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Assessing The Role of Institutional Quality Components on GDP Per Capita by ARDL Approach: Evidence from Oman

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Abstract
Economic sustainability is a vital concern for many policymakers worldwide. However, the current status of institutional quality in Oman serves as a wake-up call to assess the nexus between Institutional quality components and GDP per capita in Oman critically. Institutional quality has a significant impact on economic growth and also affects investor confidence, governance effectiveness, and policy efficacy. The Autoregressive Distributed Lag (ARDL) model investigates the short-term and long-term associations between GDP per capita and the quality of institutions, thereby addressing concerns regarding the disparate degrees of variable integration. The existence of a long-term relationship between economic development and institutional quality is substantiated by the Bounds Test for Cointegration. The empirical results suggest that the rule of law and political stability have a long-run relationship with GDP per capita, while control of corruption shows a negative relationship. Whereas government effectiveness, regulatory quality, voice, and accountability don't show a statistically significant influence on GDP per capita. These findings underscore the importance of robust governance and institutional reforms for the sustainable economic growth of Oman. The report proffers policy recommendations that emphasize the enhancement of public sector efficiency, the fortification of legal frameworks, and the augmentation of transparency, all of which are imperative for ensuring long-term economic stability and growth.
Keywords: *Institutional Quality Components, GDP per Capita, ARDL Model, Cointegration Analysis, Economic Growth, Oman. Paper type: Empirical Article GEL: F41, H11, B23, B41, B4*

1. INTRODUCTION

Institutional quality is a key factor in determining a nation's economic performance since it influences factors including investment inflows, governance efficacy, and long-term economic stability. Regulatory quality (RQ), government effectiveness (GE), political stability and absence of violence (PSV), rule of law (RL), corruption control (CC), and voice and accountability (VA) are some of the institutional frameworks that promote long-term economic success. Effective institutions are crucial for fostering economic growth, as evidenced by the numerous studies that have demonstrated a substantial correlation between GDP per capita and institutional quality (Acemoglu & Robinson, 2019; Kaufmann, Kraay, & Mastruzzi, 2020).

According to theoretical and empirical research, strong institutions boost investor confidence, lower uncertainty, and encourage resource allocation that is efficient, all of which lead to improved economic performance (Rodrik, 2018). Countries with robust institutional frameworks tend to have better levels of economic development because they can attract foreign direct investment (FDI), promote entrepreneurship, and preserve policy consistency (North, 1991). On the other hand, economic inefficiency, capital flight, and slower growth are frequently the outcomes of weak institutions marked by corruption, political instability, and poor governance (Williams & Siddique, 2008).

Institutional quality has become a crucial factor in determining economic performance in the Middle East and North Africa (MENA) area, especially in the Gulf Cooperation Council (GCC) nations. According to research, economic growth in GCC countries has been favourably connected with changes in governance metrics (Al-Mulali et al., 2021). Oman, as a GCC member, has made significant strides in enhancing its institutional quality as part of its Vision 2040 initiative, aiming for economic diversification and sustainable development (Oman Vision 2040, 2021). Nevertheless, evaluations show that in spite of these initiatives, Oman's institutional quality is still behind that of advanced countries, requiring additional reforms (International Monetary Fund, 2024).

The importance of institutional quality in determining macroeconomic stability is emphasised in economic literature. For example, government efficacy guarantees the execution of programs that boost economic growth and productivity (Siddiqui & Ahmed, 2020). By creating a stable and open legal framework, regulatory quality affects company dynamics and draws in investment (World Bank, 2022). Furthermore, preserving economic confidence, guaranteeing contract enforcement, and reducing transaction costs all depend on the rule of law and the fight against corruption (Djankov, 2021). Political stability is also important since a lack of stability can discourage investment and cause economic disruptions (Haggard & Tiede, 2022).

This study intends to evaluate the link between institutional quality components and GDP per capita in Oman, given the significance of institutional quality in determining economic growth. The Autoregressive Distributed Lag (ARDL) method is used in the study to examine both the short- and long-term relationships between economic performance and institutional markers. For policymakers looking to boost Oman's economic growth through focused institutional reforms, the study offers insightful information by determining which institutional components substantially impact GDP per capita. By concentrating on Oman, a growing economy in the GCC, and using sophisticated econometric approaches to assess the impact of institutional quality on economic performance. The results of this study should have useful ramifications for decision-makers, foreign investors, and academics who are interested in the economic growth of economies that rely on natural resources.

