Open Access | Original Research
Innovation Economics Frontiers, 27(2), 2024 | PP: 01– 12
https://doi.org/10.36923/iefrontiers.v27i2.241

A VECM Investigation on the Nexus among Government Spending, Oil Revenues, and Economic Growth: Empirical Evidence from the Sultanate of Oman

Sarfaraz Javed[1], **Uvesh Husain**[2]

Article History:

Received: 28-03-2024
Accepted: 14-06-2024
Publication: 30-6-2024

Cite this article as:

Javed, S., Husain, U. (2024). A VECM Investigation on the Nexus among Government Spending, Oil Revenues, and Economic Growth: Empirical Evidence from the Sultanate of Oman. *Innovation Economics Frontiers*, 27(2), 01-12. https://doi.org/10.36923/iefrontiers.v27i2.241

Corresponding Author(s):

Sarfaraz Javed
Department of Accounting, Faculty of Business, Sohar University, Oman. Email: sarfaraz7216@gmail.com

Abstract: This study aims to examine the impact of oil resources on the economic growth and government spending in Oman between 1989 and 2018. To enhance economic growth, it is crucial to comprehend how Oman can effectively manage its abundant resources. The objectives are to examine the correlation between oil resources, GDP, and government expenditure; to assess the interconnections that exist in both the short and long run, and to identify the causal pathways using the ARDL and VECM models. The approach involves doing unit root tests and examining long-term associations, followed by using VECM to analyze short-term dynamics. Finally, the analysis is performed on annual data obtained from the World Bank and the National Centre for Statistics and Information. The results indicate that a rise in oil revenue has a significant impact on GDP, whereas an increase in government expenditure has an adverse effect on economic growth. The findings of this research align with those of studies undertaken in other GCC states, emphasizing the significant role of oil in both economic development and public finance. The result of this research is that it will equip policymakers in Oman and other nations abundant in resources with empirical information that can be used to formulate policies for sustainable economic growth and effective resource management.

Keywords: Oil Revenues, Government Spending, Economic Growth, sultanate of Oman, VECM, multivariate co-integration analysis, error correction method

1. Introduction

Several studies have revealed that a state's economic reforms and growth trajectories heavily depend on the natural resources available within its borders. The Sultanate of Oman, a country often perceived as blessed with rich natural resources, particularly oil, has garnered significant interest from researchers (Ahmad, Masan, & Development, 2015). The central question that arises is whether this abundance has translated into economic prosperity or posed challenges. Despite extensive academic work, there remains ambiguity about the impact of resource wealth on economic growth. Abou Elseoud, Kreishan, and Policy (2020) argue that the association between resource abundance and economic growth is complex and controversial. Economists are divided on whether such resources are a curse or a blessing, with various studies suggesting a negative relationship between resource abundance and economic performance (Abou Elseoud et al., 2020; Amir, Siddique, Ali, Bukhari, & Kausar, 2022; Bekhet, Matar, Yasmin, & Reviews, 2017; Fasano & Iqbal, 2003).

Several studies have explored this "resource curse" hypothesis, demonstrating adverse outcomes from resource exports. For instance, a study covering 95 developing countries from 1970 to 1990 found a negative relationship between resource abundance and economic growth (Badeeb, Lean, & Clark, 2017). Comparatively, countries with fewer resources, like Malaysia and Mauritius, experienced higher per capita income growth during the same period (Ahmad et al., 2015). This pattern suggests that countries rich in natural resources may experience slower economic growth compared to their resource-poor counterparts. Additionally, countries that derive their wealth from minerals tend to underperform economically due to weak institutional frameworks (M. Alam, Shabbir, Alam, & Sciences, 2018; S. Alam, Rehman, & Butt, 2011).

The theoretical underpinning of the resource curse has led economists to investigate the relationship between oil resources, GDP, and government expenditure (Alaali, Naser, & Environment, 2020). However, this relationship is subject to significant debate and criticism, especially concerning the definitions and methodologies used to measure natural resource abundance (H. Al-Mawali, Sharif, Rumman, Kerzan, & Liu, 2018; N. Al-Mawali, Hasim, Al-Busaidi, & Policy, 2016). Some researchers question the robustness of evidence linking resource wealth to poor economic performance, arguing that the evidence is not definitive (Asiri, Abdalla, & Banking, 2015). Moreover, even when correlations are found, the causal

[1]Department of Accounting, Faculty of Business, Sohar University, Oman. Email: sarfaraz7216@gmail.com
[2]Department, Economics and Business Studies, Mazoon College, Muscat, Oman. Email: drowaishusain@gmail.com

mechanisms remain unclear (Gazdar, Hassan, Safa, & Grassa, 2019).

