

The Role of Natural Gas and Oil Rents and Foreign Direct Investments in Promoting Economic Sustainability in Saudi Arabia

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ABSTRACT

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Natural Resources (NR) can be a blessing in any resource-rich economy. Thus, this hypothesis is investigated in Saudi Arabia from 1970 to 2023. Saudi Arabia's economic growth is positively impacted by natural gas and oil rents in the long and short run. Thus, the Natural Resource Blessing (NRB) hypothesis is corroborated in these sectors. Moreover, Foreign Direct Investments (FDI) support economic growth. The study suggests balancing the contribution of natural rents and promoting FDI, which can support sustainable economic progress. In order to take advantage of specific sectors' potential to assist long-term development, policymakers and stakeholders may choose to focus additional strategic development projects in the natural gas and oil sectors.

1. INTRODUCTION

The Natural Resource Curse (NRC) hypothesis explains that political stability and economic progress are negatively correlated with the amount of Natural Resources (NR) [1, 2]. The NRC hypothesis argues that NR may have a range of political, social, and economic challenges due to poor governance or the mishandling of the NR. Thus, this hypothesis implies that resource-rich countries face economic, social, and political obstacles, which may result in the "Dutch Disease" [3]. For instance, the NR sector may appreciate currency, which could reduce the competitiveness of other sectors. Thus, economic instability can result from a reliance on NR, which can be due to inconsistent prices of commodities. Consequently, variations in commodity prices can result in reduced income, budgetary problems, and low investments.

Income from NR could also be responsible for corruption and rent-seeking behavior [4]. Moreover, governments would depend on revenue from Natural Resource Rents (NRR) instead of taxes, which can be due to governance issues. In this case, resource-based nations may face problems due to external shocks. For instance, geopolitical turmoil and natural disasters can have long-lasting effects because of reliance on a few commodities. This reliance may hinder long-term development, which can also reduce the efforts for economic diversification. NRR can intensify social and political conflicts due to disputes on the use of resources, distribution of their economic benefits, and political power gains [5]. NR-rich nations may have problems with authoritarian governments, civil unrest, and governance issues, which can affect economic development. However, the potential economic benefits of possessing plentiful NR can also be

realized.

The Natural Resource Blessing (NRB) hypothesis explains an opposite viewpoint to the NRC [6]. For instance, NR may increase the overall well-being and economic growth of economies. Thus, the NRB hypothesis states that NR-rich countries can enjoy social advancement, economic expansion, and overall prosperity by utilizing NRR in an equitable way. This theory argues that NR can positively contribute to economic progress by managing the NR in a good way and can reduce poverty, which can improve the social and economic outlook of nations. For instance, NRR from the extraction and export of NR can be used for public programs [7], which can improve living conditions, social welfare, healthcare, education, and infrastructure. Moreover, NR exports can improve a country's trade balance, which can improve the country's ability to import machinery, finance development projects, and build up foreign exchange reserves [8]. Thus, NRR can contribute to both economic and social progress.

NR's extraction, processing, distribution, and transportation activities can improve employment levels, which can boost household income and consumer spending. Thus, NRR can promote economic expansion and reduce poverty. Moreover, NR can also stimulate infrastructure projects of ports, power plants, telecommunications networks, and roadways [7], which improve overall economic productivity and competitiveness. The NR sector can promote information sharing, talent development, and technical innovation. Moreover, this sector may result in economic diversification if NRR can be invested in the non-resource sectors. NRR can also be invested in R&D, technology adoption, and capacity building. Thus, the NRB hypothesis argues that NRR can contribute to economic expansion, social progress, and

poverty alleviation with equitable use of resources for economic and social development. However, institutional support, proper regulation, effective governance, and human capital development are needed for sustainable development from the NR sector.

