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GOVERNMENT EXPENDITURE AND THE TRANSITION FROM OIL DEPENDENCY TO A GREEN ECONOMY IN THE UNITED ARAB EMIRATES

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Abstract
The shift from oil-based growth to a greener economy has become one of the key policy agendas for the United Arab Emirates to balance long-term economic development with environmental sustainability. This study investigates the relationship between government expenditure and the transition from oil dependency to green economy in UAE for the period 2001-2021. The central research question is whether the government spending has a significant impact on the economic growth of the UAE, with subsidiary questions examining the roles of renewable energy consumption, oil rents, and inflation. This study is guided by four theoretical frameworks; Keynesian Fiscal Theory, Green Growth Theory, Resource Curse Theory and the Triple Bottom Line. A positivist, deductive, archival quantitative methodology is adopted using secondary annual data from World Bank Development Indicators. Three analytical stages are deployed: descriptive statistics characterizing variable trends; Pearson correlation analysis; and two OLS multiple regression models, Model 1 (primary: government expenditure and renewable energy) and Model 2 (control: oil rents and inflation). Model 1 ($F(2,18)=2.966$, $p=0.077$, adjusted $R^2=0.164$, Durbin-Watson=1.734) reveals that neither government expenditure ($B=-0.770$, $p=0.230$) nor renewable energy ($B=-2.312$, $p=0.648$) reached statistical significance as predictors of UAE GDP growth. Model 2 ($F(4,16)=1.659$, $p=0.208$, adjusted $R^2=0.116$) extended the specification to all four predictors simultaneously and similarly found that none reached significance, with lower explanatory power than Model 1. All four hypotheses (H1–H4) were rejected at the 5% threshold. Correlation analysis reveals that government expenditure is significantly negatively correlated with GDP growth ($r=-0.489$, $p=0.025$) and strongly positively correlated with renewable energy ($r=0.747$, $p<0.001$). The study concludes that the UAE's green economic transition is institutionally underway but has not yet generated a statistically detectable aggregate growth dividend within the 2001–2021 window. Policy recommendations emphasis accelerating clean energy deployment, reforming fossil fuel subsidies and shifting public spending to productive capital investment.

Keywords: Government Expenditure, Renewable Energy, Green Economy, Resource Curse, United Arab Emirates.

1. Introduction

The United Arab Emirates (UAE) is one of the most strategically important and most studied cases of state led economic transformation in the contemporary world. The discovery of commercially exploitable hydrocarbon reserves in Abu Dhabi in 1958 and Dubai in 1966 laid the foundational engine of national development through oil revenues, enabling the rapid construction of modern infrastructure, the expansion of

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universal public services, and the creation of a comprehensive welfare state that transformed a collection of modest pearl-trading settlements into a globally recognised financial, commercial, and tourism hub within two generations (Sweidan, 2021; Nassar, 2025). But this very success has also created critical structural vulnerabilities. But the very success created critical structural vulnerabilities. The continued reliance on hydrocarbon revenues makes the national economy vulnerable to major volatilities in the commodity markets. The UAE's GDP growth was between a high of 9.84% during the commodity boom of 2004-2007 and a low of 8.69% during the oil price collapse caused by the 2020 pandemic. Over the 21-year window, oil rents average 19.62 per cent of GDP and never fell below 10 per cent (World Bank, 2024; Ploeg, 2011; Alssadek and Benhin, 2023). This structural fiscal vulnerability has fuelled concerns about the UAE's hydrocarbon-dependent growth model not being resilient enough for a world of accelerating decarbonisation (International Monetary Fund, 2023; Poudineh, Sen and Fattouh, 2018).

In a strategic response to these risks, the UAE has laid out one of the most ambitious green transition programmes among petroleum exporting countries. The UAE Net Zero by 2050 Strategic Initiative commits the country to reach carbon neutrality by mid-century, the UAE Energy Strategy 2050 targets a 44 per cent clean energy share in the national energy mix and the UAE Vision 2031 positions economic diversification and sustainability as defining national priorities (Ministry of Energy and Infrastructure, 2026; UAE Government, 2025). In line with this national transition agenda, recent empirical evidence from the UAE indicates that sustainability-oriented fiscal and institutional reforms are increasingly influencing sectoral transformation across the economy. In particular, public investment in sustainable development, green finance mechanisms and renewable energy infrastructure reflects a gradual change in patterns of state expenditure towards long-term objectives of environmental and economic resilience. Yet, existing studies also suggest that the macroeconomic effects of such transitions are still uneven and may not yet be fully captured by aggregate growth indicators, highlighting the complexity of capturing short-term growth responses to structural sustainability reforms (Raza et al., 2024). These commitments come with significant public capital investment: the Mohammed bin Rashid Al Maktoum Solar Park (more than USD 13.6 billion) and the Barakah Nuclear Energy Plant (approximately 5,600 megawatts of zero-carbon baseload capacity) illustrate the fiscal magnitude of the UAE's green commitment (Emirates Nuclear Energy Corporation, 2022; Al-Sarihi and Mansouri, 2022).