2. LITERATURE REVIEW

One of the most important areas of economics research is the connection between economic progress and the quality of institutions. Economic results, especially GDP per capita, have been proven to be significantly impacted by the quality of institutions, which range from political stability and regulatory laws to the efficacy of governance. Policymakers and international organisations must comprehend how institutional factors impact growth as nations strive to improve their economic performance. Recent research on the relationship between GDP per capita and six essential institutional elements: government efficacy, political stability, rule of law, regulatory quality, corruption control, and voice and accountability, is reviewed in this overview of the literature.

2.1 Government Effectiveness and GDP per Capita

It is often acknowledged that one of the main factors influencing economic growth is the efficacy of the government. It speaks to the effectiveness of the civil service, the calibre of public services, and the legitimacy of the government's adherence to its policies. Effective governments are better equipped to maintain infrastructure, offer public amenities, and create an atmosphere that is favorable to economic development, all of which contribute to increased GDP per capita (Arndt & Oman, 2021). Additionally, recent research emphasises how important government performance is in drawing in foreign direct investment (FDI), which is essential for economic growth (Mankiw et al., 2020). Indicators like the level of bureaucracy, service quality, and the lack of corruption are frequently used to gauge how effective a government is. According to Pradhan & Jha (2023), nations with robust institutional frameworks can lower inefficiencies and boost economic output. Improvements in government effectiveness, especially in sub-Saharan Africa, have resulted in notable gains in GDP per capita, according to empirical studies by Gulzar et al. (2021), highlighting the significance of good governance for economic growth. This study hypothesises the following: the null hypothesis (H_0) states that there is no significant relationship between government effectiveness and GDP per capita. Conversely, the alternative hypothesis (H_1) posits that there is a significant relationship between government effectiveness and GDP per capita.

2.2 Political Stability and Economic Growth

Political stability is yet another important factor that affects economic results. The probability that a government won't be overthrown or face serious internal strife is known as political stability. Because it lessens uncertainty about upcoming laws and regulations, a stable political climate promotes investment both locally and abroad. Because stable administrations are better at long-term economic planning and avoiding disturbances that impede progress, Bertocchi & Guerzoni (2022) discovered a positive correlation between political stability and higher GDP per capita in both industrialised and developing nations. The growth potential of a nation is adversely affected by political instability, which is typified by frequent changes of government or civil disturbance. Due to a lack of investment in infrastructure,

innovation, and human capital, GDP per capita either stagnates or falls in nations with a history of conflict or authoritarian government. Singapore and South Korea, two nations that have succeeded in preserving political stability, are prime examples of the beneficial economic effects of stable administration. This study hypothesises the following: the null hypothesis (H_0) states that there is no significant relationship between political stability and GDP per capita. Conversely, the alternative hypothesis (H_1) posits that there is a significant relationship between political stability and GDP per capita.

2.3 Rule of Law and Economic Development

A healthy economy depends on the rule of law, which is characterised by the fair application of the law and the defence of property rights. Robust legal frameworks guarantee the preservation of property rights and the honouring of contracts, which encourages investment and entrepreneurship. According to Kaufmann & Kraay (2020), nations with high rule of law rankings typically have better economic performance since people and businesses feel safe doing business there. Furthermore, the protection of intellectual property, which promotes innovation and is essential to sustained economic progress, is guaranteed by the rule of law. According to recent research, nations with poor legal systems frequently experience slow economic growth because investors are hesitant to make investments in places with unstable legal systems (Charron et al., 2022). According to Alfaro et al. (2020), enhancing the rule of law in developing nations is one of the best strategies to promote long-term, sustainable growth and raise GDP per capita. This study hypothesises the following: the null hypothesis (H_0) states that there is no significant relationship between rule of law and GDP per capita. Conversely, the alternative hypothesis (H_1) posits that there is a significant relationship between rule of law and GDP per capita.

