

Peter Ekundayo Mesagan^a • Aboje Anthony Unah^b • John Olamide Idowu^c • Abidemi Solomon Alamu^d

Oil Resource Abundance in Nigeria and Iran: Contrapuntal Effect on Social and Economic Welfare

Abstract

The study focuses on the contrapuntal effect of oil resource abundance in Nigeria and Iran between 1970 and 2016. It is driven by the fact that oil resource abundance has an impact on both economic and social welfare of citizens of both countries. We analyse data from crude oil production, exchange rate, life expectancy, mortality rate and the real gross domestic product per-capita using the vector error correction framework. We find that oil resource abundance has a contrapuntal effect on the social and economic welfare of Nigerians while we did not find evidence of a contrapuntal effect on Iranians' welfare.

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1. Introduction

Since oil was discovered for the first time in Nigeria in 1956 in Oloibiri, the country has continued to depend on crude oil exports for its economic sustainability. Nigeria remains the largest oil producer in Africa and one of the largest in the world with about 2.2 million barrels produced per day (Yeeles and Akporiaye, 2016; Charles et al., 2018). Historically, Nigeria experienced the first crude oil export in 1958 and since then, it has continued to earn huge foreign exchange revenues from the natural resource (Akpan, 2006; Omofomwan and Odia, 2009; Isola and Mesagan, 2014). The discovery of oil in commercial quantity in the country shifted attention away from

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Peter Ekundayo Mesagan: profdayoms@yahoo.com

a, b, c, d. Department of Economics, University of Lagos, Lagos, Nigeria.

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agriculture, which was the country's mainstay before independence in 1960 and made the economy totally dependent on oil exports (Yeeles and Akporiaye, 2016; Omojolaibi et al., 2015). During the 1970s, Nigeria invested heavily on oil facilities and other core infrastructure by building refineries in Port Harcourt, Warri, and Kaduna, as well as, storage depots in Jos, Aba, Makurdi, Enugu, Gombe, Ore, Yola, Mosimi, Lagos satellite town, Suleja, Kano, Gusau, Minna, and Ilorin (Ikelegbe, 2005; Mesagan and Bello, 2018). Iran, on the other hand, is one of the World's largest oil producer and a founding member of the Organisation of the Petroleum Exporting countries (OPEC). It started its first oil drilling in 1908 around the Khozestan province, Southwest region of the country (IOPEC, 2017). Since then, the country has also derived huge earnings from crude oil production. Like its Nigerian counterpart, which produced about 2 million barrels of crude oil in 2016, Iran produced about 4million barrels in 2016 (2BPS, 2017).

Oil resource boom in Nigeria in the early 1960s boosted its growth and enhanced its revenue potential. In 1971, Nigeria joined the OPEC and since then, oil and gas revenue has accounted for almost 98 percent of its export revenue (Watts, 2004; Ogunleye, 2008). In the 1970s, revenue accruing to the country from oil became the major source of government revenue (Akpanta and Okorie, 2014). Between 1965 and 2000, Nigeria's per capita oil revenue increased from 33 USD to 325 USD (Asemota, 2016). Moreover, crude oil constituted about 40 percent of government revenues and oil resources generated over \$391.6 billion to government revenues between 1970 and 2005, accounting for about 77.1% of the entire government revenue over the period (Akpan, 2006; Karl, 2007; Ogunleye, 2008; Adetunji et al, 2013). The country has also earned over 593.6 billion from oil export which accounts for 93.6% of total foreign exchange between 1970 and 2005 (Inyiama and Ikechukwu, 2015; Saibu and Mesagan, 2016). For Iran, in 2004 alone, it produced about 5.1% of the total crude oil in the world generating between \$25 billion and \$30 billion (Beigbaghlu et. al, 2014). In 2006, crude oil production accounted for about 18.7% of Iran's GDP and it is thus the country's major source of foreign earnings (Rivlin, 2006). This means that both countries depend, to a large extent, on crude oil to generate income and enhance the welfare of their citizens.

Oil resource abundance in Nigeria is not without its attendant crises as the "black gold" has come to be associated with several problems. For instance, the oil-producing areas of the Niger Delta have suffered neglect in terms of basic amenities. Moreover, the level of poverty and underdevelopment in the oil-producing areas of Nigeria is very alarming (see Omofomwan and Odia, 2009; Isola and Mesagan, 2014; Yeeles and Akporiaye, 2016). This has led to economic instability and increased insecurity of oil company workers in the Niger Delta region (Evans and Kelikume, 2018; Evans and Kelikume, 2019). In the oil-producing region of the country, there is incessant kidnappings and bombing of gas pipelines. This myriad of problems is also worsened by the high level of corruption that has ravaged the country since the early 1970s. Furthermore, tribalism, nepotism and structural imperialism have also come to

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² BP Statistical Review of World Energy

be associated with the Nigerian state since oil exploration began (see, Naanen, 1995; Watts, 2004; Olarinmoye, 2008; Mesagan, 2015; Evans, 2018). Moreover, the neglect of the agriculture sector coupled with poor oil resource management adversely affects the country's growth potential, thereby confirming the resource curse syndrome (Collier, 1987; Snyder, 2006; Olarinmoye, 2008; Isola et al., 2017). The resource curse syndrome is based on the premise that oil resource boom has the potential to generate violence and economic instability (Collier and Hoeffler, 1998; Humphreys, 2005; Eregha and Mesagan, 2016). In the oil-producing Niger Delta of Nigeria, between June 2006 and May 2014, about 1550 deaths relating to oil production were recorded and this also has implications for maternal and infant deaths in the country (Adams 2014; Mesagan and Adeniji-Ilori, 2018).