This study makes a contribution to both academic scholarship and policy development. From an academic perspective, the UAE represents a unique case where strong institutions and active management of the sovereign wealth have reduced the adverse effects of oil dependence, even if the structural dependence on hydrocarbons remains. Important evidence for understanding the economic transition of other resource-based economies is therefore offered (Sachs and Warner, 1995; Ploeg, 2011). The results offer practical policy insights for fiscal planning, renewable energy policy and the broader GCC agenda on sustainable economic diversification (International Monetary Fund, 2023). To the best of the authors' knowledge, this is the first longitudinal study to examine the joint effect of government expenditure, renewable energy, oil rents and inflation on UAE economic growth with a theoretically grounded OLS regression framework over the period 2001–2021. Thus, the study answers the following research questions: (RQ1) Does government spending affect economic growth in the UAE? (RQ2) Does the use of renewable energy affect economic growth in the UAE? (RQ3) Does the UAE show signs of an emerging green economic transition after taking into account oil dependency and inflation? The rest of the paper is organized as follows. Section 2 reviews the relevant literature and builds the conceptual framework and hypotheses. The research methodology is presented in section 3. Section 4 presents the empirical findings. The results are discussed and the study is concluded in section 5.

2. Literature Review

2.1 Theoretical Background

2.1.1 Resource Curse Theory and Oil Dependency. The Resource Curse Theory (Sachs & Warner 1995) states that countries with abundant resources tend to experience slower economic growth. Resource windfalls diminish the motivation to improve institutional standards and human capital (Gylfason, 2021).

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Heavy reliance on exporting commodities causes significant economic instability which makes it challenging to attract long-term private investment (Cologni and Manera, 2022; Alssadek and Benhin, 2023). In addition, revenues from exporting resources appreciate the real exchange rate and make other tradeable sectors that are not related to resources less competitive (Corden and Neary, 1982; Ploeg, 2011). Ross (2015) goes on to demonstrate how petroleum wealth tends to solidify governance frameworks that inhibit profitable diversification. Strong institutional frameworks and strategic sovereign wealth management have somewhat mitigated these pathological tendencies, so the resource curse is seen in the UAE in a diluted form (Sweidan, 2021; Nassar, 2025). However, oil rents as a percentage of GDP continue to be structurally significant. According to Ploeg (2011), institutional quality is the primary moderating factor, but Papageorgiou, Saam, and Schulte (2022) demonstrate that resource-dependent economies face a structural trade-off that can only be overcome by purposeful investment in assets that increase productivity, such as infrastructure for renewable energy.

2.1.2 Keynesian Fiscal Theory and Government Expenditure. According to the Keynesian fiscal theory, a government expenditure will create output through the multiplier mechanism (Keynes, 2018). The relation between the productive public expenditure and the endogenous long run growth has been formalized by Barro (1990) who showed the positive externalities generated by infrastructure, education and research expenditure. When applied to the Gulf, Fasano and Wang (2002) found positive fiscal multiplier effects in the GCC economies and Nguyen and Bui (2022) confirm that productive government expenditure still has growth-enhancing effects in resource-rich economies. Fiscal multipliers are much larger in economies with open capital accounts and fixed exchange rate regimes, both of which are features of the UAE, as shown by Born, D'Ascanio, Müller and Pfeifer (2024) (Ilzetzki, Mendoza and Vegh, 2023). The composition of expenditure seems to matter crucially for the size of the multiplier, with infrastructure and education having larger effects than transfer payments (Beetsma, Cimadomo and van Spronsen, 2024). This compositional dimension is crucial to interpreting the UAE's results: the aggregate World Bank measure confuses productive capital investment with recurrent administrative consumption.

2.1.3 Green Growth Theory and Renewable Energy. Green Growth Theory, synthesised by the Organisation for Economic Co-operation and Development (2011) and developed by Bowen and Hepburn (2014), explains that the expectation that renewable energy investment will generate positive growth effects via reduced resource dependency and supported sustainable productivity growth. Apergis and Payne (2010) revealed that renewable energy and GDP growth are bidirectional positive causes of each other in OECD panel data. Public renewable energy investment is a statistically significant positive predictor of GDP growth across 38 countries, as shown by Bhattacharya, Paramati, Ozturk and Bhattacharya (2016). Shahbaz, Nasreen, Abbas and Anis (2020) found positive long-run associations in MENA economies. Specifically for the UAE, Poudineh, Sen and Fattouh (2018) note that the ongoing rapid transition to solar and nuclear investment has been ongoing since 2015, while the deployment of renewables was still in the early stages of the transition process relative to total primary energy. Khalfaoui et al. (2023) reveal that the renewable energy-growth nexus is further enhanced when the renewable share approaches 10 per cent, a threshold not attained by the UAE during 2001-2021 (maximum 1.00 per cent). This non-linear pattern is confirmed by Selmey, Kammoun, Elgohari and Sheta (2026) in their threshold panel analysis, which supports that growth-enhancing effects stemming from renewable energy are only statistically significant when structural transformation is well-developed. Investment in renewables creates a "green multiplier" that unfolds gradually with a temporal lag (Dong, Sun and Hochman, 2022).