2.4 Regulatory Quality and Business Environment

The ability of governments to create and carry out laws and policies that support the growth of the private sector is referred to as regulatory quality. Good regulations promote entrepreneurship, streamline the business environment, and cut down on red tape. According to Zhang et al. (2021), economies with strong regulatory frameworks typically have greater GDP per capita, particularly those that support trade, safeguard consumers, and promote competition. Current research emphasises how crucial high-quality regulations are to drawing in both domestic and foreign investment. Nations with better regulatory frameworks have witnessed notable gains in GDP per capita as a result of increased international commerce, innovation, and economic activity (Bartik et al., 2023). On the other hand, ineffective and onerous rules might hinder economic growth by raising entry barriers and corporate expenses (Muggah et al., 2022). This study hypothesises the following: the null hypothesis (H_0) states that there is no significant relationship between regulatory quality and GDP per capita. Conversely, the alternative hypothesis (H_1) posits that there is a significant relationship between regulatory quality and GDP per capita.

2.5 Control of Corruption and Economic Outcomes

Most people agree that corruption is a major impediment to economic expansion. Corruption erodes investor trust, raises transaction costs, and distorts market functions. Nations with lower levels of corruption saw higher GDP growth per capita because of better resource allocation, more investor trust, and increased public sector efficiency (Fisman & Svensson, 2021). The idea that decreasing corruption might spur economic growth by fostering a more equitable business climate is supported by several studies, such as those conducted by Faccio et al. (2023). Controlling corruption promotes openness, strengthens legal safeguards, and draws in both domestic and foreign capital. However, as demonstrated by the economic hardships in many African and Latin American nations, high levels of corruption are typically linked to low GDP per capita (Asongu et al., 2020). This study hypothesises the following: the null hypothesis (H_0) states that there is no significant relationship between control of corruption and GDP per capita. Conversely, the alternative hypothesis (H_1) posits that there is a significant relationship between control of corruption and GDP per capita.

2.6 Voice and Accountability

The ability of citizens to hold their government responsible and engage in the political process is measured by voice and accountability. Higher levels of economic development are favourably correlated with this

institutional quality. Governments are more likely to enact inclusive and growth-oriented policies when individuals are free to voice their concerns and have an impact on policy (Bovens et al., 2021). Countries with more voice and accountability also tend to have higher GDPs per capita because they are more likely to enact policies that promote social welfare, inclusive growth, and the decrease of inequality (Beck et al., 2021). A vibrant civil society and active political participation are also associated with better governance outcomes, and both are necessary for long-term economic prosperity. This study hypothesises the following: the null hypothesis (H_0) states that there is no significant relationship between voice and accountability and GDP per capita. Conversely, the alternative hypothesis (H_1) posits that there is a significant relationship between voice and accountability and GDP per capita.

The significant influence that institutional quality has on GDP per capita is highlighted by this literature review. Economic outcomes are significantly influenced by a number of factors, including political stability, government efficacy, rule of law, regulatory quality, corruption control, and voice and accountability. Higher economic growth, better living standards, and more development opportunities are more likely to occur in nations with robust, open, and effective institutions. In order to improve economic growth, policymakers should concentrate on fortifying these institutional elements, particularly in developing nations where institutional flaws continue to be a significant growth hindrance.

3. METHODOLOGY

This section describes the methodology for using the Autoregressive Distributed Lag (ARDL) model to investigate the relationship between GDP per capita (GDP PC) and six institutional variables: GE, RQ, RL, CC, PSV, and VA. Because it enables the estimation of both short-term and long-term associations between variables, even when they are integrated at different levels (i.e., I(0) or I(1)), the ARDL approach is especially well-suited for this investigation. Figure 3.1 shows the structure and methodology Steps

