The Symmetric and Asymmetric Effects of Governance on Natural Resources Dependence in GCC Countries

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Abstract: The current study examined the symmetric and asymmetric effects of governance quality on natural resource dependence in the Gulf Cooperation Council (GCC) countries from 1996 to 2023. Governance quality was measured using a composite index derived from the Worldwide Governance Indicators, recording institutional effectiveness, regulatory quality, and control of corruption. The analysis applied the Pooled Mean Group (PMG) and Dynamic Common Correlated Effects (DCCE) estimators using panel data techniques to identify long-term relationships while accounting for heterogeneity and cross-sectional dependence. Furthermore, a Nonlinear Autoregressive Distributed Lag (NARDL) model was employed to document asymmetric dynamics. The results revealed that improvements in governance generate statistically significant and economically meaningful reductions, depending on natural resource rents, by strengthening institutional capacity and supporting economic diversification. Conversely, population growth, inflation, and exchange rate volatility raise natural resource dependence by intensifying fiscal pressures and macroeconomic instability, while economic growth consistently mitigates reliance. Therefore, governance improvements yield stronger and more persistent reductions in resource dependence than those associated with governance deterioration, emphasising the importance of sustained institutional reform and macroeconomic stability for GCC diversification strategies.

Keywords: Governance quality, natural resource dependence, asymmetric effects, macroeconomic instability, GCC countries.

INTRODUCTION

The economies of the GCC states have long depended on the exploitation of hydrocarbon resources, with oil and gas revenues accounting for a substantial share of GDP, fiscal budgets, and export receipts [1,2]. This resource endowment has allowed these states to finance large-scale infrastructure, build extensive welfare systems, and make significant investments in human capital, which could unleash new sectors of economic activity. Nonetheless, the situation has also exposed the countries to shifts in global energy markets and external shocks. For instance, the oil price collapse of 2014-2016 and the recent COVID-19 pandemic have demonstrated that dependence on resource rents could introduce fiscal vulnerabilities and macroeconomic instability. The GCC governments recognise these vulnerabilities and have launched major diversification programmes, such as Saudi Vision 2030, UAE Vision 2021, and Oman Vision 2040. These programmes aim to minimise dependence on hydrocarbons by supporting non-resource sectors that are competitive, innovative, and led by the private sector. Despite numerous policy pledges to diversify, the pace of change remains uneven across the region, indicating enduring rentier-state impulses supported by overflooded public employment, underpricing of subsidies, and an immature

private sector market [2]. Such conditions align with the general "resource curse" argument, which explains that resource wealth without effective state institutions can disincentivise diversification and long-term growth [3,4]. The GCC highlights that the issue concerns the size of resource rents, who succeeds in governing these resources, and how they are governed. Summarily, the issue involves the amount of natural wealth and the political coalitions that control its spending.

The outcome has made the effectiveness of governance a crucial determinant in shaping the path that resource-rich economies take: either institutionalise finite rents into durable economic benefits or promote rent-seeking behaviour, revenue mismanagement, and dependency on volatile commodity markets [5-7]. Efficiency levels depend on institutional capacity. For example, the UAE and Qatar offer regulatory modernisation, anti-corruption measures, and bureaucratic efficiency. Other countries have struggled to undertake reforms and experience serious governance hurdles [8,9]. The institutional quality theory holds that the economic effects of resource abundance depend less on the resources themselves and more on how governance systems manage these resources [6,10]. Furthermore, recent empirical analyses disclosed that the governance-resource dependence relationship is asymmetric: improvements in governance often yield stronger and more lasting reductions in natural resource dependence (NRD), while deteriorations in governance lead to increased NRD [11,12].