2.1.4 Triple Bottom Line and Fiscal Sustainability. In 1999, Elkington proposed the idea of Triple Bottom Line (TBL) that only if economic prosperity, environmental integrity and social equity are considered all together, sustainable success is possible. The TBL was developed to measure the multidimensional problem of the UAE's transition from an oil-based fiscal policy to a green economy (Bowen and Hepburn, 2014; Dietz and Neumayer, 2007). Al-Sarihi and Mansouri (2022) also highlight the gap between the UAE's green spending pledges and actual environmental outcomes. As Coady, Parry, Le and Shang (2019) point out, the 2015 reform of fossil fuel subsidies in the UAE has yielded a fiscal double dividend by alleviating

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expenditure pressure and providing incentives to shift to renewable energy. H4 The idea that Dietz and Neumayer (2007) argued that macroeconomic stability is a prerequisite of TBL sustainability. Bowen and Hepburn (2014) contend that fiscal policy coherence across all three TBL dimensions simultaneously is essential for sustainable green transitions in resource-rich states.

2.2 Research Gap

Although there is a large volume of published literature on fiscal policy, resource dependency, and renewable energy transitions in the Gulf, no published study has empirically integrated government expenditure, renewable energy consumption, oil rents, and inflation in a unified longitudinal econometric framework for the UAE for the period 2001–2021. This limits the understanding of the simultaneous interaction of fiscal policy and structural energy transitions in a resource-dependent, but institutionally advanced economy.

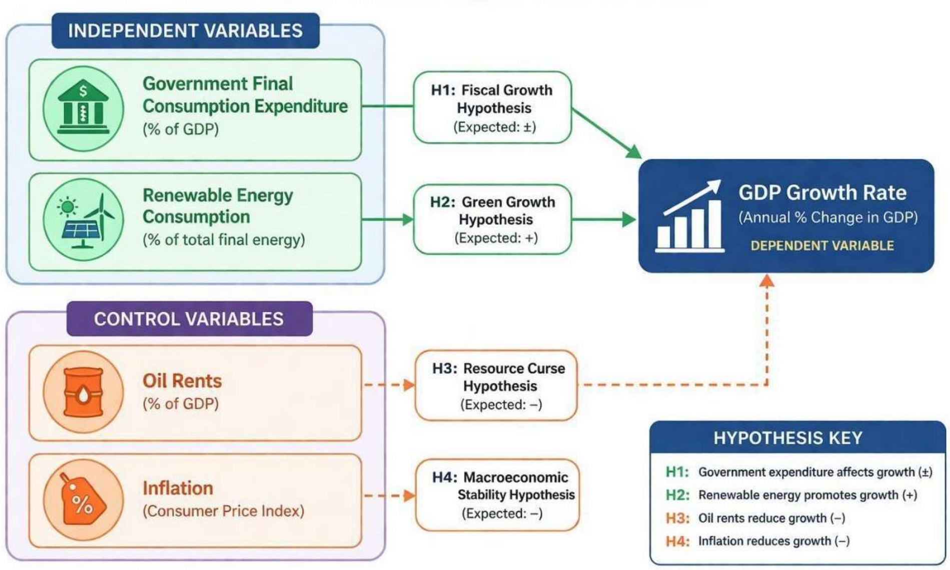
The theoretical traditions reviewed are rich but there is a major empirical gap. Most of the related studies utilize multi-country GCC or MENA panel approaches (Poudineh et al., 2018; Al-Sarihi and Mansouri, 2022; Khalfaoui et al., 2023), consider the pre-diversification periods (Fasano and Wang, 2002) or investigate bivariate relationships (Apergis and Payne, 2010; Bhattacharya et al., 2016). To our knowledge, no published study has conducted a longitudinal OLS regression analysis for the UAE over the period 2001-2021 that integrates both government expenditure and renewable energy in a single theoretically grounded model. This gap is directly addressed in this study.