This study aims to examine the case of Saudi Arabia to understand how different NR proxies and Foreign Direct Investment (FDI) can influence economic progress in an NR-based economy. Thus, this study can provide insights into the mechanisms by which various types of NR can contribute to economic development in Saudi Arabia. Saudi Arabia has an abundance of NR, which can be utilized for development plans and government finances for economic diversification. The study examines the impact of Oil Rents (OR) and Natural Gas Rents (NGR) on the economic growth of Saudi Arabia by controlling for FDI in the analysis. So, policymakers can decide on resource management, investment priorities, diversification plans, and sustainable development projects by utilizing the results on the effects of these NRR proxies and FDI.

2. LITERATURE REVIEW

The influence of the NR possession on economic growth is a focus of the literature. Nevertheless, the existing literature related to this relationship reveals contradictions, which are discussed in two sub-sections.

2.1 The heterodox or pessimistic thesis

The heterodox thesis shows that NR can be a curse [1, 2], which is due to the exploitation of raw materials, the destruction of other sectors, a rise in societal issues, and the degradation of the ecosystem [9-12]. The increase in wages due to an increase in demand for aggregate labor may also cause inflation [13]. This situation results in the loss of competitiveness of national products [14, 15], which can reduce overall exports. For instance, trade surpluses from the export of NR can cause a massive inflow of foreign currencies, which might appreciate the currency and is termed “Dutch Disease” [3]. If foreign currencies are used in their entirety for imports or the repayment of external debt, then this would not affect the money supply. Otherwise, the money supply would increase, and the pressures of domestic demand would cause a rise in prices and an appreciation of currency. Moreover, Posner [16] and Vernon [17] explained that NR would reduce innovation, which can reduce economic growth. Thus, the possession of NR may also be responsible for instability in economic activities.

The literature also suggests that Institutional Quality (IQ) can shape the NR-growth nexus. For instance, Mavrotas et al. [18] argue that low IQ can be responsible for low economic progress. Thus, growth performance is attributed to the way of distribution of the NRR through institutional mechanisms. Bhattacharyya and Hodler [19] argued that NR increases corruption. This situation is harmful to economies and can reduce economic growth under certain conditions [20]. Similarly, Sarmidi et al. [21] claimed that NR endowments can harm economic growth. However, a strong IQ can reduce such harms to economic progress.

Some empirical work on the possession of NR corroborates NRC. Khan et al. [22] examined the influence of NRR, fintech,

and literacy on green innovation in a worldwide analysis from 2004 to 2021 and found that higher literacy and technological advancement stimulated eco-innovation. However, NRR reduced eco-innovation and economic growth. Sachs and Warner [23] investigated the influence of NR on income in 95 countries from 1970 to 1989, and confirmed that NR reduced income.

In the literature of resource-abundant countries, Anoruo and Elike [24] discovered that the income in resource-rich countries was hindered by high oil prices as oil-importing nations stopped depending on foreign oil to avoid the effects of fluctuations in oil prices. Avom and Camignani [25] also reported that NR were cursed in Africa over the period 1965-2005. For instance, primary commodities reduced Gross Domestic Product (GDP) growth and human capital, which also increased income inequality. Gershon et al. [26] analyzed African nations from 1980 to 2015 and applied causality analysis. In the short term, the authors found that the oil sector contributed to the growth of a small number of the sample countries. However, this effect was not found in the long run. Arezki and Brückner [4] analyzed 31 oil-exporters for the period from 1992 to 2005 and found that significant intensification of oil revenues increases corruption, which slowed down economic growth. Maalel and Mahmood [27] investigated GCC from 1980 to 2016 and found the positive effects of NR on income from expanding oil-export dependency and the negative effects of NR on income from rising oil-income dependence. Thus, there was a dynamic asymmetry relationship between oil dependency in terms of exports and growth in the GCC region.

In the oil-importing countries' literature, Chai et al. [28] corroborated that rising oil prices had a detrimental effect on income in oil-importing nations, as rising oil prices could increase the cost of production, which reduced economic activities. However, considerable effects might only be seen during the peak oil price period, as small adjustments would not have a major impact on economic activities. Imran et al. [29] investigated BRICS from 1991 to 2022 and revealed that non-Renewable Energy Consumption (REC) and emissions boosted income growth. However, coal rents and total NRR reduced sustainable development. Qian and Chen [30] explored the impact of NR on green growth in G7 economies and found that OR supported green growth. However, coal rents and NGR reduced green growth. Moreover, Ghalayini [31] re-investigated the G7 nations and found the feedback effects between oil prices and income.