The effects of laws on boards tend to be immediate and short-term compared with institutional reforms, which build a more diversified revenue base and a stronger regulatory system through economic structural changes that are not easily reversed by yearly swings in governance. Although this dynamic has attracted growing attention, empirical research on the effects of symmetric and asymmetric governance in the GCC remains limited. Additionally, few studies have explored macroeconomic and demographic factors, such as population growth, fixed exchange rate regimes, inflationary pressures, and environmental governance challenges alongside institutional quality and the effects on NRD [1,5,13,14]. In this context, the current study addressed an important literature gap by using symmetric and asymmetric panel modelling techniques for analysing how governance reforms (together with macroeconomic determinants) influence NRD (in GCC countries). This method yields a more complex and policy-relevant answer to the question of how mediating economic diversification and resilience during a time when governance quality impacts economic performance as a region undergoes structural economic reform and global energy transition.

LITERATURE REVIEW

The GCC countries significantly rely on hydrocarbon exports, with oil and gas revenues remaining at the top composition in GDP, fiscal revenue, and export earnings [1,2]. The structural dependence in financing mega-infrastructure projects, social welfare policies, and human capital development of these economies, has resulted in high exposure to the vagaries of global commodity prices and external shocks. Nonetheless, the 2014-2016 oil price downturn and the COVID-19 pandemic have demonstrated that heavy dependence on resource rents can leave governments fiscally vulnerable and macroeconomically unstable [1]. Consequently, diversification strategies such as Saudi Vision 2030, UAE Vision 2021, and Oman Vision 2040 have attempted to minimise hydrocarbons dependence by increasing investment in non-resource sectors, building innovation capacity, and encouraging private-sector involvement. Nevertheless, the achievement of these diversification goals is mixed.

This situation has slowed the momentum of reform rooted in persistent rentier-state structures, inflated public employment, and significant subsidy systems that have driven reliance upon oil and gas revenues [2]. This condition is consistent with the broader 'resource curse' hypothesis, which posits that resource content (when not accompanied by effective governance) can compromise diversification and future growth prospects [3,4]. Although resource dependence may constrain the GCC, regional challenges stem from its dependence on these natural resources along with its institutional and governance contexts, which are mostly plagued by mismanagement or perverse incentives related to the monopoly over large revenues.

Governance quality is one determinant of whether a country can harness its natural resource wealth to sustain growth or whether the country will enter a cycle in which resource dependence leads to economic fragility. Institutions with high standards for transparency and accountability, transparent regulation, and respect for the rule of law are equipped to channel the revenues of natural resources into productive investments, create an environment for the private sector, and reduce vulnerability to external shocks [5,7]. Meanwhile, governance failure tends to encourage rent-seeking, fiscal leakages, public resources misallocation, and strengthen dependency on unstable hydrocarbon markets [6,15]. Member states experienced varying progress in improving components of the regulatory quality, anti-corruption, and bureaucratic effectiveness indices, with the UAE and Qatar making significant strides as a direct result of their institutional reforms [8,9]. Nonetheless, other states have not experienced the benefits of incremental reform due to the slow pace and possible inertia by bureaucrats. Although institutional quality theory highlights that resource abundance need not produce negative outcomes, those outcomes depend on when resource rents are poorly governed and allocated [6,10]. Additionally, GCC-specific studies outlined that the relationship between governance and resource dependence is not linear. Evidence indicates asymmetries whereby governance improvements decrease reliance more than governance deterioration increases reliance [11,12]. During the improvement governance phase, the reversibility of institutional and economic changes can be reduced, including through legal infrastructure reforms and revenue base widening reforms (policy and intervention reforms) [16,17], which explains why the effect of governance reform can be persistent.