Empirically, studies have recognised that natural resources abundance is very important to the macroeconomic development of resource abundant economies (see, Leamer et al, 1999; Sachs and Warner, 2001; Stijns, 2005; Eregha and Mesagan, 2017). For instance, global financial institutions, until the 1980s, considered natural resource wealth an advantage, but this has changed since the early 1980s up till this period as studies now attribute economic chaos in resource abundant nations to the endowment of natural resources (Sala-i-Martin and Subramanian, 2008; Eregha and Mesagan, 2016). This leads to the question whether natural resource endowment provides economic blessing or a curse (see, Sachs and Warner, 2001; Sala-i-Martin and Subramanian, 2008; Van der Ploeg, 2011). On the average, host countries of abundant resources have been observed to record a very low long-run economic growth rates compared to countries that have a more diversified export (Eifert et al, 2002; Bulte et al, 2005). Furthermore, the environmental impact of crude oil production on human lives in oil-rich nations, which is determined by the quality of investment in-flow, contribute to the debate whether resource abundance is actually a blessing or a curse (Van der Ploeg, 2011; Mesagan et al, 2018).

With the foregoing discussion in the literature, it becomes very crucial to determine the contrapuntal effect of natural resource abundance on citizens' welfare in Nigeria vis-à-vis the situation in Iran. The reason is because both Nigeria and Iran are among the world's leading oil producing nations and are also developing economies. The contrapuntal effect of crude oil production comes to the fore as it is used to describe the double-edged (i.e. positive and negative) impact of oil resource abundance on welfare in both nations from the early 1970 up till date. Contrapuntal as used in this article simply means the positive and negative effect of crude oil production on both social and economic lives of the citizens in both Iran and Nigeria. The study helps to deepen the discussion in the literature about the resource curse syndrome and the possibility of a resource blessing. To this end, we aim to determine the effect of natural resource abundance on indicators of welfare in Nigeria and Iran. Specifically, welfare is decomposed into both economic indicators and social indicators, thereby representing a major contribution to the literature.

2. Literature Review

2.1 Theoretical Issues

In literature, there are several issues relating to crude oil wealth and economic performance. One of such important issue is the Dutch Diseases Syndrome. The economic concept of Dutch disease refers to the potential negative effects of natural resources windfalls and its resulting appreciation of exchange rates can have for the rest sectors of the economy (Fardmanesh, 1991; Bulte *et al*, 2005; Gylfason and Zoega, 2006). One of the potential dangers of the oil boom is that exchange rate appreciation renders the non-oil tradable sectors, such as manufacturing, less competitive and therefore, can frustrate industrialization. This means that focusing on the booming sector can trigger exchange rate appreciation thereby making other sectors of the economy non-competitive in the international market especially in terms of price since the non-tradable goods cannot be imported easily unless at a prohibitive price (Auty and Mikesell, 1998; Auty, 2001). The other issue is the Resource Curse Syndrome. This is otherwise known as the paradox of plenty and it postulates that countries that are rich in non-renewable resources tend to be worse in terms of governance and economic development (Karl, 1997; Mehlum *et al*, 2006; Haber and Menaldo, 2011; Olaniyi, 2019). Furthermore, the issue of Rentier State is also paramount in the discussion of oil abundant-welfare link. It explains how state decision-makers in natural resource-rich economies create and maintain growth restricting policies in terms of rent-seeking (Yates, 1996; Omeje, 2006; Weyland, 2009). It is a notion that natural factor endowments or technology shape the relations of productions or institutional evolution of a society.

2.2 Empirical Review

Several scholars have analysed the effect of natural resource abundance on growth with respect to the resource curse syndrome. For instance, Karl (1997), Le Billon (2001), Sachs and Warner (2001), Ross (2004), Mehlum *et al* (2006), Brunnschweiler and Bulte (2008), Haber and Menaldo (2011), and James (2015), found positive relationship between resources dependence and loot, poor economic growth, arm conflict and arm struggle for secession by the resource-endowed region. It was also observed in several other studies that political and social variables arbitrate in the association between natural resource endowment and development outcomes to further intensify the resource curse syndrome (Auty, 2001; Papyrakis and Gerlagh, 2007; Bulte and Damania, 2008; Satti *et al*, 2014; Collier and Hoeffler, 2009). Meanwhile, studies like Bulte *et al* (2005), Perry and Olivera (2009), as well as, Eregha and Mesagan (2016), observed that the inability of natural resource abundance to promote economic development was mainly attributable to the quality of institutions operating in an economy.