In the country-specific analysis, Arslan et al. [32] also supported the NRC in China. For instance, the NRC can take place if NR endowments experience stagnant economic growth or even decreasing growth caused by the restrained supply. Omgba [33] investigated Cameroon and found that the discovery of oil and the rise in oil prices were responsible for economic and political crises in Cameroon. The author also explained that these crises were due to the mismanagement of oil revenues, which reduced income growth.

In summary, the heterodox literature demonstrates that NR can become a curse through Dutch Disease, currency appreciation, inflation, and reduced innovation. Empirical studies demonstrate that poorly managed resource wealth reduces economic growth, increases corruption, and fuels social conflict, and these effects are reported in a large Global panel [22, 23], African nations [25, 26], and oil-exporting economies [4]. Poor IQ is found as the primary mechanism, driving these negative outcomes. However, strong governance

can mitigate resource curse effects [21]. In disaggregated analysis, the GCC and G7 studies exhibit heterogeneous effects of NRR on economic growth [27, 30]. In oil-importing nations, rising oil prices increase cost-push inflation and reduce income [28]. Overall, the pessimistic view stresses that without strong institutions and diversification, NR dependence may hinder economic growth.

2.2 The orthodox or optimistic thesis

The possession of NR may also positively affect economic growth [6]. In the macroeconomic arguments of Ricardo [34], the growth differential in countries is elucidated by the possession of NR in the context of the theory of international specialization. Moreover, Leite and Weidmann [35] argued that the growth effect of possession of NR depends on the developmental stage of a country. Barro [7] argued that NRR can be utilized to modernize the productive system and public infrastructure, which can boost economic growth.

The studies on the global data corroborate the NRB hypothesis in large panels. For instance, Tsui [36] conducted an empirical work in a global context and reported a positive nexus between OR and economic progress under certain conditions of good governance. Gylfason [37] investigated 164 countries and found that the possession of NR exerted a positive influence on economic progress with strong institutions. This is the case of certain countries that have succeeded in using their abundant NR to achieve rapid economic progress, like the Gulf countries, Norway, Chile, Mauritius, and Botswana. Further, Mehlum et al. [38] found that NR positively affected economic progress with strong institutions. However, the influence of their overdependence had a double negative effect on economic progress, with a poor IQ.

Zallé [39] examined 29 African economies from 2000 to 2015 and found that human capital and IQ pleasantly moderated the effect of NRR on economic progress. Moreover, it is reported that a certain minimum level of both factors was necessary to achieve the positive growth effects of NRR. Ftiti et al. [40] investigated the influence of the oil sector in determining economic progress in OPEC economies from 2000 to 2010 and found a positive relationship. However, they also discovered that this correlation was adversely impacted by financial recessions. Hassan et al. [41] explored the effect of NRR and economic complexity on growth in BRICS economies and found that NRR and economic complexity improved economic growth with the support of strong governance. Similarly, Nasir et al. [42] investigated 10 Asia-Pacific countries and reported a positive association between NR and income, and IQ also contributed to income growth. Moreover, Haseeb et al. [43] found that NR gave rise to the export sector in Asian economies, which accelerated growth. Aboulajras et al. [44] examined the influence of NRR, REC, and Financial Development (FD) on ecological quality in emerging and developed regions from 1990 to 2022 and found that REC and NRR improved green growth. However, FD deteriorated green growth.

In the Chinese context, Yuxiang and Chen [45] concluded that NR-driven FD implicitly improved economic growth. Ji et al. [46] also supported the same result as Yuxiang and Chen [45]. However, the quality of the institutions was decisive, like the result obtained by Ji et al. [46], which emphasized the influence of IQ in the nexus between NR and economic

progress. In the particular Saudi context, the literature explored the effect of aggregate NRR on GDP growth and corroborated that the NRR positively contributed to economic growth [47-49], which validated the NRB hypothesis in the Kingdom.