In the context of Oman, the country's economic growth is heavily influenced by oil price volatility (Hamdi & Sbia, 2013). Although Oman is one of the wealthiest countries in terms of resources, its economy is not solely dependent on the oil sector, unlike other Gulf nations. Oman's economic growth trajectory is similar to Saudi Arabia's. However, significant gaps in oil production and research persist (Iqbal, Arif, Jadoon, & Rana, 2023). Despite this, Oman is recognized for its diverse economy and strategic steps towards financial and institutional diversification (H. Al-Mawali et al., 2018). The country has become a preferred business hub and an international trading center, contributing to its recent economic growth (Hayat & Tahir, 2019).

Recognizing the volatility of oil revenues, the Omani government has made efforts to reduce its dependency on oil and finance expenditures through other means (AlShehabi, 2017). In the nineties, Oman faced fiscal challenges due to fluctuating oil revenues, leading to imbalances (Alshubiri & Hussein, 2016; Alshubiri, Tawfik, & Jamil, 2020). To address these issues, the government has prioritized stabilizing current expenditures while making capital and development expenditures more responsive to oil revenue fluctuations. Studies highlight the critical role of oil revenues in financing government needs and their impact on inflation and investment (Aravind & Nayar, 2020). Similar patterns have been observed globally, where oil price shocks significantly impact economic stability (Kharusi & Ada, 2018).

This research aims to fill the gap in understanding how Oman can navigate the potential pitfalls of resource abundance while maximizing its economic growth. Based on it, the following research objectives are formulated.

- To explore the dynamic interplay among oil resources, GDP, and government expenditure in Oman through the ARDL model.
- To assess the short- and long-term interdependencies between oil resources, GDP, and government expenditure using an integrated approach with the ARDL and VECM models.
- To uncover the causal pathways between oil resources, GDP, and government expenditure by employing the VECM model.

By addressing these objectives, the research seeks to contribute novel insights into the debate on resource curse versus resource blessing and provide actionable recommendations for policymakers in Oman and other resource-rich nations. The following sections of this research include a comprehensive literature review, detailed research methodology, empirical findings, and a thorough discussion leading to the conclusion. This structured approach ensures a holistic examination of Oman's economic challenges and potential pathways to sustainable growth.

2. Review of the literature

The world has faced many oil shocks, specifically in the past century, in the era of post-World War Two periods (Jafari, Ismail, Othman, Mawar, & Environment, 2015). The oil shocks, including the Suez crisis of 1956 and 1957, the embargo on Arab oil in 1974, the Iraq and Iran war in 1980, and the Gulf War, have been seen by the world. The world also saw recent spikes in oil prices in 2008 and 2011. Many researchers have determined that their studies explain the behaviour of oil prices in such circumstances by studying past events and misfortunes (Guo, Zhang, & Iqbal, 2024; Yu, Umair, Oskenbayev, & Karabayeva, 2023). They have also tried to explain the behaviour and impacts of oil prices on the country's economic conditions.

2.1. Economic Impact of Oil Price Shocks

Economists have illuminated the various transmission channels through which oil can impact a country's economy. They have studied the behavior of oil prices using three main approaches (Kilian, 2014): the supply-demand framework, the exhaustive resources economy, and the informal approach. Renowned researchers like Mork and Hall utilized these approaches in the 1980s to achieve specific objectives related to oil price volatility (N. Al-Mawali et al., 2016). Their initial work focused on understanding the impacts of oil price changes (Demirer, Ferrer, & Shahzad, 2020; Sun, Gao, Raza, Shah, & Sharif, 2023), particularly within the energy sector of the United States. The results of these studies significantly highlighted how unanticipated changes in oil prices and energy values could adversely affect overall economic growth (Ge, 2023). It was found that oil recessions are often driven by inflation and broader economic downturns (Vázquez-Fariñas, 2023).

Hyperinflation led to the shutdown of many businesses and manufacturing firms, underlining the pivotal role of oil prices in establishing new businesses and institutions that bolster economic growth (Alodayni, 2016). The scope of these studies extended to include the impact of other factors, such as the removal of oil price controls in the context of economic stability programs (Azad & Serletis, 2022), which can slow investment movements. Further studies have documented significant growth in oil-producing countries like Qatar, Bahrain, Saudi Arabia, the UAE, and Oman (Ge, 2023; Guo et al., 2024; Yu et al., 2023). These studies explain that OPEC countries have accrued substantial revenues from increased oil prices (Belwal, 2017), leading to surpluses that fueled significant development. In contrast, countries dependent on oil imports and lacking oil production capacity face deficits due to rising prices (Evans, 2024; Yildirim & Arifli, 2021)

2.2. Specific Economic Variables Affected by Oil Prices

The income and consumption of individuals had severe impacts from the high volatility of oil prices (Quint & Venditti, 2023). In the Luca-Barro income equation, the researcher Darby conducted the test to see the impact of oil prices on different variables such as income and consumption (Bamaiyi, 2024). The impact was seen in different countries, including the United States of America. The sample was developed countries of Europe and America, such as Germany, Italy, France, and the U.K. (Boughanmi, Khan, & Policy, 2019). However, the researcher was unable to create a significant association between macroeconomic variables and oil prices. In the output of the United States of America, the influence of oil prices was observed (Guo et al., 2024).