Other studies in the literature have beamed searchlight on the Dutch disease syndrome by focusing on the exchange rate channel. For instance, Torvik (2002), Matsen and Torvik (2005), Bresser-Pereira (2008) and Roemer (2015) observed that natural resource endowment expands the number of industrialists that are engaged in

rent-seeking. These empirical studies confirmed that the resource-abundant sectors triggered exchange rate appreciation for the whole country thereby restricting the growth of other sectors of the economy. Similarly, Gylfason (1984), Collier and Hoeffler (1998), Mehlum *et al* (2006), Capo *et al* (2007), and Collier and Hoeffler (2009) observed that resource wealthy nations are economically stagnated because of weak rule of law, corruption, institutional decay and conflicts. The other studies that attributed the Dutch disease issue in resource-rich economies to conflicts and weak institutions include Easterly and Ross (1997), Le Billon (2001), and Collier and Hoeffler (2005). It is evident from the literature that there has been no consensus on the actual effect of resource endowment on the development of resource-rich economies. Some studies have observed that resource endowment ensure sustainable growth in resource abundant economies (Sachs and Warner, 1999; Auty, 2001; Papyrakis and Gerlagh, 2007) while others like Watts (2004), Sala-i-Martin and Subramanian (2008), Satti *et al* (2014), and Yeeles and Akporiaye (2016), have found the opposite as it is opined that resource endowment hinders economic growth. This present study aims at joining in the discourse by focusing on the double-edged impact of oil resource abundance for Nigeria and Iran. Specifically, most of the earlier studies in the literature have only beamed searchlight on the effect of natural resource endowment by using mainly economic indicators thereby often leaving out the social welfare indicators in the process. Therefore, by including the social indicators, this present study makes an original contribution to the literature.

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3. Research Methodology

As observed in the empirical literature, oil resource abundance has a positive impact on welfare in some of the developed oil-abundant countries, while it has a negative impact on welfare in less developed oil-abundant economies. It thus implies that there is a strong link between crude oil production and human welfare. This relationship has been modelled empirically in Collier (1987), as well as, Gylfason and Zoega (2006). To this end, we follow these previous studies in specifying a functional relationship for oil resource abundance and welfare in Nigeria and Iran as follows:

$$GDP = f(OIL) \quad (1)$$

$$EXC = f(OIL) \quad (2)$$

$$MTR = f(OIL) \quad (3)$$

$$LEX = f(OIL) \quad (4)$$

Where GDP, EXC and MTR and LEX represent real gross domestic product (GDP) per-capita, exchange rate (EXC), mortality rate (MTR) captured with the crude death rate per 1000 people, and life expectancy (LEX) respectively. These are the variables used to proxy human welfare in Nigeria. Both GDP and EXC are economic indicators of welfare, while MTR and LEX are social indicators of welfare. Moreover, crude oil production (OIL) is captured with the barrels of crude oil production.

In this study, the vector auto-regression/vector error correction (VAR/VECM) model is the most suitable for this work. This is because the estimation is handled as a system of equations, which enables us to determine the effect of net oil export on all the indicators of human welfare in Nigeria and Iran. Also, the VAR/VECM model makes it possible for each equation to be estimated with the usual OLS method separately and forecasts obtained from the system are in most cases better than those obtained from the far more complex simultaneous equation models (McNees, 1986). The quest to overcome endogeneity problem also necessitate the use of the VAR/VECM framework in this study. The appropriate lag length is then chosen using the Akaike Information Criterion. Moreover, along with the VAR/VECM estimation, the variance decomposition and the impulse response analysis can also be conducted. This makes the analysis robust and very useful for determining the contrapuntal effect of crude oil production in the two countries.

To this end, equations (1) to (4) are specified in an estimable form for the VAR/VECM framework as:

$$GDP_t = \alpha_1 + \beta_1 OIL_{t-1} + \beta_2 EXC_{t-1} + \beta_3 MTR_{t-1} + \beta_4 LEX_{t-1} + \varepsilon_1 \quad (5)$$

$$EXC_t = \alpha_2 + \delta_1 OIL_{t-1} + \delta_2 GDP_{t-1} + \delta_3 MTR_{t-1} + \delta_4 LEX_{t-1} + \varepsilon_2 \quad (6)$$

$$MTR_t = \alpha_3 + \lambda_1 OIL_{t-1} + \lambda_2 GDP_{t-1} + \lambda_3 EXC_{t-1} + \lambda_4 LEX_{t-1} + \varepsilon_3 \quad (7)$$

$$LEX_t = \alpha_4 + \psi_1 OIL_{t-1} + \psi_2 GDP_{t-1} + \psi_3 EXC_{t-1} + \psi_4 MTR_{t-1} + \varepsilon_4 \quad (8)$$

$$OIL_t = \alpha_5 + \theta_1 LEX_{t-1} + \theta_2 GDP_{t-1} + \theta_3 EXC_{t-1} + \theta_4 MTR_{t-1} + \varepsilon_5 \quad (9)$$

The variables in equations (5) to (9) remains as explained earlier. However, ε is the residual term. Equation (6) is very important as it makes it possible to determine the presence or absence of the Dutch Disease in Nigeria and Iran. Should crude oil production positively impact exchange rate, then, there is Dutch Disease syndrome in both countries. The study focuses on the Nigerian and Iranian economies employing secondary data from 1970 to 2016. Data on real GDP per-capita, exchange rate, mortality rate and life expectancy are sourced from the World Development Indicators of the World Bank (WDI, 2017) while crude oil production is sourced from the BP Statistical Review of World Energy (BPS, 2017).