Alongside institutional capacity, macroeconomic and demographic factors also shape the boundaries and sustainability of resource dependence in the GCC. A further compounding factor is the rapid population growth driven by high levels of expatriate labour, which places pressure on the fiscal systems needed to support employment, public services, and hydrocarbon-revenue-funded subsidies [1,4]. Exchange rate regimes that are fixed or heavily managed can minimise monetary stability yet amplify the effects of Dutch disease with a highly appreciated currency, which deters other exports and the perishable commodity competitiveness of the manufacturing sector [5,18]. For example, inflationary pressures (frequently imported through currency pegging and global commodity cycles) can entrench the dependence as governments will resort to resource rents to finance price controls and consumer subsidies [14,19]. Furthermore, the environmental governance dimension: unregulated intensive hydrocarbon extraction with little environmental risk can drive ecologically detrimental processes more quickly, jeopardising sustainable development goals [13]. These macroeconomic and environmental pressures, combined with

governance quality, point to the need for complementing institutional reforms with demographic, exchange rate, and environmental policies to avoid the dependence trap.

The existing literature on the GCC has highlighted the importance of a more sophisticated analytical framework that combines symmetric and asymmetric methods to address governance-related resource dependency. Symmetric models assume that the effects of governance improvements and deteriorations are equal in magnitude, albeit opposite in direction. Recent studies demonstrated that this assumption is oversimplified. Ben-Salha and Zmami [11] discovered that gains from better governance are generally larger in magnitude and more permanent than the losses from intensified dependence induced by governance deterioration. Gaies et al. [16] outlined that a short-term decline in the government quality may occur in jurisdictions where governance systems are robust. Nonetheless, historical reforms have at least established a level of institutional and economic advancement that is too complex in the near-term to unwind. This one-handed approach is salient for the GCC in that the importance of resource rents as a critical factor shaping long-term strategic considerations, and that institutional reforms can have a durable effect upon economic structures. Accordingly, empirical approaches that differentiate positive and negative governance changes can provide a more precise and policy – relevant understanding of the question: what are the linkages between NRD and governance issues.

Although the literature on governance and resource dependence is growing, research gaps remain in studies that focus more on the unique economic and institutional setting of the GCC. Existing literature on the resource curse has explored the topic more broadly in the developing-country context and in the MENA region, overlooking the region-specific context of governance, macroeconomic variables, and demographic dynamics. The GCC relies on fixed exchange rate regimes, an overdependence on expat labour, and has typical rentier-state characteristics [1,10], which might not be fully reflected in general resource-curse models. Moreover, limited studies have adopted environmental governance to explain non-renewable resources depletion, despite renewed consolidation towards sustainability in GCC diversification strategies [6,13]. The present study addressed these research gaps by employing symmetric and asymmetric panel models to investigate the impact of governance on NRD in GCC countries. As for robustness, the current study included factors such as population growth, exchange rate volatility, inflation, and economic growth. This method yields a more subtle reflection on whether governance reforms have varying implications depending on the direction of the improvements and how these interact with general macroeconomic conditions to determine how institutional quality influences the potential durability of resource dependence. From a GCC-centric perspective, the findings provide policymakers with valuable insights for balancing resource management with their goals of diversification in a post-transition global energy landscape and volatility in hydrocarbon markets.
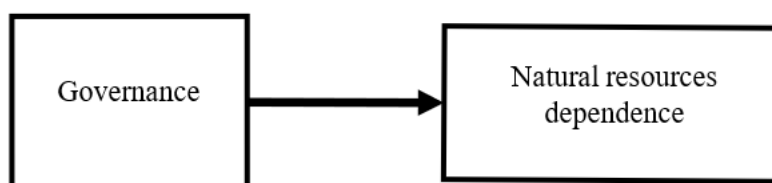

Figure 1: Conceptual Framework.

METHODOLOGY

In GCC countries, the dependent variable is NRD, and the explanatory variables include governance quality and several macroeconomic drivers: population growth, economic growth, exchange rate volatility, and inflation. Recognised resource–governance paradigms [2,5] were used by situating a dynamical model of short-term variations in long-run equilibrium. This approach is theoretically grounded in classical institutional quality theory, which outlines that the development implications of natural resource wealth hinge significantly on governance strength [6,7]. Good governance could reduce NRD by fostering transparency, curbing rent-seeking, and encouraging economic diversification. In contrast, weak governance could increase reliance on resources.