For a long time, the associated literature has seen the impact of the prices of oil shocks on national-level aggregates, which was the main focus in the oil-importing countries, which were developed countries like the U.K. and the USA (Liu, Ahmad, Perveen, & Alvi, 2023).

Much research has been conducted on oil imports by developed countries (Boughanmi et al., 2019). Significant surveys were also being conducted to see and determine the facts of the issue. In order to see that, to some lesser extent, some students and institutions have conducted studies to see the relationship between oil prices and countries that were developing but importing oil for their needs. Some examples may include Japan, Thailand, and the Philippines (El & Policy, 2019). Some studies have also explained the impacts of oil prices on macroeconomic variables in countries exporting oil and products made with oil (Dagher & Hasanov, 2023; Quint & Venditti, 2023; Yildirim & Arifli, 2021).

Through industrial production, researchers have also studied the relationship between economic development and changing oil prices in the economy of Nigeria (Ibrahim et al., 2019). The study found an indirect relationship between industrial production and oil prices. Thus, the insignificant relationship was concluded by his research as well. Similarly, researchers have also examined the relationship of oil prices with Nigeria's output, inflation, real exchange rate, and money supply. They have used data from different quarters to conduct that study (Ibrahim et al., 2019). The research findings have suggested that the money supply has a significant and robust impact through oil shocks and price volatility, but this finding was absolute for the long run only. This impact may differ from circumstances or situations to other things in the short run (Iqbal et al., 2023; Xu, Mohsin, Ullah, & Ma, 2023; Yu et al., 2023).

Furthermore, the shortlist of results concluded that the asymmetric effects of the oil prices shocked Nigeria's economy. The results also showed that the relationship was strong between oil prices and the expenditures of the actual government (Bamaiyi, 2024; Sarker, Bouri, & Marco, 2023). The marginal effects of oil volatility or oil prices on industrial output and production can be seen through the findings (Vohra & science, 2017). In 2008, researchers conducted a study to explore the association between oil revenues and the growth of production for exporting oil products. They suggested that the gross domestic product may also react to oil revenue shocks non-linear or asymmetric (Tétreault, 2016). From a logical point of view, a positive oil price shock and a negative oil price shock can significantly impact gross domestic output (Sarker et al., 2023). Research on the Iranian economy was also determined, which may help the findings for the Oman oil sector and economy. They have used the VAR framework to consider the changing association between oil and leading economic indicators (Ibrahim, Devesh, & Ubaidullah, 2017).

The study found the asymmetric effects of oil price shocks. They have found that positive or negative oil price shocks can cause increased inflation (Sarker et al., 2023). Because oil prices can directly and significantly affect inflation in the economy (Zahlan, 2016). Furthermore, many studies have also found that the positive relationship between industrial growth and favourable oil prices can benefit the overall economy (Azad & Serletis, 2022; Sarker et al., 2023). By applying the Dutch disease hypothesis, they have confirmed these relationships, and they have also confirmed the association of oil prices with genuine exchange rate appreciation (Ahmad et al., 2015; N. Al-Mawali et al., 2016; Alshubiri & Hussein, 2016).

2.3. Empirical Literature and Study Framework

Lawal, Alabi, Ige, and Ibraheem (2016) suggest that government expenditures in Nigeria have a negative but statistically insignificant effect on domestic output in the long run, with recurrent expenditure being significant in the short run. It also notes that federal government retained revenue has a positive and significant effect on GDP, while crude oil prices have a negative effect on domestic output (Dagher & Hasanov, 2023; Gull, Farid, & Maqsood, 2023; Natto, 2024). In contrast, Najmadin (2022) emphasizes the direct relationship between oil revenues and GDP in Iraq, with oil revenues being a significant source for generating national income and thus improving economic growth rates. Interestingly, while (Okeke Charles, 2019) acknowledges the contribution of oil and non-oil products to Nigeria's GDP, it finds that the impact of oil products on economic growth is positive but insignificant. In contrast, non-oil products have a significant positive effect (Wang, Su, Umar, & Lobonț, 2023). This suggests a need for diversification away from crude oil dependency.

Similarly, Belullo and Dužman (2011) identify a significant long-run stable relationship between GDP and budget revenues in Croatia, with GDP significantly impacting state revenues. (Rahmawati & Intan, 2020) further explores the influence of government spending on the Human Development Index (HDI), indicating that

government spending significantly affects the educational dimension of HDI, while GDP per capita significantly affects the economic dimension (Alawadhi & Longe, 2024; Sweidan & Elbargathi, 2023; Wang et al., 2023). Previous research has identified a void connection between oil revenues and economic growth, exacerbated by government spending. To bridge this divide and address the issue at hand, the present study introduces and develops the following model, depicted in the accompanying image below.