2.3 Research Hypotheses and Conceptual Framework

Based on the four theoretical frameworks reviewed above, this study formulates four research hypotheses. H1 (Economic Growth Hypothesis): Government final consumption expenditure (% GDP) The theory of Keynesian fiscal multiplier has significant impact on the UAE GDP growth (Keynes, 2018; Barro, 1990; Fasano & Wang, 2002). Anticipated sign: ±. H2 (Green Growth Hypothesis): . Renewable energy consumption (% of total final energy) Positive and significant effect on UAE GDP growth Based on Green Growth Theory (Organisation for Economic Co-operation and Development, 2011; Bhattacharya et al., 2016) Expected sign: + H3 (Resource Curse Hypothesis): Oil rents (% GDP) has a significant negative effect on UAE GDP growth (Resource Curse Theory, Sachs and Warner, 1995; Ploeg, 2011; Alssadek & Benhin, 2023); expected sign: −. H4 (Hypothesis of Macroeconomic Stability): Inflation (GDP deflator, annual %) has a significant negative effect on UAE GDP growth (macro-economic stabilisation theory, Triple Bottom Line, Dietz and Neumayer, 2007; Ilzetzki et al., 2023); expected sign:

Figure 1

Conceptual Framework



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Note: Fiscal Policy, Renewable Energy, and Economic Growth in the UAE. Primary predictors (Gov. Expenditure → H1; Renewable Energy → H2) and control variables (Oil Rents → H3; Inflation → H4) converge on the dependent variable, UAE GDP Growth Rate. Source: Author's original conceptual framework; variables operationalised using World Bank Development Indicators (World Bank, 2024).

Figure 1 shows the conceptual framework, illustrating the four independent variables linked to the GDP growth rate, the dependent variable, through the respective hypotheses. The framework disaggregates primary independent variables (government expenditure and renewable energy consumption) that directly test the Keynesian and Green Growth propositions from control variables (oil rents and inflation) that capture structural and macroeconomic contextual effects. The two main predictors are formally tested in Model 1 of the regression models presented in Section 4 with oil rents and inflation added as controls in Model 2.

3. Methodology

3.1 Research Philosophy and Approach

This study adopts the Saunder’s Research Onion framework, Lewis and Thornhill (2023). The philosophical approach taken is positivism with a deductive research approach. Positivism is suitable as it treats social and economic phenomena as objective realities that can be empirically measured (Bryman, 2016; Saunders et al., 2023). The study tests four hypotheses based on the theoretical underpinnings of the study using archival secondary data. A deductive approach is suitable as there is already a theoretical base from which specific and testable propositions can be empirically examined (Bryman, 2016).

3.2 Research Strategy and Design

The research strategy used in this study was archival research. The secondary data were collected from the World Bank Development Indicators (World Bank, 2024). This study adopts a mono-method longitudinal quantitative design for the UAE from 2001–2021 (N = 21) to investigate changes in the drivers of economic growth between the pre-diversification and accelerated green investment periods. The data were downloaded from the World Bank Open Data portal and analysed using SPSS Version 28. Missing values and outliers were not an issue because only complete annual observations were included.

3.3 Variables and Data Sources

The variables used in this study are presented in Table 1.

Variable Type	World Bank Indicator	Role in Model
Dependent	GDP Growth Rate (annual %)	Outcome: economic performance
Independent 1	Government Final Consumption Expenditure (% GDP)	Tests H1: Fiscal Growth Hypothesis
Independent 2	Renewable Energy Consumption (% of total final energy)	Tests H2: Green Growth Hypothesis
Control 1	Oil Rents (% of GDP)	Contextualises H3: Resource Curse
Control 2	Inflation, GDP Deflator (annual %)	Contextualises H4: Macroeconomic Stability

Source: World Bank Development Indicators (World Bank, 2024).

3.4 Data Analysis Procedures

Data analysis followed three stages based on Field (2024). was conducted in accordance with Field (2024) in three steps. The first step involved calculation of the measures of descriptive statistics, such as mean, standard deviation, minimum and maximum, and was accompanied by construction of the SPSS time-series line graphs. The second step included the conductance of the Pearson correlation analysis for determining the presence of collinearity between variables. The third step consisted in performing OLS multiple regression analysis.

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The baseline model (Model 1) is specified as:

$$GDPGrowth_t = \beta_0 + \beta_1(GovExp)_t + \beta_2(RenewEnergy)_t + \varepsilon_t \quad (1)$$

where β_1 measures the effect of fiscal policy and β_2 captures the contribution of renewable energy to economic growth.

The extended model (Model 2) incorporates oil rents and inflation as control variables:

$$GDPGrowth_t = \beta_0 + \beta_1(GovExp)_t + \beta_2(RenewEnergy)_t + \beta_3(OilRents)_t + \beta_4(Inflation)_t + \varepsilon_t \quad (2)$$

The robustness of the findings is tested by controlling for broader macroeconomic conditions, and the two models are compared using coefficient significance, coefficient magnitude and adjusted R^2. Statistical significance is tested at the 5% level ($p < 0.05$) and marginal effects are reported at the 10% level. Model adequacy is checked using F-test, Adjusted R2, Durbin-Watson statistic and residual plots for normality and homoscedasticity.