The dependent variable, NRD, is calculated as the share of total natural resource rents in GDP using the method applied for GCC economies by Abdelkawy [1]. Governance quality is based on the WGI, comprising six areas: government effectiveness, regulatory quality, control of corruption, rule of law, political stability, and voice and accountability [8]. Population growth is calculated as the average annual multiplier increases in the entire population, as larger populations can lead to a greater reliance on resource rents [17]. Economic growth is measured as the annual percent change in real GDP, whereby economic performance could be negatively linked with NRD, with a higher incidence of better performing non-resource sectors [4]. Meanwhile, exchange rate volatility is represented by the annual percentage change in the nominal exchange rate. In the GCC, fixed-peg currency systems may increase resource dependence through Dutch disease effects [5]. Inflation is evaluated based on the annual percentage change in the Consumer Price Index, considering that unstable prices cause governments to depend more on resource rents [13]. As for pre-estimation, the study assessed for stationarity in data and presence of long-term relationships using descriptive statistics, correlation analysis, panel unit root tests, and Pedroni cointegration tests.

The estimation strategy involved two steps, observing the symmetric effects using the Pooled Mean Group (PMG) and Dynamic Common Correlated Effects (DCCE) estimators. These methods addressed cross-sectional dependence, allowed for varying short-run dynamics across countries, and assumed a common long-run relationship [1]. Second, asymmetric effects were analysed using the Nonlinear Autoregressive Distributed Lag model with the PMG estimator (NARDL-PMG). In this approach, governance was separated into positive changes (GOV^+) and negative changes (GOV^-) to identify variances in their long-run effects [11]. This approach allows for testing whether improvements in governance reduce NRD more significantly than governance deterioration increases it, in line with earlier studies [20]. Hausman tests were applied to choose between PMG, Mean Group, and Dynamic Fixed Effects estimators. Combining symmetric and asymmetric models enables capturing the governance-NRD relationship in GCC economies, considering shared structural features and country-specific short-run adjustments.

FINDINGS

Descriptive Statistics and Correlation Analysis

Table 1 presents the descriptive statistics for the variables in question. The NRD is 30.816, with a wide dispersion (9.648 to 59.069). This finding suggests an important time and place variation within the included countries over the years. Governance (GOV) has a mean of

0.171, indicating that scores are mostly low with a range from negative to modestly positive. The population grows on average by 4.157 percent per period but varies greatly, including decreases in certain periods. EXCH: An average of 2.019 percent for exchange rate movements, and a range which spans only from 1.isperspan > (INF: Averages at 2.341 percent, with ranges as high as 15.05 percent). The GDPG has a mean of 4.279 percent and exhibits the greatest range of all but one variable (from -7.076 to 30.012 percent), covering both periods of decline in economic activity and strong growth phases.

Table 1: Summary of Descriptive Statistics for the Second Objective.

Variable	Obs.	Mean	Std. Dev.	Min	Max
NRD	168	30.816	11.615	9.648	59.069
GOV	168	0.171	0.312	-0.488	0.722
POPG	168	4.157	3.600	-10.927	21.70
EXCH	168	2.019	1.673	0.269	3.750
INF	168	2.341	2.960	-4.863	15.050
GDPG	168	4.279	5.136	-7.076	30.012

Table 2 presents the correlation matrix for the variables in the second objective, with most relationships being low to moderate. Governance (GOV) has weak positive links with all other variables, the strongest being with GDP growth (0.1554) and population growth (0.1410). This finding portrays only a small pattern where better governance is linked with higher economic and population growth. The POPG is moderately associated with inflation (0.4334) and GDP growth (0.3912). This result might indicate a potential relationship between the size of the population, price changes, and economic performance. The exchange rate changes (EXCH) present significantly weak links with the other variables, with an absolute value under 0.2 for the highest linked variable, GDP growth (0.1688). Inflation (INF) has a low and positive link with GDP growth (0.3684), hence faster economic growth may come together with inflationary times.