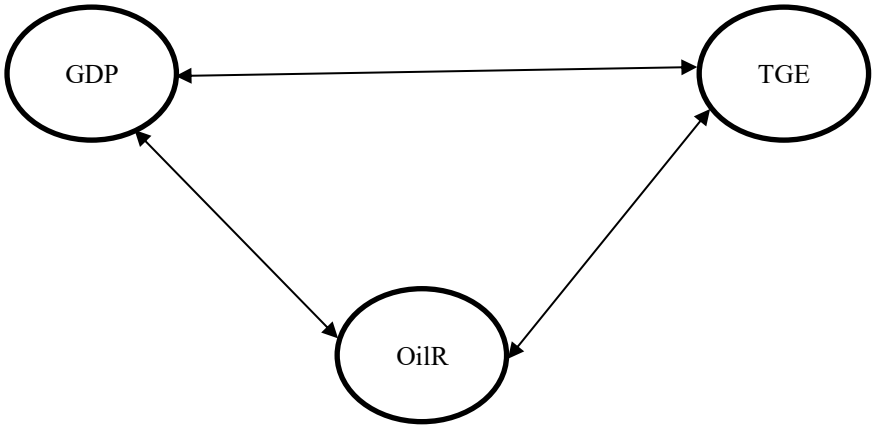

Figure 1: Study Model

3. Research Methodology

3.1. Data

The observation period is from 1989 to 2018, and the frequency of the data is on an annual basis for the following variables: economic growth, oil sector revenues, and government expenditures. Discussing the oil revenues, in real terms, the rent for gas and oil are the revenues for Oman. For the Oman government, these rents are a significant source of income and also represent the gross domestic product of up to 22.9% and for government revenues, it is up to 88%. Following the oil revenues, oil expenditures are also the central source of spending for the country. Through these statements, we can say that higher revenues can also cause higher government spending in the oil sector. In the case of increased revenue, expenditures would also increase.

Moreover, debating about the downfall in oil prices will also cause lower expenses for the government. These shrinking spending and shrinking prices of oil can cause a significant deficit for the country as well (Vohra & Science, 2017). In Oman, the government spends its income on current capital expenditures. Recurring expenses are current expenses, and long-term expenses are capital expenditures for the government. For example, the development of infrastructure can be the government's capital expenditure. The third variable is the country's economic growth, which can be determined by the ratio of GDP.

All variables are in logarithm form and real current local currency. Data were collected for the study through such institutions as the World Bank database and the National Centre for Statistics and Information. The following illustration illustrates our study's oil revenues, government spending, and economic growth. The increase in oil revenues can be seen in 1960 just due to the increase in oil prices in the country (Franks, Barkbu, Blavy, Oman, & Schoelermann, 2018). As a result, the development of the country's infrastructure caused many expenses. A positive relationship can be seen between these three indicators, which started in 1973 during the oil shock, and the oil prices reached a certain record level.

3.2. Method

There are two objectives of this study: the first is to find the relationship between GDP, government expenditure, and oil revenues in the long run in Oman, and the second is to find the short-term relationship. A test for unit root will be carried out; this enhanced Dickey-Fuller test will be carried out. Johansen Fisher's methods are used to find long-term relationships between variables, and then the vector error correlation model (VECM) is applied to calculating short-term elasticities (Hussein, Alam, & Business–Vol, 2019; Kharusi & Ada, 2018). The VECM can be written as follows:

$$\Delta LGDP_t = \alpha_1 + \sum_{i=1}^{p} \beta_{1i}\Delta LGDP_{t-i} + \sum_{i=1}^{q} \beta_{1i}\Delta LOILR_{t-i} + \sum_{i=1}^{r} \beta_{1i}\Delta LTGE_{t-i} + \lambda_1 ECT_{t-1} + \mu_{1t} \quad (1)$$

$$\Delta LOILR_t = \alpha_2 + \sum_{i=1}^{p} \beta_{2i}\Delta LGDP_{t-i} + \sum_{i=1}^{q} \beta_{2i}\Delta LOILR_{t-i} + \sum_{i=1}^{r} \beta_{2i}\Delta LTGEc_{t-i} + \lambda_2 ECT_{t-1} + \mu_{2t} \quad (2)$$

$$\Delta LTGE_t = \alpha_3 + \sum_{i=1}^{p} \beta_{3i}\Delta LGDP_{t-i} + \sum_{i=1}^{q} \beta_{3i}\Delta LOILR_{t-i} + \sum_{i=1}^{r} \beta_{3i}\Delta LTGEc_{t-i} + \lambda_3 ECT_{t-1} + \mu_{3t} \quad (3)$$

Here, $ECT_t = LGDP_t - \beta_0 - \beta_1 LOILR_t - \beta_2 TGE_t$

Where t denotes period,

so these equations represent a system of dynamic regression models commonly used in econometrics to

analyze the relationship between variables over time. Let us break down each Equation:

Equation (1): This Equation models the change in log GDP (ΔLGDP) at time t as a function of lagged changes in log GDP (ΔLGDP), changes in oil revenues (ΔLOILR), and changes in total government expenditure (ΔLTGE). The equation terms represent the lagged effects of GDP, oil revenues, and government expenditure, respectively. λ1 represents the coefficient for the error correction term (ECTt – 1), which captures the short-term adjustments to deviations from the long-run equilibrium. α1 is the intercept, and μ1t represents the error term.