3.5 Reliability, Validity, and Ethical Considerations

The World Bank Development Indicators is a macro-economic dataset that is highly validated and transparently documented. Its institutional provenance is a support for reliability (World Bank, 2024; Saunders et al., 2023). Each variable is theoretically justified and empirically used, maintaining internal and construct validity (Field, 2024; Apergis and Payne, 2010). The external validity is rightly confined to the UAE context; the findings should not be generalized to other petrostates with different institutional configurations. There are no ethical issues as the study utilises solely anonymised secondary data and involves no human participants (Saunders et al., 2023).

4. Results and Findings

4.1 Descriptive Statistics and Trend Analysis

Table 2 presents descriptive statistics for all five study variables over 2001–2021

Variable	N	Mean	Min	Max	Std. Dev.
GDP Growth Rate (annual %)	21	3.379	−8.693	9.837	4.497
Inflation, GDP Deflator (annual %)	21	3.991	−16.060	19.457	10.303
Oil Rents (% of GDP)	21	19.618	10.494	28.599	5.675
Gov. Final Consumption Expenditure (% GDP)	21	10.313	6.733	14.853	2.232
Renewable Energy Consumption (% total final energy)	21	0.224	0.100	1.000	0.277

Source: SPSS output generated by author from World Bank Development Indicators (World Bank, 2024).

The GDP Growth Rate averaged 3.379 per cent (SD=4.497) with considerable interannual volatility characteristic of hydrocarbon-dependent economies. The minimum of −8.693 per cent refers to the contraction of the pandemic in 2020, while the maximum of 9.837 per cent is relevant to the commodity boom of the mid-2000s. The trend data show three distinct phases: a period of sustained high growth between 2001 and 2007 (around 9–10%) driven by the global commodity super-cycle and the UAE construction boom; a sharp contraction in 2009 (around −5.5%) associated with the global financial crisis and Dubai property collapse; and a moderate recovery from 2010 to 2019, followed by the sharp contraction of the 2020 pandemic and a strong rebound in 2021. These persistent patterns are consistent with global oil price dynamics and support the classification of the UAE as a structurally commodity-sensitive economy.

Government Final Consumption Expenditure (% GDP) averaged 10.313 per cent (SD=2.232) with a minimum of 6.733 per cent and a maximum of 14.853 per cent. The path is U-shaped: the ratio fell from about 10 per cent in 2001 to 6.7 per cent around 2007-2008 as rapid GDP growth inflated the denominator during the oil boom, then rose steadily to 14-15 per cent by 2020-2021 alongside the UAE's accelerated diversification investment programmes. This pattern matters for H1, because the inverse mechanical relationship between the expenditure-to-GDP ratio and GDP growth induces a structural negative correlation that needs to be disentangled from any true causal effect. Renewable Energy Consumption (% total final energy) averaged only 0.224 per cent (SD=0.277), with a maximum of 1.00 per cent, which confirms the early stage nature of the UAE energy transition during the study period. Inflation (GDP Deflator) had extreme interannual volatility (SD=10.303) ranging from −16.060 per cent to 19.457 per cent, which is reflective of the broader coverage of the GDP deflator to include asset prices. The average for Oil Rents (% GDP) was 19.618 (SD=5.675) ranging from a maximum of 28.599 to a minimum of 10.494. It never fell below the 10 per cent mark throughout the whole study period – a threshold commonly cited as signifying structural oil dependency (Ploeg, 2011).

4.2 Correlation Analysis

Table 3 presents the Pearson correlation matrix.

Table 3

Pearson Correlation Matrix

Variable	GDP Growth	Gov. Exp.	Renew. Energy	Oil Rents	Inflation
GDP Growth Rate	1.000	−0.489*	−0.428	0.424	0.360
Gov. Final Consumption Exp.	−0.489*	1.000	0.747**	−0.746**	−0.484*
Renewable Energy Consumption	−0.428	0.747**	1.000	−0.455*	−0.103
Oil Rents	0.424	−0.746**	−0.455*	1.000	0.561**
Inflation, GDP Deflator	0.360	−0.484*	−0.103	0.561**	1.000

*** p < 0.01 (2-tailed); * p < 0.05 (2-tailed). N = 21. Source: SPSS output generated by author from World Bank Development Indicators (World Bank, 2024).*

Government expenditure has a negative and statistically significant correlation with the growth of GDP (r=−0.489, p=0.025). This is contrary to simple Keynesian expectations but consistent with the UAE context. The share of government expenditure in GDP tends to rise during periods of GDP contraction or crisis-induced fiscal expansion, rather than during productive investment-led growth, leading to a structural negative aggregate correlation. GDP growth is positively and marginally correlated with inflation (r=0.360, p=0.109), positively and marginally correlated with oil rents (r=0.424, p=0.056), and negatively correlated with renewable energy consumption (r=−0.428, p=0.053). This pattern reflects the contrasting temporal relationship between oil boom periods, characterised by high growth and low renewable shares and the more recent diversification period characterised by lower growth momentum and higher renewable shares.