Table 2: Correlation Matrix for the Second Objective.

Correlation	GOV	POPG	EXCH	INF	GDPG
GOV	1.0000				
POPG	0.1410	1.0000			
EXCH	0.0765	0.1179	1.0000		
INF	0.0515	0. 0.4334	0.0432	1.0000	
GDPG	0.1554	0. 0.3912	0.1688	0.3684	1.0000

Note: all variables are not in logarithmic form.

Panel Unit Roots Tests

Table 3 summarises the panel unit root test results for the variables utilised for the second aim using the ADF-Fisher and PP-Fisher tests in fixed effects under first difference (FD) and level forms (DO), respectively. The results suggest that the NRD, POPG, and EXCH series are

non-stationary at levels but stationary after first differencing (confirming their integration order is one or I(1). On the other hand, IMP and GDIR are both differenced to become stationary under each test condition, indicating that they are I(1). Integrations of order one while INF and GDPG remain stationary under both tests, implying integration of order zero, I(0). For most of the first-difference results, the test rejects the null hypothesis of non-stationarity at 1% level of significance. The results indicate a combination of integration orders in the variables, which suggests I(0) and I(1) processes. The combination of such variables is consistent with the relevance of estimation methods, such as ARDL-based approaches, which have been specifically designed to handle mixed-order integrated variables in contrast to methods that require homogeneous orders across all variables.

Table 3: Results of Panel Unit Root Tests for the Second Objective.

Variable	Statistics	Level I(0)		1st difference I(1)		Integration order, I(d)
		Constant	Constant & Trend	Constant	Constant & Trend	
NRD	ADF-Fisher	-2.353083	-2.036554	-3.655428***	-3.765879 ***	I(1)
	PP - Fisher	-1.561822	-1.190844	-3.503220**	-3.695771**	I(1)
GOV	ADF-Fisher	-1.200469	-1.099124	-3.714175 ***	-3.678462**	I(1)
	PP - Fisher	-1.430997	-1.558664	-3.714175 ***	-3.678462**	I(1)
POPG	ADF-Fisher	-2.154421	-2.414563	-4.872646***	-4.771261***	I(1)
	PP - Fisher	-2.154421	-2.494970	-4.871259 ***	-4.755292***	I(1)
EXCH	ADF-Fisher	1.81426	0.66240	19.7430 ***	16.5591***	I(1)
	PP - Fisher	1.58827	0.49065	20.6213 ***	19.3927***	I(1)
INF	ADF-Fisher	-3.309327***	-3.186803	-5.983994***	-5.988653***	I(0)
	PP - Fisher	-3.309327***	-3.186803	-6.191227***	-6.059373***	I(0)
GDPG	ADF-Fisher	-3.698790***	-4.024086***	-6.957290***	-6.801423***	I(0)
	PP - Fisher	-3.698790***	-4.024086***	-7.088830 ***	-6.922170***	I(0)

Notes: ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively. Automatic lag length selection based on the Schwarz Information Criterion (SIC). Values reported are t-statistic, and the null hypothesis is nonstationary.

Optimal Lag Length Selection

The lag lengths were chosen by using the Akaike Information Criterion (AIC), Hannan-Quinn Information Criterion (HQIC), and Schwarz Bayesian Information Criterion (SBIC) for model selection (see Table 4). The ARDL (1, 1, 1, 1, 1) model presents the lowest results in all

three criteria compared to other estimated ARDL specifications and is recognised as the best specification in Table 4. This model is marked with an asterisk to indicate its optimality. Further lag structures, including ARDL (1, 2, 2, 2, 2) and ARDL (2, 1, 1, 1, 1) represent larger information criteria compared to the specific lag pattern that indicates optimal harmony between model fitting and parsimony.

Table 4: Lag Length Selection Results for the Second Objective.