Equation (2): This Equation models the change in oil revenues (ΔLOILR) at time t as a function of lagged changes in GDP, oil revenues, and total government expenditure. Similar to Equation (1), it includes lagged terms for each variable, an error correction term (ECTt – 1), an intercept (α2), and an error term (μ2t).

Equation (3): This Equation models the change in total government expenditure (ΔLTGE) at time t as a function of lagged changes in GDP, oil revenues, and total government expenditure. Like the previous equations, it includes lagged terms for each variable, an error correction term (ECTt – 1), an intercept (α3), and an error term (μ3t).

The error correction term (ECTt) in each Equation captures the long-term relationship between the variables LGDP, LOILR, and LTGE. It is calculated as the difference between the actual log GDP (LGDPt) and the predicted log GDP based on the coefficients (β0, β1, β2) estimated from the regression. This term adjusts for any short-term deviations from the long-run equilibrium relationship between the variables. VECM also helps verify causality present among variables; this model provides significant longer-term forecasting over an unconstrained model. Table 1 presents the measurement of each variable along with the data description and sources.

Description of variables

Variables	Description	Sources
GDP	GDP measures the total value of goods and services produced within a country's borders over annually.	World Bank Open Data. (data.worldbank.org)
OILR	Oil Revenues represent the income generated from the sale of oil, including both domestic sales and exports.	National Centre for Statistics and Information (data.gov.om)
TGE	TGE refers to the total amount of money spent by the government on goods and services, infrastructure, social programs, and other expenses.	World Bank Open Data (data.worldbank.org)

Source: Calculated by the Author

4. Empirical results

Table 2 below shows the descriptive statistics of the data collected over the past 30 years regarding GDP, OILR, and TGE.

Table 2: Descriptive Statistics

	GDP	OILR	TGE
Mean	3.038181	8.053258	3.115623
Median	3.070415	7.920818	3.154612
Maximum	3.597007	9.386376	3.393324
Minimum	2.511756	7.087908	2.650541
Std. Dev.	0.307847	0.791321	0.154289
Skewness	-0.018183	0.304354	-0.916964
Kurtosis	1.921472	1.633791	3.079360
Jarque-Bera	1.455682	2.796317	5.660386
Probability	0.482951	0.247051	0.059001
Observations	30	30	30

Source: Calculated by the Author

The minimum and maximum values lie in the threshold range; the mean values are close to the mid, which shows that there is the most minor level of skewness; it can also be observed that the deviation from the mean is low. Based on the statistical measures provided in Table 2, the normality of the variables GDP, OILR, and TGE are assessed. For GDP, both skewness and kurtosis are close to zero and less than 3, respectively, indicating a symmetric and moderately peaked distribution. The Jarque-Bera test statistic of 1.456, coupled with a p-value of 0.483, fails to reject the null hypothesis of normality. This suggests that GDP follows an approximately normal distribution.

Similarly, OILR exhibits a slightly positive skewness and a moderately peaked distribution with a kurtosis of 1.634. The Jarque-Bera test statistic of 2.796, accompanied by a p-value of 0.247, also fails to reject the null

hypothesis of normality. This indicates that OILR is approximately normally distributed. In contrast, TGE displays negative skewness and a leptokurtic distribution with a kurtosis of 3.079. The Jarque-Bera test statistic of 5.660, along with a p-value of 0.059, suggests that we almost reject the null hypothesis of normality at a significance level of 0.05. This implies that TGE deviates slightly from normality, especially given its significant Jarque-Bera test result. However, since it is closest to the normality values based on skewness, we considered it to be normal and proceeded with further analysis, already having taken its logarithmic values.

Table 3: Unit Root Test – ADF

Variable	ADF		ADF		Order of Integration
	At Level	At 1st Diff	At Level	At 1st Diff	
GDP	-2.2568	-5.5337**	-2.1225	-7.7464**	I (1)
TGE	-1.8862	-6.5618**	-1.9777	-6.5176**	I (1)
OILR	-0.6585	-4.1941**	-0.6431	-4.0733**	I (1)

Source: Calculated by the Author

Table 2 presents the results; it shows that the test statistics are insignificant for log levels of GDP, TGE and OILR. When the unit root test is applied to the first difference of two variables, the joint null hypothesis for both variables is rejected by the tests at a level of 1%. Each variable is integrated in order one according to the unit root tests; after checking for integration, the optimal lag length related to the vector autoregression is selected, applying the traditional model selection standard. The optimal lag length selected is two.