4. Empirical Results

In this section, the result of the empirical study is presented. To determine the contrapuntal effect of crude oil production on welfare in Nigeria and Iran, the stationarity of the data is presented first using the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test statistic, followed by the test for the long run relationship. This is followed by presenting the VAR/VECM result and then the Granger causality test. The KPSS unit root test is more appropriate when the sample is not very large and

that is the advantage it has over the Augmented Dickey-Fuller (ADF) and the Philips-Perron tests. For stationarity to exist, the KPSS test statistic must be less than the critical values.

Table 1. Stationarity Tests for Nigeria and Iran

Variables	Nigeria			Iran		
	KPSS Test @ Level	KPSS Test @ First Diff.	Status	KPSS Test @ Level	KPSS Test @ First Diff.	Status
EXC	0.676805	0.282834**	Stationary	0.730732	0.324653**	Stationary
GDP	0.465119	0.141931**	Stationary	0.528382	0.123165**	Stationary
LEX	0.614121	0.372105**	Stationary	0.603747	0.247283**	Stationary
MTR	0.645128	0.415208**	Stationary	0.598482	0.327419**	Stationary
OIL	0.561268	0.134909**	Stationary	0.598217	0.198037**	Stationary

*Note: ** significant at 5% critical level, Asymptotic critical values are selected using the Newey-West automatic and Bartlett kernel criteria.*

As presented in table 1, the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test result shows that exchange rate, oil production, life expectancy, mortality rate and the real GDP are not stationary at level at the 5% level of significance for the two countries. This means that when tested at their levels, the KPSS test suggests that we reject the null hypothesis of no unit root, confirm that there is unit root and conclude that the series is not stationary. However, when the series for both countries are first differenced, we observed that the KPSS tests are at 5% significance level. It thus implies that we can accept the null hypothesis of no unit root and confirm that the incorporated series are stationary at first difference. Since exchange rate, oil production, life expectancy, mortality rate and the real GDP are mean reverting and converge towards their long-run equilibrium as reported in the KPSS stationarity test, we can then estimate the vector error correction model.

Table 2a. Johansen Cointegration Result for Nigeria

Hypothesized No. of CE (s)	Trace Statistic	Prob. **	Hypothesized No. of CE (s)	Max-Eigen Statistic	Prob.**
None *	0.865469	0.0000	None *	70.20866	0.0000
At most 1 *	0.597288	0.0023	At most 1 *	31.83365	0.0133
At most 2	0.404249	0.0712	At most 2	18.12762	0.1251
At most 3	0.225026	0.2578	At most 3	8.922417	0.2927
At most 4	0.038806	0.2392	At most 4	1.385278	0.2392

*Note: ** significant at 5% critical level*

Table 2b. Johansen Cointegration Result for Iran

Hypothesized No. of CE (s)	Trace Statistic	Prob. **	Hypothesized No. of CE (s)	Max-Eigen Statistic	Prob.**
None *	196.8236	0.0000	None *	90.73423	0.0000
At most 1 *	106.0893	0.0000	At most 1 *	53.72413	0.0000
At most 2 *	52.36521	0.0000	At most 2 *	40.74109	0.0000
At most 3	11.62413	0.1759	At most 3	10.42019	0.1858
At most 4	1.203938	0.2725	At most 4	1.203938	0.2725

Note: ** significant at 5% critical level

Since the VAR/VECM model is a system of equations, we test for long-run relationship using the Johansen cointegration test. As presented in table 2a, both the trace test and the max-eigen test confirm that there exist two cointegrating equations among the series employed in the study for Nigeria. In Table 2b, however, both the trace test and the max-eigen test confirm that there exist three cointegrating equations among the series employed in the study for Iran. It thus means that there is a long run relationship between the exchange rate, oil production, life expectancy, mortality rate and the real GDP in Nigeria and Iran over the period of study.