Model	Specification	AIC	HQIC	SBIC
1*	ARDL(1, 1, 1, 1, 1)*	11.41122*	11.83414*	12.45427*
2	ARDL(1, 2, 2, 2, 2)	11.61364	12.39906	13.55073
3	ARDL(2, 1, 1, 1, 1)	11.67136	12.81928	14.50250
4	ARDL(2, 2, 2, 2, 2)	11.98270	13.49313	15.70788

Panel Cointegration Tests

Table 5 demonstrates the Pedroni panel cointegration test results for the first objective, which examines the long-run relationship between the variables. The panel v-statistic and panel rho-statistics are not significant. The panel PP-statistic and panel ADF-statistic are statistically significant at the 1% level, with their group versions also significant at either the 1% or 5% levels. These results provide evidence against the null hypothesis of no cointegration and expire a long-run equilibrium relationship in the model between its variables. This finding denotes that the variables are co-integrated over time, despite any short-term fluctuations.

Table 5: Results of Pedroni Panel Cointegration Test for the First Objective.

Pedroni Residual Cointegration Test	Panel Statistics	Group Statistics
Panel v-Statistic	-1.279984	--------
Panel rho-Statistic	1.025162	1.510141
Panel PP-Statistic	-1.116593***	-1.059265**
Panel ADF-Statistic	-3.848983***	-4.345699***

Note: ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively. Intercept and trend were used in the Pedroni test. The null hypothesis is no cointegration automatic lag length selection based on SIC with a max lag of 4.

Estimation and Interpretation of Results for Objective Two

Estimation Results of the PMG Model for Symmetric Effect of Governance on NRD

The NRD results are presented in Table 6. Governance (GOV) has a strong negative coefficient of -0.214 in the long term, indicating that better governance is associated with lower NRD. Population growth (POPG), exchange rate changes (EXCH), and inflation (INF) have positive and significant effects, indicating that these factors contribute to higher NRD. GDP growth (GDPG) has a significant negative effect, lowering dependence. The error correction term (ECM) is -0.462 and significant, depicting a moderate speed of moving back to the long-run balance. In the short run, governance is negative, albeit not significant,

while population growth is positive and only weakly significant. Meanwhile, the other short-run coefficients are small and not statistically significant. The constant term is positive and highly significant. The model used data from six GCC countries with 168 observations.

Table 6: The PMG Estimation Results (Symmetric Effects on NRD).

	Long-run Coefficient	Std. Error
GOV	–0.214***	0.006
POPG	0.176***	0.049
EXCH	0.098*	0.040
GDPG	–0.133***	0.038
INF	0.065**	0.027
ECM	–0.462***	0.076
	Short-run coefficients	**Std. Error**
Δ GOV	–0.045	0.028
Δ POPG	0.031*	0.018
Δ EXCH	0.013	0.022
Δ GDPG	–0.024	0.015
	Short-run coefficients	**Std. Error**
Δ INF	0.012	0.017
Constant	0.234***	0.067
No. of countries	6	
No. of observations	168	

Note: ***, **, and * symbolise significance at the 1%, 5%, and 10% levels, respectively.

Estimation Results of the DCCE Model for Symmetric Effect of Governance on NRD

Table 7 summarises the results. Eventually, the estimate for governance (GOV) is -0.209 and statistically significant, indicating that better governance is linked with lower NRD. Population growth (POPG) has a positive and significant effect, suggesting that higher population growth is linked with greater dependence. Additionally, GDP growth (GDPG) has a significant negative effect, helping to reduce NRD. Exchange rate changes (EXCH) have a positive coefficient, albeit not statistically significant. Inflation (INF) has a positive and significant effect, indicating that higher price levels are linked to greater dependence. The error correction term (ECM) is -0.352 and significant, demonstrating a moderate speed of adjustment back to the long-run balance for the six GCC countries in the sample.

Table 7: DCCE Estimation Results (Symmetric Effects on NRD).

