 2. Trend analysis of mineral rent. Source: Authors' computation (2018).

If we remember that happiness is the inverse of the misery index, the happier the country, the less the misery there is and vice versa. From the trend in Figure 3, the level of happiness of all four countries in 1995 was almost infinitesimal, but this began to change, as their happiness level began to rise albeit marginally. Aside from Cameroon (HappC), the happiness level of every other country seems to have moved at almost the same level, converging at 0.05 compared to Cameroon (HappC), whose happiness level recorded a peak of 0.25 in 2007 and have posted a higher level of happiness compared to the other countries. This implies that the misery index in Cameroon is low in relation to the other three countries.

The Table 1 shows the results of all our models estimated using the random effect method and the within fixed effect method. This methodology is best suited for panel data and it produces efficient results. The

Figure 3. Trend analysis of happiness. Source: Authors' computation (2018).

Table 1. Data presentation.

Dependent Variables / **Independent Variables**	**Happiness**	
	Fixed Effect (FE)	**Random Effect (RE)**
Oil Rent	0.006 (1.08)	–0.003 (–4.63)
Mineral Rent	–0.046 (–1.67)	–0.61 (–1.71)
GDP Growth	–0.005 (–0.061)	–0.007 (–0.60)
Oil Price	0.003 (2.74)	0.004 (2.49)
Constant	0.0536 (5.72)	0.0903 (7.82)
R2 Within	0.108	0.010
R2 Between	0.212	0.772
R2 Overall	0.230	0.248
Hausman Test	Reject H0	

Source: Authors' computation (2018). (0.00) = t– values.

Hausman test- Accept H_0 = RE best explains model; Reject H_0= FE best explains model

models are estimated at levels due to the uniqueness of the data used in the study. The model shows that the GDP growth and mineral rent are negatively related to the level of happiness in the countries studied using both the FE and RE method, while the oil price positively affects happiness when applying both the RE and FE methods. The oil rent, our focal variable, shows a positive relationship with happiness using the FE method and a negative relationship using the RE method. The model rejects the null hypothesis of the Hausman test and accepts the fixed effect method for discussion. The result of the fixed effect method shows that oil rent does not significantly increase the level of happiness because the coefficient of the regression shows that oil is 0.0006 with t-value of 1.08. This implies that as oil rent increases, the level of happiness increases but not significantly.

An increase in happiness resulting from an increase in oil rent means that the misery index of the country is falling, further implying that the levels of unemployment and inflation are falling but not significantly. The per capita GDP alongside mineral rents are however negatively related to the level of happiness, though not significantly. This implies a unit increase in mineral rent and GDP growth reduces the level of happiness which further implies that the misery index increases but not significantly. Furthermore, our estimates show an increase in oil price nevertheless significantly increases the level of happiness; this implies that when oil price increases, the level of happiness increases.

Relationship between oil rent and happiness

As stated previously, in this case, happiness is the inverse of the misery index which is the summation of the rates of unemployment and inflation. The result of the fixed effect method shows that oil rent does not significantly increase the level of happiness in the oil-producing countries studied. This implies that as oil rent increases, the level of happiness increases but not significantly. An increase in happiness resulting from an increase in oil rent means that the misery index of the country is falling, further implying that the levels of unemployment and inflation are falling but not significantly. The GDP growth and mineral rents, on the other hand, are negatively related to happiness but not significantly. This implies a per cent increase in mineral rent and the GDP growth reduces the level of happiness, which further implies that the misery index increases but not significantly. Furthermore, our estimates show an increase in oil price nevertheless significantly increases the level of happiness, implying that when oil price increases, the level of happiness increases. This is not surprising. When there is an increase in the price of oil, the level of foreign exchange accruable to the country increases, enabling the government to spend and implement ambitious projects which are often characterised by increased budgetary allocations thus increasing happiness (while misery falls), since capital expenditure implies job creation. The huge foreign exchange receipt makes the economy surfeit with funds in a detrimental manner whereby it becomes cheaper to import rather than manufacture. Thus, on the one hand, the government capital expenditure might be creating jobs yet leading to inflation due to importation, which is a result of the ease of import rather than manufacturing. Thus, a false sense of happiness, which most often is temporary, it is not surprising that the coefficient of oil rent shows that it does not significantly increase happiness. This is because in the long run, we are economically disadvantaged and exposed to the vagaries of oil price fluctuation. Tule *et al.* (2017) reported a different result. They showed that there is the co-movement between the misery index and oil price in Nigeria, implying that the country is heavily dependent on proceeds from oil, stating further that within the period studied, increase in oil price was consistent with an increase in misery in Nigeria, which implies that as the oil price increased, the rate of happiness fell. Oishi, Kesebir (2015) however support our result by showing that an increase in the economic growth and GDP per capita do not lead to happiness in the presence of growing income inequality, which is expressed in resource--rich countries. If the growth in the GDP of a country is not evenly spread for more citizens to benefit from the growth, the level of happiness decreases, which means a rise in the misery index. Thus, the growth alone that does not create sustainable jobs or reduce unemployment is not sufficient.