Table 3a. Nigeria's Vector Error Correction Estimates

Independent variables	Dependent variables				
	Exchange Rate	Real GDP	Life Expectancy	Mortality Rate	Oil Production
	I	II	III	IV	V
Ecm ₁	-0.1099* (0.084)	-0.0072* (0.014)	-0.0005* (0.026)	-0.0017* (0.079)	0.0139** (0.019)
Exchange Rate ₁	0.0032** (0.208)	0.0006* (0.035)	-0.0003 (0.006)	0.0004 (0.001)	0.0240 (0.048)
Exchange Rate ₂	-0.0327* (0.211)	-0.0338 (0.035)	0.0023 (0.006)	-0.0005 (0.001)	0.0376 (0.049)
Real GDP ₁	0.7048* (1.321)	-0.4883 (0.222)	0.0035 (0.004)	-0.0012 (0.012)	0.1008 (0.310)
Real GDP ₂	0.5383* (1.337)	-0.4114 (0.224)	-0.0017 (0.004)	0.0044 (0.012)	-0.0994 (0.313)
Life Expectancy ₁	-8.9623 (8.338)	-6.8965 (1.401)	4.9793 (2.594)	-9.2037 (7.832)	-1.2514 (1.956)
Life Expectancy ₂	7.3725 (6.901)	3.4253 (1.159)	-2.8429 (2.146)	5.5583 (6.481)	9.6102 (1.619)

Mortality Rate ₁	-4.2157 (4.396)	-7.0143 (7.390)	1.6561 (1.367)	-3.0326 (4.130)	-6.7907 (1.031)
Mortality Rate ₂	3.4541 (3.752)	5.2057 (6.307)	-1.0210 (1.167)	1.9683 (3.524)	5.3390 (8.806)
Oil Production ₁	-0.6276* (1.181)	0.5304 (0.198)	-0.0032** (0.003)	0.0104* (0.011)	0.3374** (0.277)
Oil Production ₂	-1.3888* (1.045)	0.1670 (0.175)	-0.0016* (0.003)	0.0068 (0.009)	0.1701 (0.245)
Intercept	-0.1022 (0.384)	-0.0495** (0.064)	0.0026* (0.001)	-0.0089* (0.003)	-0.0571* (0.090)

Note: Standard Error in (), *, **, significant at 5%, 1% respectively.

In the results presented in table 3, the vector error correction result used the optimal lag structure of two. Models 1 to 4 enable us to determine the contrapuntal effect of oil resource abundance on welfare in Nigeria. In table 3, the coefficients of the error correction terms confirm that there is the convergence of the model to the long run and the model is not spurious because the error correction terms are negative and significant. In model 1, oil production of both first and second lags has a negative impact on exchange rate. This means that oil resource abundance causes the naira to fall nominally (exchange rate appreciation) in Nigeria, thereby confirming the Dutch Disease syndrome in the country. In model 2, net oil export has a positive impact on the real GDP in Nigeria. This is expected as the crude oil sector is an important driver of Nigeria's economic growth and a major source of foreign exchange earnings in the country. The intuition behind both results is that oil resource abundance enables the country to earn more foreign exchange, which then diverts attention away from other productive sectors to the oil sector. The strengthening of the domestic currency against foreign currency then helps to expand the country's economic output (See Evans, 2019). In model 3 and model 4, it is observed that crude oil production has a negative effect on life expectancy but exerts positive impacts on mortality rate. It means that oil resource abundance has not enhanced the social indicators employed in the study.

Table 3b. Iran's Vector Error Correction Estimates

Independent variables	Dependent variables				
	Exchange Rate	Real GDP	Life Expectancy	Mortality Rate	Oil Production
	I	II	III	IV	V
Ecm ₁	-0.0832* (0.029)	-0.0159* (0.036)	-0.0027* (0.041)	0.0024* (0.085)	-0.0091** (0.023)
Exchange Rate ₁	-0.0047** (0.212)	0.0056* (0.054)	-0.0009 (0.007)	0.0087 (0.008)	0.0104* (0.094)

Exchange Rate ₋₂	-0.0149* (0.456)	0.0023 (0.132)	-0.0157** (0.003)	-0.0027 (0.024)	0.0013 (0.074)
Real GDP ₋₁	0.6392* (0.211)	0.2012** (0.034)	0.0087 (0.008)	-0.0034** (0.123)	0.0053 (0.032)
Real GDP ₋₂	-0.3342* (2.402)	0.3021 (0.026)	0.0021 (0.008)	-0.0052 (0.028)	0.0135 (0.206)
Life Expectancy ₋₁	-2.2672** (2.108)	-3.1942** (0.024)	3.3301 (2.012)	-6.7201 (4.321)	-0.4278** (0.358)
Life Expectancy ₋₂	4.0923 (5.034)	3.8641 (2.349)	-0.8214 (5.958)	3.5381** (3.102)	8.2231 (1.218)
Mortality Rate ₁	-2.7322* (2.617)	-9.0324 (5.238)	-4.9341* (1.253)	1.6924 (3.290)	-4.7132* (2.021)
Mortality Rate ₂	-1.1278 (3.093)	3.0328** (1.035)	-2.8323 (0.837)	-4.0283 (1.036)	3.0273 (1.932)
Oil Production ₋₁	0.3271** (0.297)	5.2731 (2.038)	2.2581* (0.089)	0.0375** (0.023)	8.4925* (2.297)
Oil Production ₋₂	0.8213** (1.134)	2.2717* (0.248)	1.0087 (0.017)	-0.0181* (0.004)	3.1387** (0.108)
Intercept	0.2472** (0.195)	0.0269* (0.183)	0.0409* (0.008)	-3.0842* (0.023)	0.1852* (0.087)