	Long-run Coefficient	Std. Error
GOV	–0.209***	0.059
POPG	0.182***	0.044
EXCH	0.103	0.034
GDPG	–0.118***	0.032

INF	0.076**	0.024
ECM	–0.352***	0.061
No. of countries	6	
No. of observations	168	

Note: ***, **, and * symbolize significance at the 1%, 5%, and 10% levels, respectively.

Estimation Results of the NARDL PMG Model for Asymmetric Effect of Governance on NRD

The NRD results are presented in Table 8. In the long run, positive changes in governance (GOV⁺) have a significant negative effect of -0.295, meaning that improvements in governance strongly reduce NRD. Negative changes in governance (GOV⁻) are positive, albeit not statistically significant, indicating that weaker governance does not produce an immediate or equal effect in increasing dependence. Population growth (POPG), exchange rate changes (EXCH), and inflation (INF) all produce positive and significant effects, while GDP growth (GDPG) has a significant negative effect. The error correction term (ECT) is negative and highly significant, verifying that the model moves towards the long-run balance. In the short run, none of the governance coefficients is significant. The Wald tests indicate both long-run and short-run asymmetries, and the high R-squared values denote that the model explains the data well.

Table 8: NARDL-PMG Estimation Results (Asymmetric Effects on NRD).

	Long-run Coefficient	Std. Error
GOV ⁺	-0.295***	0.062
GOV ⁻	0.075	0.087
POPG	0.112***	0.037
EXCH	0.108*	0.041
GDPG	-0.142***	0.029
INF	0.067**	0.029
ECT	-0.462***	0.081
	Short-run coefficients	Std. Error
Δ GOV ⁺	-0.048	0.029
Δ GOV ⁻	0.012	0.020
Δ POPG	0.032	0.019
Δ EXCH	0.015	0.023
Δ GDPG	-0.028	0.012
Δ INF	0.013	0.016
Constant	0.018**	0.010
Wald Test (Long-run)	22.35 (p = 0.012)	
Wald Test (Short-run)	9.45 (p = 0.034)	
R-squared	0.876	
Adjusted R-squared	0.845	

Note: ***, **, and * symbolise significance at the 1%, 5%, and 10% levels, respectively.

DISCUSSION

NRD in the GCC region. PMG and DCCE estimates under the symmetric framework present a statistically significant negative long-run effect of governance on NRD. Ultimately, better institutional quality helps reduce reliance on natural resource rents. This result aligns with institutionalist theories of the resource curse, which explains that good governance encourages transparency, limits rent-seeking, and helps diversify the economy [6,7,21]. The PMG model demonstrates a slightly stronger governance effect than the DCCE model. Nonetheless, both models yield similar results, suggesting that the findings are robust. These results also align with earlier studies that discovered strong governance reduces the negative effects of resource dependence by improving fiscal discipline, better use of resources, and institutional efficiency [2,16,22].

The analysis of the control variables further supports the structural factors that shape NRD in the GCC. Population growth (POPG) has a positive and significant connection with NRD in all models, signifying that larger populations create fiscal pressures by increasing the need for subsidies, infrastructure, and public services (often funded through resource rents) [23]. This condition is especially important for GCC economies, who have built large welfare programs on resource-based revenue. Exchange rate changes (EXCH) have a positive effect in the PMG model, supporting the Dutch disease idea that currency gains from resource exports can minimise the competitiveness of non-resource sectors [5]. Nonetheless, the lack of significance in the DCCE model suggests that the effect of exchange rate movements on resource dependence varies across nations. Inflation (INF) is also positive and significant, implying that governments may rely more on resource rents during periods of price instability to help stabilise the economy [13]. Contrarily, GDP growth (GDPG) depicts the expected strong and significant negative link with NRD. Higher growth in non-resource sectors reduces dependence on resource revenues. This finding is consistent with previous literature, namely Sachs and Warner [4] and Aljarallah [17], who revealed the negative effect of economic type diversification on resource dependence. The error correction terms in symmetric models are negative and highly significant, indicating that while the adjustment towards long-run equilibrium is gradual, reducing resource dependence is a gradual process that demands sustained policy commitment.