The results of the Johansen cointegration tests are given in Table 3 below:

Table 4: Results for Johansen cointegration tests

Hypothesized No. of CE(s)	Trace Statistic	Max-Eigen Statistics
None	25.29352**	19.50675**
At most 1	5.786770*	4.180129*
At most 2	1.606641	1.606641

Source: Calculated by the Author

The trace statistic and the Max-Eigen statistics in the results of Table 3 show the presence of co-integrating vectors at a 1% significance level. This shows that there is at least one long-term equilibrium relationship among variables. This means that Granger causality exists among variables as well. VECM is applied to correct the disequilibrium in cointegration relationships using the mean of ECT and to determine the causality of long- and short-term nature. The long-term results of the equilibrium relationship are shown in Table 4 above.

Table 5: long-run equilibrium relationship. Dependent variable: LGDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TGE	-0.680888	0.355727	-2.914074	0.0476
OILR	0.252651	0.067228	3.758154	0.0010
C	3.186854	1.286082	2.477956	0.0206

Source: Calculated by the Author

The coefficient of total government expenditure is -68%, which means that it has a negative and significant impact of -68% on GDP. Moreover, the coefficient of OILR is 25%, showing an impact of 25% on GDP. This means that if the oil revenue of Oman increases, the GDP will increase by 25%, but if total government expenditure increases, it will decrease the GDP of Oman.

Table 6: Error Correction Dependent Variable: D(GDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TGE (1)	-1.076103	0.395066	-2.723860	0.0135
TGE (2)	-0.687428	0.308806	-2.226088	0.0383
OILR (1)	0.541188	0.189565	2.854891	0.0101
OILR (2)	0.268289	0.182976	2.968119	0.0018
CointEq(-1)*	-0.883061	0.189632	-4.656709	0.0002

Source: Calculated by the Author

The error correction term is applied; it can be seen that the impact of total government expenditure is negative and significant on GDP, and the impact of oil revenue on GDP is significant and positive. The results of diagnostic tests and Durbin Watson stat are given above in Table 6.

Table 7: Estimated Model and Diagnostic Tests

Estimated Model	**Appraise**	**P value**
R-squared	0.8316***	0.0000
Adjusted R-squared	0.7382***	0.0000
S.E. of regression	0.40719	-
Durbin-Watson stat	2.1861	-
Diagnostic tests	**F-statistics**	**P-values**
White	0.3782	0.7844
Normality	0.1883	0.1772
Serial Correlation	0.2912	0.0927
ARCH	0.2029	0.1872

Source: Calculated by the Author

For consistency in the analysis, diagnostic tests were applied, stability tests were applied, and the ECM model was applied. There is no serial correlation, heteroskedasticity, and autoregressive conditional heteroskedasticity present in the model based on the tests run, and the results are shown in the lower part of the table above. The results of the VECM causality test are provided in Table 7 above.

Table 8: VECM Causality test

Variables	**Short Run Causality**			**ECT**
	GDP	OILR	TGE	
GDP	-	-3.202**	3.073*	-2.278**
OILR	2.1893	-	1.188	2.387**
TGE	-2.299*	7.510**	-	-3.188**

Source: Calculated by the Author

After the discussion on the long-run and short-run dynamics, the next step is to examine the direction of causalities; the results of the VECM causality test can be seen in the table above, and the short-run causality test and error correction term have been performed. It is confirmed that there is a unidirectional relationship between oil revenues and GDP. Figure 2 below shows the impulse response functions that describe the responses and impacts of all variables.