Partial efficiency analysis

Kunst (2013) rule states that if the within R^2 and overall R^2 are close in a random or fixed effect model, this serves as evidence for individual effects being not so important. We

Table 2. Goodness of fit for the models.

Model	Within R^2	Overall R^2
Happiness	10%	23%

Source: Authors' computation (2018).

Table 3. Partial efficiency result (input = oil rent, output = happiness).

Country	Efficiency Score	Efficiency Rank
Algeria	0.11	4
Cameroon	0.60	1
Egypt	0.22	2
Nigeria	0.15	3

Source: Authors' computation (2018).

will therefore present the within R^2 and overall R^2 in the Table 2.

In the Table 2, we can see that the gap between the within R^2 and overall R^2 for the model is 13%. This implies that since the gap is relatively wide, individual effects are important and it is necessary to explain these effects, as they differ amongst the countries studied. We therefore employ the use of the partial efficiency frontier, which is an input output comparative analysis that measures the countries or institutions that make the best use of inputs (oil rent in this instance) to produce expected outputs (IV). The partial equilibrium measures the efficiency on output on a range of 0 (very low efficiency) to 1 (very high efficiency). We present the results of the efficiency analysis in the Table 3.

From the Table 3, Cameroon recorded the highest efficiency score in happiness (0.60) with Egypt coming a distant second with an efficiency score of 0.22, while Algeria recorded the lowest (0.11). This implies that the Cameroonians were the happiest people economically given their level of oil rent so that, with respect to the level of oil rent attributed to countries producing over a million barrels of oil per day, they will perform efficiently and far better than countries such as Algeria and Nigeria. Cameroon maintained low inflation and unemployment during the 2010–2014 period due to benefits associated as a member of the Communaute Economique *et* Monetaire de l'Afrique Centrale (CEMAC). The Colonies Françaises d'Afrique (CFA) zone countries have strong trade links with France, hence they enjoy low interest and inflation rates compared with other countries in Africa. Algeria with oil production above a million barrels of oil per day produced the worst result. This is not entirely surprising. The country witnessed protests against the rising cost of food, unemployment and inequality in the Arab Spring in 2011; the discontent in the country serves to explain the level of economic unhappiness.

4. Conclusion

Oil rent does not significantly increase the level of happiness in the oil-producing countries studied while the oil price does. The GDP growth, on the other hand, reduces the level of happiness though not significantly. Cameroon recorded the highest efficiency in generating happiness per unit of oil rent. This paper contributes to the literature by providing empirical insights on oil rent and happiness in oil producing countries in the African context. We recommend that revenue from oil should be geared not only towards the economic growth but ensuring that the growth is inclusive so that the welfare of citizens could improve significantly. The inclusive growth can be created through but not limited to the following:

a. Promoting the job-rich growth. Government policies that spur and support the agricultural and manufacturing sectors that create value additions in the value chain in countries have the tendency to create the job-rich growth.
b. Creation of social safety nets for the vulnerable in the society. We recommend the introduction of food stamps targeted at women in the rural areas which will ena-

ble them to have access to food items that will not only improve their nutrition alone but that of their children, while also empowering them. These food stamps will only be used for nutritional items, not for harmful products such as alcohol or tobacco. It is, therefore, necessary for a solid database to be created for citizens in the various countries.

Finally, the only way to make oil revenue have a significant impact on the citizens is through good governance, effective management of resources and the economy to ensure the sustainable growth with low inflation. This study focused on four oil-producing countries in Africa, which may limit the generalization of our findings. Future studies can include more oil producing countries to get comprehensive insights of the subject. Future studies should use a deeper statistical analysis and test to examine the subject. Nonetheless, this paper enriches our understanding of the connection between oil rent and happiness in oil producing countries in Africa.

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