Government expenditure is positively and significantly correlated with renewable energy consumption (r=0.747, p<0.001), indicating that public expenditure in the UAE has led to an increase in state-directed investment in clean energy. It also has a strong negative correlation with oil rents (r=−0.746, p<0.001). Oil rents are positively and significantly correlated with inflation (r=0.561, p=0.008) in line with the demand-push inflationary dynamics of commodity booms (Cologni and Manera, 2022). In general, the relatively high inter-predictor correlations imply that multicollinearity could impact the accuracy of the coefficient estimates in the regression models (Field, 2024).

4.3 OLS Regression Results

Table 4 summarises both OLS regression models.

Table 4

Regression Analysis

Model	R^2	Adj. R^2	Std. Error	Durbin-Watson
Model 1: Gov. Expenditure + Renewable Energy [F(2,18)=2.966, p=0.077]	0.248	0.164	4.111	1.734
Model 2: All Four Predictors [F(4,16)=1.659, p=0.208]	0.293	0.116	4.227	1.656

Source: SPSS output generated by the author. Dependent variable: UAE GDP growth rate (annual %).

Model 1 R .498 R Square .248 Adjusted R Square .164 Std. Error of the Estimate 4.111 Durbin-Watson 1.734 The value of R^2 shows that government expenditure and renewable energy together explain about 24.8 per cent of the variance in UAE GDP growth, whereas the adjusted R^2 shows that the real explanatory power is about 16.4 per cent. The Durbin-Watson statistic was 1.734, which falls in the acceptable range of 1.5–2.5, indicating no serious first-order autocorrelation (Field, 2024). The overall F-statistic is F(2,18)=2.966, p=0.077, which is close but not quite at the conventional 5% threshold and is thus marginally significant at the 10% level. This suggests that the two predictors explain a sizeable but small part of the variation in growth, consistent with the literature, which shows that the main driver of growth in the UAE continues to be the oil market (Ploeg, 2011).

Model 2 R=0.541 R Square=0.293 Adjusted R Square=0.116 Standard Error=4.227 Durbin-Watson=1.656 Total F value is F(4,16)=1.659, p=0.208. This does not reach statistical significance at the 10% level. When comparing the two models, Model 1 has a higher adjusted explanatory power (0.164 vs. 0.116), standard error (4.111 vs. 4.227) and p-value (0.077 vs. 0.208). Hence, the two-predictor specification is more parsimonious and explains more growth variance per degree of freedom than the full four-predictor model. The results of both models are not statistically significant at the conventional 5% level, implying that a longer dataset after diversification may be required for a robust statistical identification of UAE GDP growth dynamics.

Table 5 presents the regression coefficients for the extended four-predictor Model 2.

Table 5

Regression Coefficients

Predictor (Model 2)	B	SE	Beta	t	p	Hypothesis
(Constant)	4.114	12.604	,	0.326	0.748	,
Gov. Final Consumption Expenditure	−0.150	0.941	−0.074	−0.159	0.876	H1 – rejected
Renewable Energy Consumption	−4.934	5.746	−0.304	−0.859	0.403	H2 – rejected
Inflation, GDP Deflator	0.104	0.122	0.239	0.856	0.405	H4 – rejected
Oil Rents (% GDP)	0.076	0.268	0.096	0.285	0.779	H3 – rejected

Source: SPSS output generated by the author. Dependent variable: UAE GDP growth rate (annual %).

Government Final Consumption Expenditure B=−0.150 SE=0.941 Beta=−0.074 t=−0.159 p=0.876 The result shows the relationship is not significant. H1 is not supported. Renewable Energy Consumption B=-4.934 SE=5.746 Beta=-0.304 t=-0.859 p=0.403 The association is negative but not significant. Hence, H2 is not supported. Inflation (GDP Deflator) has B=0.104 (SE=0.122, Beta=0.239, t=0.856, p=0.405) indicating a positive association that is not statistically significant. Oil Rents has B=0.076 (SE=0.268, Beta=0.096, t=0.285, p=0.779), also positive but completely non-significant, consistent with the UAE's attenuated resource curse profile. The relatively large standard errors for all predictors is a function of both the small sample size (N=21) and multicollinearity among predictors.