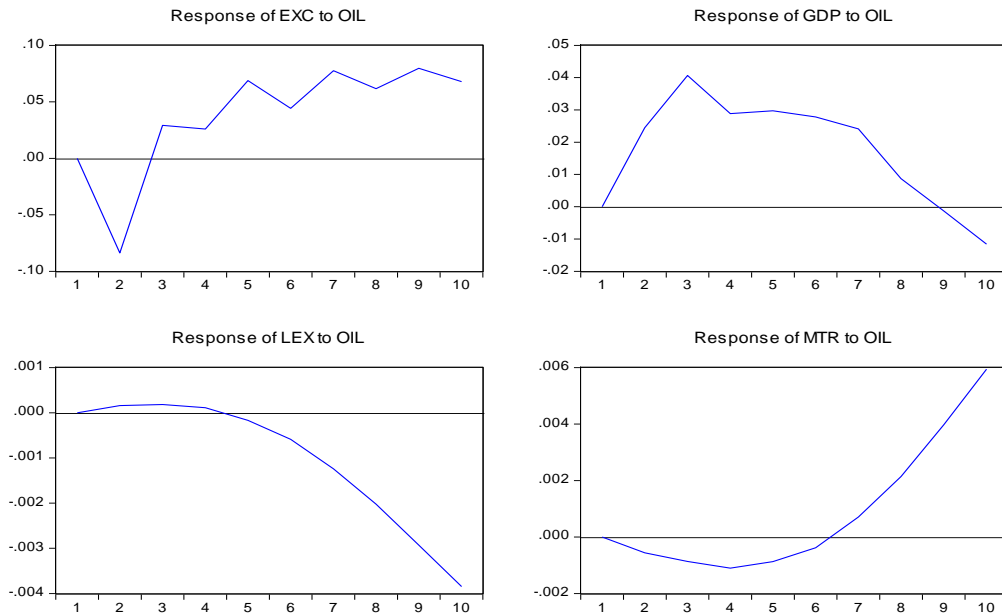
Note: Standard Errors in (), *, **, significant at 5%, 1% respectively.

In table 3b, we present the vector error correction result to determine the contrapuntal effect of oil resource abundance on welfare in Iran. Using the same optimal lag structure of 2, we find that the coefficients of the error correction terms confirm that there is the convergence of the model to the long run, as they are negative and significant. In model 1, oil production of both first and second lags has a positive impact on exchange rate. This means that oil resource abundance causes the Iranian rial (IRR) to rise nominally (exchange rate depreciation), thereby confirming the absence of the Dutch Disease syndrome in Iran, unlike in Nigeria. In model 2, oil production, of both first and second lags, has a positive impact on the real GDP in Iran. This means that the crude oil sector is very important for boosting Iran's economic growth. Intuitively, both results imply that oil resource abundance enhances the economic indicators in Iran because it drives economic growth and removes the Dutch Disease syndrome. Also, the expansion of the oil sector in Iran did not make other sectors worse-off in this study, unlike the situation in Nigeria. Interestingly, in model 3 and model 4, crude oil production has a positive impact on

life expectancy but exerts a negative effect on mortality rate. It means that oil resource abundance has enhanced the social indicators for Iran in the study.

Figure 1. Nigeria's Impulse Response Analysis

Response to Cholesky One S.D. Innovations



In Figure 1, the impulse response analysis confirmed the result of the vector error correction model. In the figure, the response of exchange rate to a one standard deviation shock in oil production was negative in the earlier periods before responding positively in the latter periods. The response of the real GDP to shocks in the net oil export is positive while that of mortality rate was initially negative but responded positively in the latter periods. Lastly, life expectancy was also in tune with the earlier results as it responded negatively to a one standard innovation in oil resource abundance. It thus implies that oil resource abundance worsened the social indicators by increasing the mortality rate and reducing the life expectancy in Nigeria while it enhances the real GDP and the naira to the US dollars exchange rate respectively. With this result, we can then proceed to determine the magnitude of the impact of crude oil production on each of the indicator by conducting the variance decomposition analysis.

In Figure 2, the impulse response result corroborates the result of the vector error correction model for Iran. In the figure, the exchange rate and the real GDP responded negatively to a one standard deviation shock in oil production over the forecast period. Moreover, mortality rate responded negatively to shocks in crude oil production while life expectancy responded to it positively. This means that a positive shock to crude oil production lowers mortality rate for Iran and improve the country's life expectancy, unlike the situation with the results from Nigeria where the reverse holds. This means that oil resource abundance improved the social indicators in Iran by reducing the mortality rate and increasing the life expectancy. To

determine the magnitude of the impact of crude oil production on each indicator, we present the result of the variance decomposition analysis.