In summary, the orthodox literature supports the conditional NRB hypothesis. Thus, NR positively affects income growth with the support of strong IQ, governance, transparency, and investment in public infrastructure. Global panel studies consistently confirm that IQ helps to determine the positive effect of NR on economic progress [36, 37], which is particularly significant in Gulf countries, Norway, Chile, and Botswana. However, overdependence on NR with weak institutions may reverse this effect [38]. A critical gap remains in the literature in employing aggregate NRR in most analyses. Particularly, the Saudi studies examined the effect of aggregated NRR on economic progress [47-49]. The present study addresses this limitation by probing the effect of disaggregated OR and NGR on economic progress in Saudi Arabia, which shares key similarities with some resource-rich economies like Nigeria and Venezuela. For instance, Saudi Arabia is heavily dependent on oil revenues, which can expose it to risks such as Dutch Disease, revenue volatility, and external shocks. However, the Saudi economy is different from other resource-abundant developing economies with relatively stronger strategic policy frameworks. For instance, Saudi Vision 2030 targets to diversify the economy by reducing oil dependence. Moreover, some resource-rich economies have suffered from persistent mismanagement of resource rents [33]. However, Saudi Arabia has invested in infrastructure development, economic diversification, and attracting FDI, which is closer to the successful case of Norway.

The study on the Saudi economy with disaggregated analysis of sources of resource rents is particularly important as each resource sector operates under distinct market dynamics, institutional frameworks, and development trajectories. For instance, OR may be affected due to global price volatility and depletion concerns. However, the reliance on the natural gas sector offers diversification opportunities, which are aligned with Saudi Vision 2030's objectives to expand the non-oil economy. Thus, the differentiated effects of OR and NGR may enable policymakers to prioritize investments in sectors that demonstrate the strongest growth linkages and could be helpful in diversification efforts as per Vision 2030. Moreover, FDI is included in the analysis as a complementary driver of growth in resource-rich nations, which may act as a catalyst for technology transfer, productivity enhancement, and non-oil sector development. Thus, by including FDI alongside disaggregated resource rents in the empirical model, this study offers insights into how external capital flows interact with domestic resource sectors to shape Saudi economic growth.

3. METHODOLOGY

The endogenous growth theory argues that economic progress is driven by internal forces, including capital accumulation and resource utilization [50]. In the context of resource-rich economies, NRR constitutes a form of capital that can be reinvested to support economic growth [7]. Particularly, NRR is a major local source of income, savings, and investment in the Saudi economy, which can be invested

to support economic growth. Moreover, FDI is an external source of investment, which complements domestic capital by bringing technology and managerial skills [8, 51]. Moreover, FDI inflows can contribute to industrial diversification, job creation, and knowledge transfer. Thus, both NRR and FDI should be included in the model of the Saudi economy. Moreover, resource rents are taken into disaggregated form. For instance, OR and NGR are major NRR and may have distinct effects on economic growth due to distinct market dynamics and the government's objectives. Saudi Vision 2030 targets to diversify from the oil sector. Thus, the natural gas sector and FDI can support this objective. In addition, the literature suggests that IQ can shape the resource-growth nexus [21, 38, 39]. However, the data on IQ indicators is available from 1996, which does not cover the sample period of the present study (1970-2023). Including IQ in the model would reduce the sample size and compromise the robustness of the ARDL estimation. Moreover, Saudi Arabia's institutional environment has been relatively stable over the study period, which may reduce the explanatory power of IQ in a time-series context. Thus, the model is hypothesized in the following way to comprehensively understand the role of NR and global investment in shaping the economic progress in Saudi Arabia:

$$GDPG_t = f(NGR_t, OR_t, FDI_t, D_t) \quad (1)$$

$GDPG_t$ is the GDP growth rate. NGR_t and OR_t are NGR and OR as a percentage of GDP, respectively. FDI_t is the percentage of FDI inflows in GDP. D_t is a dummy variable that assumes 1 after the break year 1982 and 0 before. All data is taken from 1970 to 2023 in Saudi Arabia and sourced from the World Bank [52]. For unit root testing, Ng and Perron's [53] methodology could provide more reliable results in a small sample and will be estimated through the following statistics:

$$MZ_a^d = \left[\frac{Y_T^d}{T} \right]^2 / 2K - f_0 / 2K \quad (2)$$

$$MSB^d = \left[\frac{k}{f_0} \right]^{1/2} \quad (3)$$

$$MZ_t^d = MZ_a^d \cdot MSB^d \quad (4)$$

$$MPT_T^d = [c^2 \cdot K + \frac{1-c}{T}] \cdot \frac{Y_T^d}{f_0} \quad (5)$$

Y_T^d and c are GLS-detrended series and parameter, respectively. T is the sample size. K is the long-run variance correction factor. f_0 is the spectral density at frequency zero. Eqs. (2)-(5) will be utilized with intercept and trend specification for testing each variable in Eq. (1). Then, introduced by Pesaran et al. [54], the Autoregressive Distributed Lag (ARDL) methodology is used, which is a popular econometric tool for estimating long-run correlations among variables in a dynamic environment. When examining cointegration and long-run equilibrium relationships in time series data, this method works especially well. ARDL makes it possible to simultaneously capture long-run equilibrium relationships and short-term changes. Moreover, ARDL allows for the integration of variables at alternative orders [I(0) or I(1)].

$$\begin{aligned} \Delta GDPG_t = & a_0 + a_1 GDPG_{t-1} + a_2 NGR_{t-1} \\ & + a_3 OR_{t-1} + a_4 FDI_{t-1} \\ & + \sum_{i=1}^n a_{5i} \Delta GDPG_{t-i} \\ & + \sum_{i=0}^n a_{6i} \Delta NGR_{t-i} \\ & + \sum_{i=0}^n a_{7i} \Delta OR_{t-i} \\ & + \sum_{i=0}^n a_{8i} \Delta FDI_{t-i} + a_9 D_t + \Psi_{2t} \end{aligned} \quad (6)$$

Eq. (6) will be run, and the Bound test will be applied with a null hypothesis ($a_1 = a_2 = a_3 = a_4 = 0$) to test the cointegration. The long-run effect will be estimated by normalizing a_2 , a_3 , and a_4 with a_1 . All variables in their first differences are added to remove endogeneity in the model. a_9 will capture the structural shift in the long-run relationship at the break point.

$$\begin{aligned} \Delta GDPG_t = & \beta_0 + \beta_1 ECT_{t-1} + \sum_{i=1}^n \beta_{2i} \Delta GDPG_{t-i} \\ & + \sum_{i=0}^n \beta_{3i} \Delta NGR_{t-i} \\ & + \sum_{i=0}^n \beta_{4i} \Delta OR_{t-i} \\ & + \sum_{i=0}^n \beta_{5i} \Delta FDI_{t-i} + \beta_6 D_t + \Psi_{3t} \end{aligned} \quad (7)$$

Eq. (7) is derived from Eq. (6) by replacing lagged-level variables with the error correction term (ECT_{t-1}). β_1 should be negative to validate the short-run relationship. The magnitude of β_1 will capture the speed of adjustment. The estimated β_{3i} - β_{5i} will capture the short-run effects. β_6 will capture the structural shift in the short-run relationship at the break point. Many benefits come with the ARDL approach, such as its adaptability to mixed-order integrated variables, its capacity to appraise both short-run (Eq. (7)) and long-run (Eq. (6)) impact at the same time, and its resilience to small sample sizes. Because of these characteristics, ARDL is a useful tool for examining dynamic interactions in time series data.

4. DATA ANALYSIS

To determine multicollinearity, the Variance Inflation Factor (VIF) analysis is first performed. In Table 1, VIF values are below the cutoff of 10, which suggests no problems of multicollinearity in the model. Moreover, this result corroborates that each variable independently explained economic growth, which could help in the estimation of a robust model.