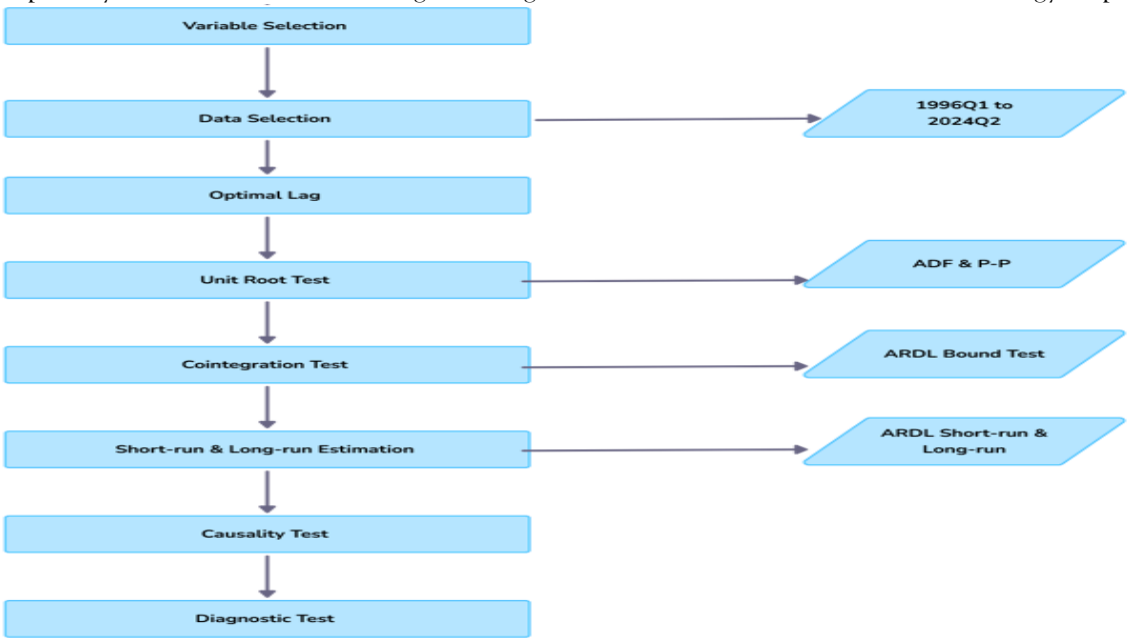

Figure 3.1: Flow of Estimation Approach

3.1 Data and Variables

The study's data will come from globally renowned databases, including the World Bank's World Governance Indicators (WGI) for the institutional variables and the World Bank's GDP per capita. The dependent variable, GDP per capita (GDP PC), which is the economic output per person after being adjusted for inflation (constant USD), will be used specifically. Regulatory Quality (RQ), which measures the government's capacity to create and carry out sensible policies that support the growth of the private sector; Government Effectiveness (GE), which gauges the calibre of public services and policies; Control of Corruption (CC), which gauges the degree to which public power is used for private benefit; Rule of Law (RL), which evaluates the fair application of the law and the defense of property rights; Voice and Accountability (VA), which assesses how well citizens can engage in politics and hold the administration responsible, and Political Stability and Absence of Violence (PSV), which calculates the probability that

the government will be toppled or destabilised. Data from 1996 to 2024 will be used semi-annually in the

Variables	Description	Logarithmic Form	Unit of Measurement	Sources
GDP PC	GDP Per Capita	LGDPPC	Current (USD $)	World Bank
GE	Government Effectiveness	LGE	Index	World Bank
RQ	Regulatory Quality	LRQ	Index	World Bank
CC	Control of Corruption	LCC	Index	World Bank
RL	Rule of Law	LRL	Index	World Bank
PSV	Political Stability & Absence of Violence	LPSV	Index	World Bank
VA	Voice & Accountability	LVA	Index	World Bank

study. Table 3.1 provides descriptive data, sources, and measurement units for every variable to ensure the study's transparency and reproducibility. The research aims to provide a thorough overview of the elements impacting Oman's economic development and, by carefully choosing these variables, offer crucial insights regarding the existence of the resource curse.

Table 3.1 : Data and Variables

3.2 Theoretical Framework and Model Specification

Economic growth theories that highlight how institutions, governance, and economic policies shape economic performance provide the foundation for the link between GDP per capita and institutional quality. The New Institutional Economics (NIE) paradigm, which maintains that robust institutions support economic development by guaranteeing efficient markets, lowering transaction costs, and fostering confidence in the private sector, serves as the main framework for this investigation. North (1990) asserts that institutions that include both formal (such as laws, rules, and government policies) and informal (such as customs, culture, and norms) constraints are essential factors that determine sustained economic growth. A fundamental viewpoint on economic growth is offered by the Solow-Swan Growth Model (Solow, 1956), which emphasises labour, capital accumulation, and technical advancement as the primary drivers of long-term economic development. But in line with Romer's (1986) and Lucas's (1988) endogenous growth theory, institutional quality has come to be seen as a critical determinant of productivity and investment choices. According to these views, stable institutions foster an atmosphere that supports innovation, the growth of human capital, and long-term economic growth.