The asymmetric analysis uses the Nonlinear Autoregressive Distributed Lag (NARDL-PMG) model. The present study provides important new insights into the governance–NRD relationship. In the long run, positive changes in governance (GOV^+) have a strong and statistically significant negative effect on NRD. The size of this effect is greater than in the symmetric models, indicating that governance improvements such as better regulatory quality, stricter rule of law, and higher government effectiveness lead to large reductions in resource dependence. This finding verified that governance reforms improve the management of resource rents and create conditions for sectoral diversification and sustainable economic development [11,20]. Conversely, negative changes in governance (GOV^-) are positive, albeit not statistically significant. Hence, weaker governance does not quickly or equally increase NRD. This difference may be due to institutional inertia or strong fiscal systems that reduce the short-term effects of weaker governance [16]. The Wald tests explain that both long-run and short-run asymmetries are statistically significant, verifying the need to study governance effects separately. Improvements and declines should be examined individually. The asymmetric model has a high explanatory power ($R^2 = 0.876$), accounting for the complex link between governance and resource dependence in the GCC.

These results enhance the theoretical and policy understanding of resource dependence. The symmetric estimations indicate that governance quality is a critical structural factor that shapes NRD, which aligns with the broader institutionalist literature on the resource curse [6,21]. The asymmetric findings demonstrate that the economic benefits from governance improvements are larger and more consistent than the losses from weaker governance. This condition suggests that even when governance problems persist, targeted reforms in important institutional areas can bring large reductions in NRD. In the GCC, resource revenues remain central to fiscal policy, governance reform should be prioritised alongside macroeconomic stabilisation. In practice, this reformation could involve strengthening public financial management, improving transparency in reporting resource revenues, and building the capacity of state institutions to plan and execute diversification policies. The positive and significant effects of population growth, exchange rate volatility, and inflation on NRD indicate that governance reforms should be supported by demographic management, stable exchange rate policies, and measures to control inflation. The moderate speed of adjustment in the ECM terms suggests that these reforms will not have an immediate impact. This situation reinforces the need for a long-term commitment to stronger institutions and greater macroeconomic stability.

CONCLUSION

The NRD in GCC countries is influenced by vital macroeconomic factors, such as population growth, economic growth, exchange rate changes, and inflation. The evidence suggests that better governance matters significantly to the long-run diminution of NRD. This condition is underpinned by the contested theory of institutional quality as being necessary to turn resource wealth into real economic benefits, securely, transparently, and accountably. The asymmetric analysis explains that improvements in governance have a significantly larger and more persistent effect in reducing NRD than deteriorations because weaker governance raises this value. Thus, institutional reforms have lasting benefits. The results also suggest that population growth, exchange rate volatility, and inflation increase resource dependence. Ultimately, higher economic growth rates help to reduce resource dependence.

These results signify that resource dependence in the GCC is shaped by governance quality and wider macroeconomic factors. Policy-wise, the findings suggest that governance reforms of a more permanent nature should be the main focus of strategies to reduce resource dependence in the GCC. Measures taken to reinforce public financial management, enhance regulatory effectiveness and transparency regarding resource revenue allocation would accelerate diversification and build resilience in the process. High NRD is a consequence of macroeconomic pressures and needs to be addressed concurrently with governance reforms, population management, exchange rate stability, and inflation control. The asymmetric findings also present that even minor improvements in governance can yield substantial benefits. This situation makes reform investment worthwhile, even in politically complex situations. Future research could build on this study by adding environmental governance indicators and examining how global energy transition policies affect the link between governance and NRD. Such research could provide stronger support for the plans in the GCC to move towards more diversified, sustainable, and resilient economies.

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