Table 1. Variance Inflation Factor (VIF) test

Variable	Variance	VIF
NGR _t	17.5419	1.6943
OR _t	4.9436	2.0541
FDI _t	0.5416	3.9746

Note: NGR = Natural Gas Rents (% of GDP); OR = Oil Rents (% of GDP); FDI = Foreign Direct Investment inflows (% of GDP).

The Ng-Perron test is applied, and the estimated statistics at the variable's level show that the variables are non-stationary in Table 2. Moreover, the estimated statistics of all variables are significant at their first difference. Thus, the order of

integration is one, and we can proceed with ARDL, which can provide efficient results in this case.

Table 2. Ng-Perron test

Variables	MZa	MZt	MSB	MPT
GDPG _t	-4.2541	-1.2478	0.3154	16.2496
NGR _t	-6.4189	-1.8249	0.2947	13.5419
OR _t	-8.5414	-1.8745	0.2357	8.9874
FDI _t	-12.749	-2.3746	0.1846	6.9248
ΔGDPG _t	-28.4416**	-4.5419**	0.1245**	2.1549**
ΔNGR _t	-25.1549**	-3.4927**	0.1497**	3.8549**
ΔOR _t	-19.2649*	-3.1155*	0.1597*	4.9246*
ΔFDI _t	-25.5478**	-4.2468**	0.1349**	3.7876**

Note: * and ** depict stationary series at 5% and 1%. GDPG = Gross Domestic Product Growth rate; NGR = Natural Gas Rents (% of GDP); OR = Oil Rents (% of GDP); FDI = Foreign Direct Investment inflows (% of GDP). MZa, MZt, MSB, and MPT are Ng-Perron unit root test statistics.

Table 3 shows the Zivot-Andrews test with one most significant break. All variables are non-stationary at the level. The significant breaks are found for GDPG_t, NGR_t, OR_t, and FDI_t at the years 1982, 1982, 1979, and 1974, respectively. The year 1982 is chosen to include in further analysis as it is a break year of the dependent variable at the level. Moreover, all variables are stationary at the first difference.

Table 3. Zivot-Andrews test

Variables	Test Statistics	Year of Break
GDPG _t	-2.5741	1982
NGR _t	-2.9174	1982
OR _t	-4.5371	1979
FDI _t	-3.5749	1974
ΔGDPG _t	-8.5003**	1975
ΔNGR _t	-7.4102**	2018
ΔOR _t	-8.8858**	1979
ΔFDI _t	-9.3685**	1975

Note: * and ** depict stationary series at 5% and 1%. GDPG = Gross Domestic Product Growth rate; NGR = Natural Gas Rents (% of GDP); OR = Oil Rents (% of GDP); FDI = Foreign Direct Investment inflows (% of GDP).

Table 4 displays cointegration estimations, and the bound test shows a high F-value, which suggests a cointegration at a 1% significance level. Moreover, this result is consistent with the negative ECT_{t-1} parameter in Table 5, which corroborates evidence against the long-term equilibrium. Diagnostic tests confirm the estimated model's econometric soundness and reliability with low statistics and high p-values of more than 0.1. Thus, the estimated model is reliable for further analysis. Moreover, we perform CUSUM and CUSUMsq tests in Figures 1 and 2, and the estimated lines are within critical bounds. Thus, the estimated model shows stable parameters.