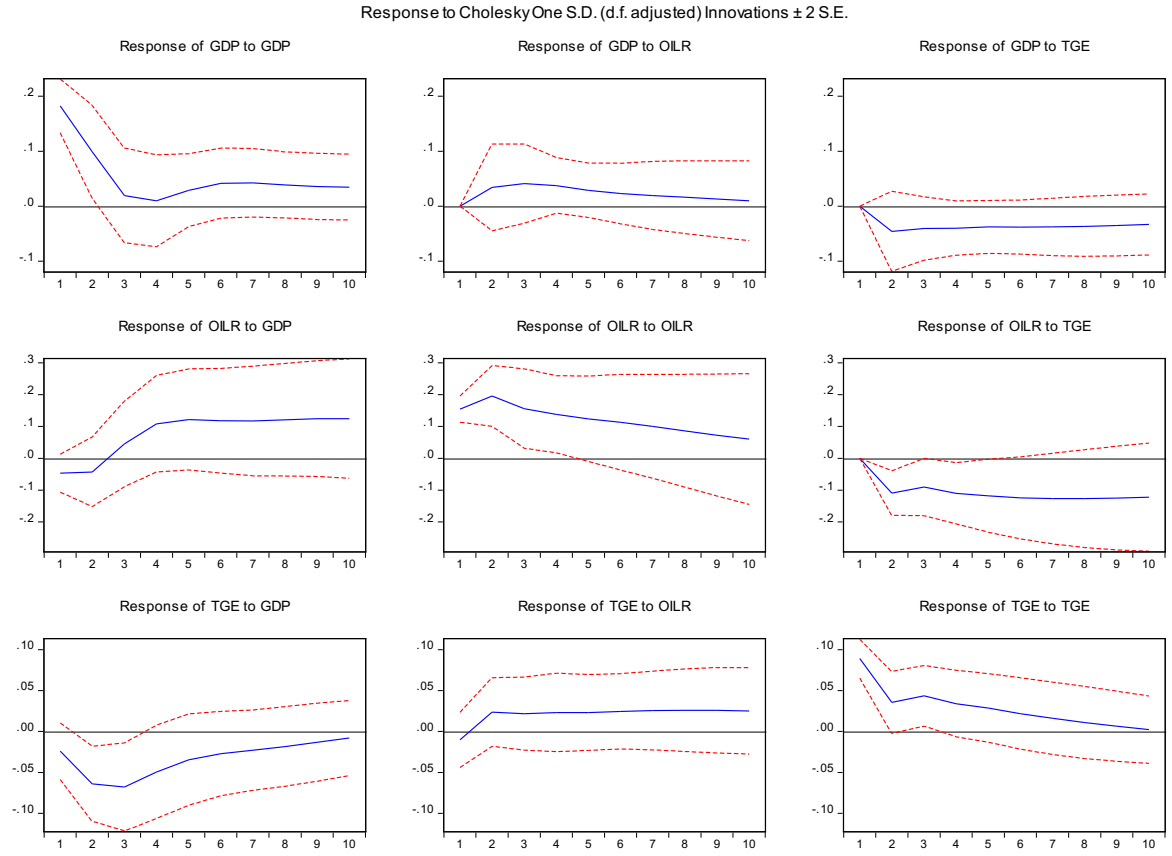

Figure 2: Impulse response function

The positive relationship between oil revenues and GDP can be seen, but it can also be seen that there is a significant and negative impact on government expenditure and the GDP of Oman.

5. Discussion

The financial crisis and debt issues led to the discussion of the impact of oil revenues on GDP and government spending. As Oman is an economy highly dependent on oil revenues, studying these variables is a vital addition to research work. The results have concluded that oil revenues in Oman have a significant and positive impact on Oman's GDP, while government expenditure has a negative and significant impact. Our findings echo those of recent studies conducted in neighbouring Gulf Cooperation Council (GCC) countries, shedding light on the regional implications of oil revenue management. For instance, a study (Natto, 2024) in Saudi Arabia observed a comparable positive correlation between oil revenues and GDP growth, affirming the crucial role of oil in driving economic expansion in the region. The research highlights the resilience of the oil sector in supporting GDP growth, even in the face of global economic challenges (Sweidan & Elbargathi, 2023).

Similarly, recent research by (Alawadhi & Longe, 2024) in Kuwait provides further evidence of the substantial contributions of oil revenues to government expenditure. Their findings underscore the critical role of oil revenues in financing public sector projects and social welfare programs, aligning with our observations in Oman. This suggests a common trend across GCC countries, where oil revenues serve as a primary source of funding for government initiatives.

Furthermore, our results align with the findings of recent studies conducted in Bahrain, another GCC nation facing similar economic challenges. Ozturk, Al-Mulali, and Reviews (2015) found a significant positive relationship between oil revenues and GDP growth in Bahrain, alongside substantial contributions to government expenditure, mirroring our observations in Oman. Additionally, Masan's (2015) study underscores the enduring significance of oil revenues on both short and long-term GDP and government expenditure in Bahrain, emphasizing the enduring relevance of oil revenues in sustaining economic stability amidst financial turmoil and debt crises.

6. Conclusion

In Oman, the primary source of funding government expenditures is oil revenues and exports. Economic and social expenditures have increased significantly during the past few years due to the increase in oil prices. In this research, a multivariate cointegration analysis and error correction model was applied to the data collected from Oman's oil sector. The results have shown that oil revenues significantly enhance economic growth and directly contribute to government expenditure. The study has significant theoretical, practical, and policy-making implications, along with some limitations, discussed in the following section.

7. Implications of the Research

7.1. Theoretical Implications

This research contributes to the existing body of literature on the relationship between natural resources, government expenditure, and economic growth, specifically in the context of oil-dependent economies. It provides empirical evidence supporting the resource curse hypothesis, which posits that countries with abundant natural resources may experience less economic growth due to mismanagement and over-reliance on these resources. By employing a multivariate cointegration analysis and error correction model, the study enriches the methodological approaches used in examining the dynamic relationships between oil revenues, government spending, and economic growth, serving as a reference for future research in similar contexts. Moreover, the findings illustrate the critical role of government spending, financed by oil revenues, in driving economic growth in Oman. This contributes to the broader theoretical debate on the effectiveness of government expenditure in resource-rich economies. Moreover, the study enhances understanding of economic growth models by integrating unique variables pertinent to oil-dependent economies, such as volatility in oil prices and external demand factors, into traditional economic growth frameworks.