Figure 2. Iran’s Impulse Response Analysis
Response to Cholesky One S.D. Innovations

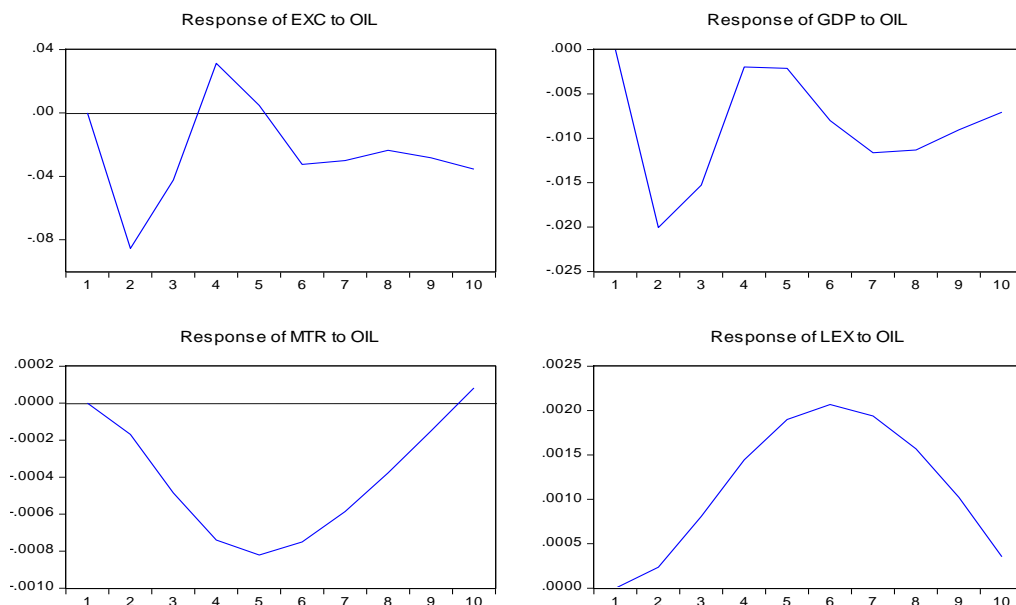


Table 4a. Variance Decomposition of Crude Oil Production in Nigeria

Period	S.E.	EXC	GDP	LEX	MTR	OIL
1	0.305052	0.000000	41.05685	0.000000	0.000000	58.94315
2	0.545578	0.033470	34.12333	0.044219	18.49818	47.30080
3	0.604171	0.886689	33.48068	0.036541	16.28914	49.30695
4	0.685906	1.887039	32.98918	0.050274	14.63417	50.43933
5	0.744638	2.845661	33.59263	0.063206	12.57195	50.92655
6	0.824822	2.901292	33.77997	0.049705	12.60927	50.65977
7	0.872368	2.961437	34.23288	0.043303	11.40879	51.35358
8	0.919402	3.076826	34.38023	0.039140	10.56027	51.94353
9	0.958530	3.171999	34.66540	0.036576	9.806831	52.31919
10	0.995241	3.073720	34.95002	0.045226	9.260717	52.67032

Source: Authors’ computation (2017)

The variance decomposition presented in Table 4a shows the proportion of the forecast error in crude oil production accounted for by innovations in the exchange rate, life expectancy, mortality rate and the real GDP. In table 4, from the 1st to the 10th period, aside from net oil export itself, the real GDP accounted for the largest proportion of the forecast error in crude oil production. Next to the real GDP is mortality rate and followed by the exchange rate. However, life expectancy was the

least affected by crude oil production among the four variables. This result gives a clear indication of the fact that oil resource abundance significantly affects economic growth and mortality rate also. In Nigeria, the fall in the international crude oil price coupled with the crisis in oil-producing areas caused the oil earnings and oil production to decline respectively. This adversely affected the GDP growth rate and plunged the economy into recession (See Obi, Oluseyi and Evans, 2018). Moreover, the environmental pollution caused by gas flaring and oil spillage caused serious health issues, which increased the mortality rate and reduced the life expectancy. The third most affected indicator is the exchange rate, which is caused by the fall in foreign exchange earnings from crude oil. Moreover, the result confirmed that life expectancy is not directly affected by crude oil production in Nigeria and hence, the reason for it being the least affected by shocks to crude oil production in the model.

Table 4b. Variance Decomposition of Crude Oil Production in Iran

Period	S.E.	EXC	GDP	LEX	MTR	OIL
1	0.081055	0.000000	0.000000	0.000000	0.000000	100.0000
2	0.109600	0.058803	0.170988	0.372195	0.039731	99.35828
3	0.128601	0.317543	1.107627	0.553880	0.037880	97.98307
4	0.148930	0.313941	2.119024	0.438233	0.041939	97.08686
5	0.164893	0.256128	2.683225	0.363469	0.096113	96.60107
6	0.176129	0.230263	3.295112	0.343486	0.184118	95.94702
7	0.186197	0.209215	4.331158	0.336465	0.305180	94.81798
8	0.197119	0.192503	5.920575	0.326670	0.468108	93.09214
9	0.209095	0.186590	7.913958	0.312764	0.677461	90.90923
10	0.221712	0.192404	10.07289	0.295560	0.926392	88.51275

Source: Authors' computation (2017)