Table 4. Bound and diagnostic tests

Test	Statistic	P-Value	
Heteroscedasticity	0.3872	0.8167	
Serial correlation	0.9309	0.3403	
Normality	1.3157	0.5179	
Functional form	1.9339	0.1718	
Bound test	6.0984		
Critical values	I(0)	I(1)	
	5%	2.823	3.872
	1%	3.845	5.150

Based on ARDL, the regression results are reported in Table 5. NGR_t shows a positive association with economic growth at 10% level of significance, which shows a low level of significance. So, evidence of this relationship is marginal, not strong. A 1% increase in NGR results in a 0.1455% increase in GDP growth. OR_t shows a positive association with economic growth at 5% level of significance. A 1% increase in OR results in a 0.4011% increase in GDP growth. Thus, OR shows more effect on economic progress compared to NGR, as per the coefficient and level of significance. These results corroborate the fact that Saudi OR is a major contributor to GDP. Moreover, revenues from oil exports are also significant, which can be used for social programs, infrastructure improvements, healthcare, and education, as OR is also a major contributor to government spending in the Kingdom. Thus, OR is helpful in social and infrastructure development in the Kingdom. Furthermore, the oil sector also employs labor in oil extraction, refining, transportation, and distribution activities. In spillovers of the oil sector, this sector also provides indirect job opportunities in manufacturing, construction, transportation, and the service sector, which can further support the GDP growth. Furthermore, the government spending in infrastructure projects in the oil sector, like refineries, ports, pipelines, and transportation networks, also contributes to GDP growth with direct and indirect linkages. These investments boost economic activity. On the whole, the NRB hypothesis has been proven in the oil and natural gas sectors in Saudi Arabia by supporting GDP growth.

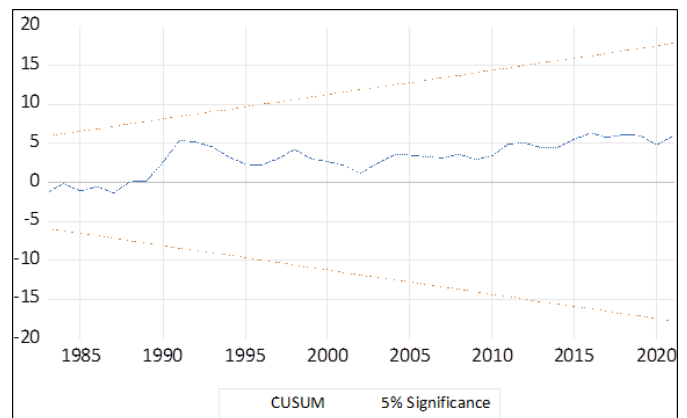


Figure 1. CUSUM test

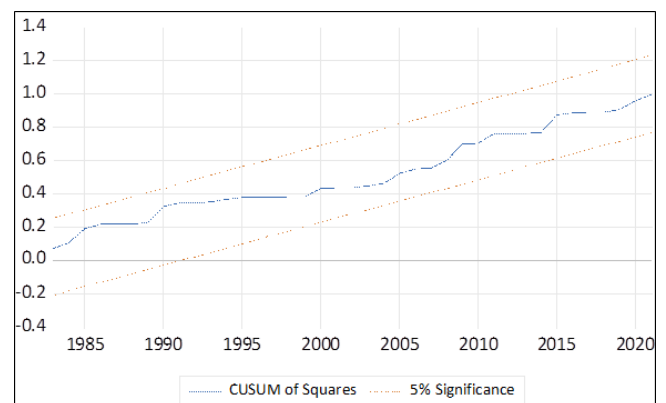


Figure 2. CUSUMsq test

FDI has a positive effect at 1% level of significance. A 1% rise in FDI may lead to a 0.6874% increase in GDP growth. Thus, foreign investment helps the Saudi economy for capital

formation, which positively supports economic growth. FDI comes with the latest technologies, which can give a big push to increasing industrial productivity to support GDP growth. Moreover, the coefficient of the dummy variable is negative and significant at 10% level of significance, which shows a low level of significance. So, evidence of this shift in long run relationship is marginal, not strong. However, we may conclude that economic growth has declined after the year 1982.