This model, especially in institutional economics, is expanded to include variables related to governance that indirectly affect productivity and economic output (Suvorov et al., 2020; Zhang et al., 2020). The reason is that good institutions and good governance make it easier for people to do productive things by lowering transaction costs, making sure the law is clear, and building investor trust (Ishikawa, 2021). GDP is the dependent variable in this model, and it stands for the total output of an economy. GE, RQ, RL, CC, PSV, and VA are all independent variables that are seen as parts of institutional capital that affect how well physical and human capital are used and how well they work.

Thus, the functional format can be written as:

$$GDP_t = f(GE_t, RQ_t, CC_t, RL_t, PSV_t, VA_t) \quad (1)$$

Now the econometric version of equation (1) can be written in equation (2);

$$\ln GDP_t = \beta_0 + \beta_1 GE_t + \beta_2 RQ_t + \beta_3 CC_t + \beta_4 RL_t + \beta_5 PSV_t + \beta_6 VA_t + \varepsilon_t \quad (2)$$

In Equation (2), we used the logarithm of GDP instead of its base form. In the above equation β_0 used as an intercept term, and β_1 to β_6 as coefficients of explanatory variables. Figure 2, shows how conceptually explanatory variables related to GDP in model-01.

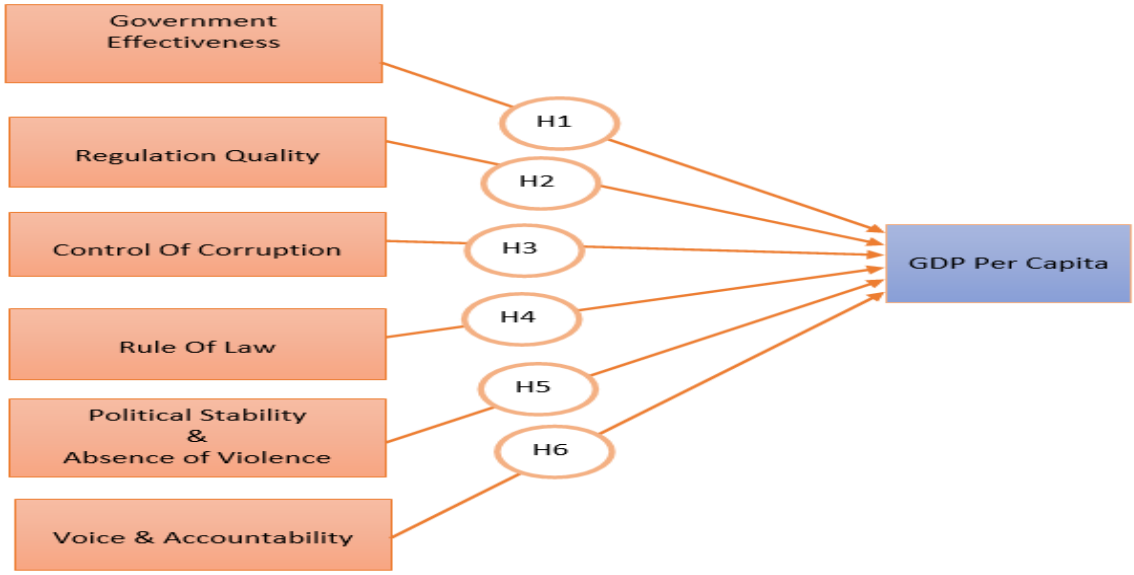

Figure 3.2: Conceptual framework of the model

3.3 Econometric Framework

The study utilized various econometric techniques to achieve its objectives. The unit root test was used to verify the stationarity of variables, while the ARDL technique investigated short- and long-term correlations. Diagnostic tests were conducted to ensure the model's accuracy and validity. The DF-GLS, P-P, and ADF tests were used to ascertain stationarity, improving intervariate connections and model estimates' precision and dependability.

3.3.1 Lag Length Selection

Determining the appropriate lag length is crucial for the ARDL model. To select the optimal lag length, the study will use both the Akaike Information Criterion (AIC) and the Schwarz Bayesian Criterion (SBC). The AIC helps balance model fit and complexity, whereas the SBC penalizes more complex models to avoid overfitting. The optimal lag length will be chosen by comparing the AIC and SBC values across different models, ensuring the most efficient and accurate representation of the data.