4.4 Assumption Testing

The residual statistics indicate that the predicted values range from −2.774 to 6.493 whereas the standardised predicted values range from −2.527 to 1.279 (mean=0, SD=1.000 as expected). Standardised residuals range from -1.693 to 1.392 and are all within the conventional ±2 threshold, suggesting no single observation has extreme leverage. The histogram of standardised residuals exhibits an approximate bell-shaped distribution around zero, which is largely in line with the normality assumption of the OLS, and minor left skewness due to the presence of extreme observations in 2009 and 2020. The Normal P-P plot shows points that cluster tightly around the 45-degree diagonal, with only small tail deviations associated with those outlier years. This pattern is consistent with approximate normality and is characteristic of small samples with a few extreme observations (Field, 2024; Bryman, 2016). Overall, the residual diagnostics support the use of OLS regression on this dataset and suggest that the coefficient estimates retain inferential validity, subject to the small-sample constraint.

5. Discussion

5.1 Government Expenditure and Economic Growth (H1)

The regression indicated a negative but statistically insignificant link between the levels of government expenditure and the growth of UAE GDP (B=−0.150, Beta=−0.074, p=0.876), which explains the lack of support for H1. There are three possible explanations for this outcome. The first one is an example of a measurement artifact known as pro-cyclical effect: when UAE GDP falls (e.g., in 2009 and 2020), the ratio of government expenditure to GDP automatically increases. Second, the aggregate World Bank measure combines productive infrastructure spending with recurrent administrative consumption, even though only the productive capital component is expected to generate positive Keynesian multiplier effects (Beetsma et al., 2024; Nguyen and Bui, 2022). Third, multicollinearity with renewable energy (r=0.747) increases the coefficient's standard error (SE=0.941) and reduces statistical precision. These structural features, rather than a truly negative fiscal effect, provide the most plausible explanation for the finding. Had disaggregated capital investment data been available, a positive coefficient would be theoretically expected (Barro, 1990; Fasano and Wang, 2002).

5.2 Renewable Energy Consumption and Growth (H2)

The regression shows a negative and non-significant relationship between renewable energy and UAE GDP growth (B=−4.934, Beta=−0.304, p=0.403), leading to the non-confirmation of H2. The main explanation is structural temporal confounding: the high-growth oil-boom years of 2004–2008 coincide with minimal renewable shares (approximately 0.10%), whereas the post-2015 years of gradually expanding renewable deployment coincide with only moderate growth. The negative sign therefore appears to reflect a spurious temporal trend rather than a genuine causal effect. In addition, with a maximum renewable share of only 1.00 per cent, the UAE's clean energy sector remained far below the 10 per cent threshold at which positive growth effects tend to emerge (Khalfaoui et al., 2023). This does not refute Green Growth Theory; rather, it supports its maturation hypothesis, according to which positive effects become detectable only once penetration is sufficient to generate scale effects (Organisation for Economic Co-operation and Development, 2011; Bhattacharya et al., 2016). The strong positive correlation between government expenditure and renewable energy (r=0.747, p<0.001) further suggests that the fiscal basis for future green growth dividends is being built in line with this early-stage expectation.

5.3 Oil Dependency and the Resource Curse (H3)

The positive bivariate correlation between oil rents and GDP growth (r=0.424, p=0.056) is opposite to H3's predicted negative sign but remains analytically consistent with the UAE's attenuated resource curse profile: strong institutions appear to have channelled oil revenues into productive investment, so oil booms have supported rather than undermined growth (Sweidan, 2021; Alssadek and Benhin, 2023). At the same time, structural hydrocarbon dependence remains clear. Oil rents averaged 19.618 per cent of GDP and never fell below 10 per cent during 2001–2021. The strong negative correlation between oil rents and government expenditure (r=−0.746, p<0.001) points to persistent fiscal vulnerability, with expenditure capacity still fundamentally conditioned by commodity revenues and therefore prone to procyclical dynamics that weaken Keynesian multiplier effects. Model 2's lower explanatory power relative to Model 1 (adjusted R^2=0.116 versus 0.164) is also consistent with the UAE's progressive use of sovereign wealth mechanisms to buffer the direct oil-growth transmission channel (Ploeg, 2011).

5.4 Inflation and Macroeconomic Stability (H4)

But contrary to H4's predicted negative sign, inflation had a positive but insignificant correlation with GDP growth (r=0.360, p=0.109). This is plausible in the UAE context as periods of higher inflation largely reflect demand surges associated with oil booms that coincide with strong GDP growth. This parallel dynamic linked to commodities has been documented in oil-exporting economies (Cologni and Manera, 2022; Berument, Ceylan and Dogan, 2021). The very large standard deviation for inflation (10.303%) makes interpretation even more complicated. The GDP deflator, however, reflects the broad movements of asset prices and may generate extreme values (−16.060 to 19.457%) relative to the CPI, which could overstate the inflationary environment faced by investors and consumers (International Monetary Fund, 2023). Future studies using CPI rather than the GDP deflator may therefore find a more theoretically consistent negative relationship.