Table 5. Autoregressive Distributed Lag (ARDL) results

Regressor	Parameter	S.E.	t-Stat	Prob.
Long Run				
NGR _t	0.1455*	0.0816	1.7827	0.0815
OR _t	0.4011**	0.1507	2.6615	0.0284
FDI _t	0.6874***	0.1429	4.8099	0.0000
D _t	-0.0562*	0.0297	1.8896	0.0661
Intercept	-4.0409	3.8455	-1.0508	0.2991
Short Run				
ΔGDPG _{t-1}	0.6587***	0.0955	6.8948	0.0000
ΔNGR _t	0.2661***	0.0701	3.7938	0.0005
ΔOR _t	0.4951*	0.2578	1.9208	0.0619
ΔFDI _t	1.0780***	0.2908	3.7068	0.0006
D _t	-0.0278**	0.0107	-2.5889	0.0134
ECT _{t-1}	-0.6894***	0.0861	-8.0112	0.0000

Note: *, **, and *** depict level of significance at 10%, 5%, and 1%, respectively. GDPG = Gross Domestic Product Growth rate; NGR = Natural Gas Rents (% of GDP); OR = Oil Rents (% of GDP); FDI = Foreign Direct Investment inflows (% of GDP).

In Table 5, the negative parameter of the ECT_{t-1} corroborates a short-run relationship in the model, which is significant at 1%. The coefficient signifies that any short-run fluctuation would be adjusted at a rate of 68.94% in a year. Moreover, GDP growth is also significantly influenced by the lagged impacts of growth at 1% level of significance. Moreover, NGR and FDI also positively impact growth at 1% level of significance. However, OR has a positive effect on economic growth at 10% level of significance, which shows a low level of significance. So, evidence of this short-run relationship is marginal, not strong.

5. CONCLUSION

As per the NRB theory, NR can stimulate the GDP growth of a resource-rich economy. Thus, this research investigates this hypothesis by exploring the nexus between disaggregated NRR and GDP growth in Saudi Arabia for the period 1970-2023. In the long run, GDP growth has been positively impacted by FDI, OR, and NGR. Thus, this result emphasizes the importance of OR and NGR in fostering GDP growth in the Kingdom, and the NRB hypothesis is corroborated in the oil and natural gas sectors. Comparatively, OR has a greater effect than NGR. This result corroborates that Saudi OR is a major contributor to GDP and exports. Moreover, oil revenues also support the government's spending in the Kingdom. Thus, OR can be used to fund social programs, infrastructure, healthcare, and education, which can bring social and infrastructure development in the Kingdom. Moreover, the oil sector also provides a significant amount of employment in oil extraction, refining, transportation, and distribution activities, which indirectly contribute to GDP growth through the income of labor. Moreover, the oil sector also helps in creating job opportunities by raising aggregate demand in other sectors,

like manufacturing, construction, transportation, and the service sector, which can further support the GDP growth by its spillover effects. In the short run, GDP growth is significantly affected by the lagged impacts of GDP growth. Moreover, OR and NGR also positively influence GDP growth. Thus, the oil and natural gas industries are major sources of short-term economic expansion as well. Lastly, FDI contributes to GDP growth in the long and short run. Thus, foreign capital helps spur productivity growth by transferring technologies and managerial skills of foreign investors, which gives rise to GDP growth.

The findings of this study disclose oil and natural gas sectors significantly contribute to economic growth. However, both sectors are pollution-intensive. Thus, the study suggests using the rents from oil and natural gas sectors for education, green innovation, renewable infrastructure, and non-NR sectors to diversify the economy from the pollution-oriented NR sectors. Thus, this policy can enhance human capital and technological advancement in the Kingdom to reduce dependence on the NR sectors in the long run. FDI inflows help to improve GDP growth. To further support economic growth and positive spillovers from foreign investment, policymakers should promote FDI inflows by providing easy legal frameworks, improving transparency, and reducing bureaucratic hurdles to foreign investments.

The present study faces limitations of the data availability of a reasonable sample size of IQ for time series analysis. The future study should incorporate governance measures once longer time series become available for IQ. Second, the analysis employs aggregate FDI inflows. Future studies should disaggregate FDI by sector to identify which foreign investments most effectively complement domestic resource rents for sustainable growth. Lastly, future studies can conduct comparative analysis between Saudi Arabia and other GCC countries to understand regionally generalizable mechanisms of resource blessing.

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