The variance decomposition result for Iran is presented in Table 4b. A cursory look at the table suggests that from the 1st to the 10th period, aside from crude oil production itself, the real GDP accounted for the largest proportion of the forecast error in crude oil production. Next to the real GDP is life expectancy and mortality rate. However, exchange rate was the least affected by crude oil production in Iran. This is like the result obtained for Nigeria as the GDP is the most influenced by any improvement or reduction in crude oil production. Also, it indicates that oil resource abundance in Iran first affects the growth of the country before affecting the people's social welfare through life expectancy and mortality rate. In addition, if there is an increase in the international crude oil price, Iran's oil earning increases and growth increases as well. This inadvertently reduces mortality rate as more investment flows in to the health sector and enhances the life expectancy. For Iran, exchange rate is not significantly affected by crude oil production in this study, hence, the reason for it being the least affected by shocks to crude oil production.

Table 5a. Granger Causality Analysis for Nigeria

No Causality		Unidirectional Causality			Bidirectional Causality		
GDP	— LEX	OIL	→	MTR	LEX	↔	MTR
EXC	— LEX	OIL	→	GDP	MTR	↔	GDP
OIL	— LEX	OIL	→	EXC			
		EXC	→	MTR			
		EXC	→	GDP			

Note: (—) No causality, (→) Unidirectional causality, (↔) Bidirectional causality.

The Granger causality test presented in Table 5 confirms that no causality exists between the real GDP and life expectancy, between the exchange rate and life expectancy and between net oil export and life expectancy. In terms of bidirectional causality, life expectancy and mortality rate, as well as, mortality rate and the real GDP are mutually causal. However, there is unidirectional causality running from the net oil export to mortality rate, exchange rate and the real GDP respectively. Moreover, there is unidirectional causality running from exchange rate to mortality rate and the real GDP respectively. The intuition is that oil resource abundance causes mortality rate and determines the pace of economic growth in the country as well.

Table 5b: Granger Causality Analysis for Iran

No Causality		Unidirectional Causality			Bidirectional Causality		
EXC	— OIL	EXC	→	GDP	LEX	↔	GDP
		GDP	→	MTR	EXC	↔	LEX
		LEX	→	OIL	MTR	↔	LEX
		OIL	→	GDP	MTR	↔	OIL
					MTR	↔	EXC

Note: (—) No causality, (→) Unidirectional causality, (↔) Bidirectional causality.

The Granger causality test presented in Table 5b confirms that for Iran, no causality exists between the exchange rate and crude oil production in Iran, confirming the variance decomposition result. In terms of bidirectional causality, life expectancy and mortality rate, mortality rate and crude oil production, mortality rate and exchange rate, exchange rate and life expectancy, as well as, life expectancy and the real GDP are mutually causal. However, there is unidirectional causality running from the real GDP to mortality rate, from life expectancy to crude oil production, and from exchange rate to the real GDP respectively. The intuition is that oil resource abundance causes mortality rate and determines the pace of economic growth in Iran as well.

5. Summary and Conclusion

This study has investigated the contrapuntal effect of crude oil production on both social and economic indicators in Nigeria and Iran. The study employed mainly secondary data covering the period of 1970 to 2016. The data sourced from the World Development Indicators and the BP Statistical Review of World Energy include the real GDP per-capita, exchange rate, mortality rate; life expectancy and net oil export per-capita. The vector error correction approach, impulse response and variance decomposition analysis were employed in the study. The KPSS unit root test confirmed stationary of data for both countries at first difference while the Johansen cointegration test confirmed that there is a long run relationship among the five variables. Empirical results confirmed that oil resource abundance positively enhanced economic growth and mortality rate, but negatively impacts both the exchange rate and life expectancy in Nigeria. For Iran, however, oil resource abundance positively enhanced economic growth, exchange rate, and life expectancy while it negatively impacted mortality rate. Based on the variance decomposition analysis, it was discovered that oil resource abundance significantly enhanced the real GDP, mortality rate and the exchange rate in Nigeria while it insignificantly impacted its life expectancy over the forecast periods. Similar results were confirmed in Iran as oil resource abundance significantly enhanced economic growth, life expectancy and mortality rate while it insignificantly impacted the exchange rate.

Consequent on this result, we submit that oil resource abundance positively enhanced the economic indicators but negatively impacted the social indicators of welfare in Nigeria while it positively enhanced all the social and economic indicators of welfare in Iran. We therefore conclude that oil resource abundance has a contrapuntal effect on the Nigerian economy whereas a contrapuntal effect is not confirmed for Iran over the period of study. We recommend for Nigeria that crude oil proceeds should be judiciously utilised by the authorities to get the country out of recession and sustain the growth process. This will help to guide against economic shocks associated with exchange rate fluctuations. Furthermore, the target to end gas flaring in the country, as contained in the gas master plan of 1996, should be vigorously pursued to reduce the mortality rate and improve the life expectancy. For Iran, we recommend that the authorities should continue to intensify efforts at improving on the current gains by increasing investment to the health sector and properly channeling oil proceeds to critical sectors that can sustain general improvement in citizens' social and economic welfare.

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