5.5 Theoretical Implications

In Keynesian Fiscal Theory the insignificant coefficient does not falsify the multiplier hypothesis but indicates its conditionality: multiplier effects are more likely when expenditure is directed towards productive capital rather than recurrent administrative consumption, confirming Barro's (1990) distinction between productive and non-productive public spending. The lack of a statistically significant renewable energy effect for Green Growth Theory is consistent with the theory's own maturation-threshold argument. The theory is not falsified but postponed to a higher level of renewable penetration (Khalfaoui et al., 2023). The positive association between oil rents and growth in the context of Resource Curse Theory suggests that strong sovereign wealth mechanisms can help offset the usual resource curse dynamic (Sweidan, 2021). In terms of the Triple Bottom Line, the strong co-movement between public expenditure and renewable energy ($r=0.747$, $p<0.001$) demonstrates the UAE's effort to pursue the economic and environmental pillars simultaneously, even though the macroeconomic dividend is statistically nascent in the period of this study (Elkington, 1999; Al-Sarihi and Mansouri, 2022).

5.6 Policy Implications

The study's findings highlight four important policy priorities for the UAE. First, public spending should be increasingly focused on productive capital investment, notably in renewable energy, digital infrastructure and human capital, rather than recurrent administrative spending. This would improve fiscal policy effectiveness and the magnitude of long-run Keynesian multiplier effects (Beetsma et al., 2024). The National Investment Strategy provides the appropriate institutional framework that can support the transition. This recommendation is also in line with previous evidence underlining the importance of aligning fiscal sustainability with sectoral competitiveness and long-term financial performance in the UAE (Raza et al., 2024).

Second, the policy and structural priority of fast deployment of renewable energy remains. With renewable energy contributing an average of only 0.224 per cent of total final energy consumption during 2001–2021, it is important to achieve the Ministry of Energy and Infrastructure's (2026) target of 60 per cent clean energy by 2035 to realize tangible economic benefits. Previous studies have shown that positive growth effects are only visible at a certain level of penetration of renewable energy, which highlights the need to move beyond the current early stage of deployment (Khalfaoui et al., 2023). This is further supported by evidence that green growth is more pronounced when sustainability initiatives are integrated into wider institutional and sectoral transformation strategies (Shazia et al., 2026).

Third, the gradual phase-out of fossil fuel subsidies, which was launched in 2015, should remain at the forefront of the fiscal reform agenda. Reducing dependence on subsidies would reduce the structural dependence on hydrocarbons and provide more fiscal space for investment in sustainable and productivity-enhancing sectors (Coady et al., 2019). Similarly, the latest research on the UAE shows that subsidy reform enhances long-term financial resilience and promotes economic diversification (Raza et al., 2024).

Finally, a formal fiscal rule linked to long-term sustainable oil revenue benchmarks would help to mitigate procyclical government spending and the pass-through of oil price volatility to inflation and economic growth (IMF, 2023). Such a framework would bolster fiscal discipline and further support the UAE's transition to a more stable, resilient and diversified economy.

6. Conclusion

This study provides the first comprehensive, multi-variable longitudinal OLS regression analysis of UAE fiscal-energy-growth dynamics covering 2001–2021, simultaneously incorporating government expenditure and renewable energy as primary predictors alongside oil rents and inflation as contextual controls. The study demonstrates, with rigorous structural explanation, that none of the four hypotheses was confirmed at conventional significance thresholds, while providing theoretically coherent accounts of why each expected effect has not yet materialised within the study window. Crucially, the findings reveal that Model 1 (government expenditure and renewable energy) outperforms Model 2 (all four predictors) on adjusted explanatory power despite both falling short of significance, suggesting that the parsimonious fiscal and clean energy specification captures growth dynamics more efficiently and that fiscal and clean energy policy variables are becoming progressively more relevant to UAE growth dynamics relative to raw hydrocarbon revenue exposure, a finding consistent with the UAE's advancing institutional diversification.

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The study's original academic contribution is identifying precisely the structural conditions, procyclical expenditure measurement, expenditure composition aggregation, early-stage renewable penetration, and temporal confounding, that prevent expected positive effects from being statistically detected, and specifying the policy conditions necessary for them to emerge. The UAE's green transition is institutionally underway and fiscally committed; its macroeconomic growth dividend awaits the scale of clean energy deployment that Green Growth Theory identifies as the threshold for statistical detectability. Future research should employ disaggregated UAE fiscal expenditure data by category, extend the dataset post-2021 as more renewable deployment data accumulate, and apply panel ARDL cointegration or structural VAR methods as the renewable energy share approaches and eventually exceeds 10 per cent. As UAE renewable penetration grows toward its 2030 and 2035 targets, the green growth signal identified in this study as statistically nascent is expected to become robust.

Contribution of Authors

All the authors participated in the ideation, development, and final approval of the manuscript, making significant contributions to the work reported.

Conflict of Interest Statement

The authors declare no conflicts of interest.

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Data Availability

The datasets generated during and analysed during the current study are available from the corresponding author on reasonable request.

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