7.2. Practical Implications

The study has several significant practical implications, particularly for policymakers and stakeholders within Oman's oil sector. Given Oman's heavy dependence on oil revenues, which are highly volatile, exhaustible, and uncertain, the findings of this research can guide the formulation of robust economic policies and strategies. Policymakers can leverage these insights to implement reforms aimed at diversifying the economy and reducing its over-reliance on oil revenues.

Firstly, to mitigate the risks associated with the volatile nature of oil revenues, Oman should intensify efforts to diversify its economy. This includes investing in non-oil sectors such as tourism, fisheries, logistics, and renewable energy, creating alternative revenue streams. Additionally, the government can use the findings to manage fiscal policies better, ensuring that expenditures align with fluctuating oil revenues. By establishing sovereign wealth funds and stabilizing funds, Oman can save surplus oil revenues during periods of high oil prices and use these reserves to stabilize the economy during downturns.

Furthermore, the study highlights the dependence on external demand for oil. Therefore, Oman can enhance its diplomatic and trade relationships with key oil-importing countries to secure long-term contracts and stable demand, thereby reducing revenue volatility. Investing in human capital by offering education and training

programs can prepare Oman's workforce for employment in diversified sectors, reducing the dependency on the oil sector for employment and economic stability. Lastly, implementing policies that encourage sustainable practices within the oil industry can help prolong the life of oil reserves and reduce environmental impact, ensuring long-term economic benefits.

7.3. Societal Implications

The societal implications of this study are profound, considering the significant role that oil revenues play in Oman's socio-economic landscape. The research highlights the need for sustainable and inclusive economic policies that can lead to improved societal outcomes. With better management of oil revenues and government spending, Oman can improve the provision of public services such as healthcare, education, and infrastructure, leading to an enhanced quality of life for its citizens. Diversifying the economy and reducing dependency on the oil sector can create more employment opportunities across various industries, contributing to lower unemployment rates and improved social stability. Effective fiscal policies can ensure a more equitable distribution of oil revenues, addressing income disparities and fostering social cohesion. By promoting sustainable practices within the oil industry and investing in renewable energy, Oman can address environmental concerns, ensuring a healthier environment for future generations. Enhancing economic resilience through diversification and better fiscal management can protect society from the adverse effects of oil price fluctuations and global economic shocks.

8. Limitations of the study and future research recommendations

As it is a known fact that all natural resources have limitations, this study has the limitation of only considering the oil sector of Oman to check impacts on GDP and Government expenditure. However, future researchers are recommended to conduct studies on non-oil sectors so that the Omani government and policymakers can consider and explore other sectors to improve GDP or economic growth. Moreover, the study has focused only on Oman as an oil-dependent economy. In contrast, several Gulf countries are oil-dependent economies. They are facing far more significant challenges than Oman, such as Bahrain facing financial turmoil and a debt crisis, so future researchers are recommended to explore and conduct a study on other countries as well so the results can be better generalized.

Acknowledgement statement: The authors would like to thank the reviewers for providing comments in helping this manuscript to completion.

Conflicts of interest: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

CRediT Author contribution statements: Author 1: Dr Sarfaraz Javed conceptualized and designed the research, developed and used the ARDL and VECM models for reliable data analysis and interpretation, and led the article draft, providing vital insights into the study results' significance. also developed the methodology, results, and discussion sections. Dr Uvesh Husain contributed to the relevant literature review, aligned the theoretical framework, developed the methodology, results, and discussion sections, proofread and reviewed the complete work, and eliminated syntax errors, structural formation errors, wrong citations, in-text errors, and missing references, thus ensuring data integrity. Dr. Husain was also instrumental in data gathering and validation.

Funding: This research did not receive a specific grant from any funding agency in the public, commercial, or non-profit sections

Data availability statement: Data is available at request. Please contact the corresponding author for any additional information on data access or usage.

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About the Author(S):

Dr Sarfaraz Javed is presently working at Sohar University as a full-time Associate professor. He has completed his education at Aligarh Muslim University, India. Dr Javed is a Laurel Award winner from AMU. He has published more than 30+ research papers and articles and attended more than 20 seminars, conferences and 30+ workshops nationally and internationally.

Dr Uvesh Husain is working as an Associate professor at Mazoon College, Oman. He has more than 18+ years of teaching and research experience. He is equipped with an extraordinary calibre and appreciable academic potencies. He is currently associated with Mazoon College as an Assistant Dean for Academic Affairs, in Muscat, Sultanate of Oman.