3.3.2 Unit root test

Unit root testing is a crucial statistical technique used in time-series analysis to identify the stationary or non-stationary nature of a time series variable. Stationarity in time series analysis suggests that the statistical characteristics of the data remain constant throughout time. Stationary time series are easier to model and analyse due to their constant mean, variance, and autocovariance (Bekhet & Othman, 2018). Non-stationary time series may show cycles, trends, or other patterns that alter over time, making them more difficult to evaluate (Rath & Akram, 2021). Herranz (2017) illustrated that non-stationarity in a time series is indicated by the existence of a unit root, which indicates a non-stationary process with a stochastic trend There are a few popular unit root tests, such as ADF test (Dickey and Fuller, 1979), P-P test (Phillips and Perron, 1988), KPSS test (Kwiatkowski et al., 1992), and N-P tests (Ng and Perron, 2001). However, in this study, we will use ADF and P-P tests as the initial two tests for stationarity (Bekhet & Othman, 2017).

3.3.3 Bound Testing Approach

The ARDL bounds testing approach, introduced by Pesaran et al. (2001), is used to determine the long-run relationship between GDP per capita and institutional variables. The F-statistic is calculated to test for cointegration, with the null hypothesis suggesting no relationship. The F-statistic is compared with critical value bounds, depending on the sample size and number of variables. If the F-statistic exceeds the

upper bound, the null hypothesis is rejected, and if it lies between the bounds, further investigation is needed (Bekhet & Othman, 2018).

3.3.4 ARDL Model Specification

ARDL method supports a balanced combination of relevant theory and practical tools to monitor short-term trends and long-term outcomes in economic systems. Equation 3 illustrates the ARDL long-run estimation for the Model:

$$\Delta \ln GDP_t = \mathcal{V}_0 + \pi_1 \ln GDP_{t-1} + \pi_2 GE_{t-1} + \pi_3 RQ_{t-1} + \pi_4 CC_{t-1} + \pi_5 RL_{t-1} + \pi_6 PSV_{t-1} + \pi_7 VA_{t-1} + \sum_{i=1}^{w} \mathcal{V}_1 \Delta \ln GDP_{t-i} + \sum_{i=1}^{w} \mathcal{V}_2 \Delta GE_{t-i} + \sum_{i=1}^{w} \mathcal{V}_3 \Delta RQ_{t-i} + \sum_{i=1}^{w} \mathcal{V}_4 \Delta CC_{t-i} + \sum_{i=1}^{w} \mathcal{V}_5 \Delta RL_{t-i} + \sum_{i=1}^{w} \mathcal{V}_6 \Delta PSV_{t-i} + \sum_{i=1}^{w} \mathcal{V}_7 \Delta VA_{t-i} + \epsilon_t \quad (3)$$

The presence of cointegration is assessed by contrasting the null hypothesis of no cointegration against the alternative hypothesis that suggests a long-run equilibrium relationship among the variables. If the computed F-statistic exceeds the critical values of the upper and lower bounds, the null hypothesis is rejected, indicating evidence of cointegration. The hypotheses are defined as follows:

$$H_0 = \mathcal{V}_1 = \mathcal{V}_2 = \mathcal{V}_3 = \mathcal{V}_4 = \mathcal{V}_5 = \mathcal{V}_6 \quad (4)$$

$$H_1 = \mathcal{V}_1 \neq \mathcal{V}_2 \neq \mathcal{V}_3 \neq \mathcal{V}_4 \neq \mathcal{V}_5 \neq \mathcal{V}_6 \quad (5)$$

H_0 stands for null hypothesis & H_1 for alternative.

After checking that co-integration exists, we proceeded to model the relationships with the ARDL model. To represent the short-run path and quantify the shift to long-run equilibrium, we applied the model by Engle and Granger (1987) known as an error correction model (ECM). Therefore, to calculate the short-run ARDL, Equation 6 was applied with the Error Correction Term to represent speed of adjustment.

$$\Delta \ln GDP_t = \mathcal{V}_0 + \sum_{i=1}^{w} \mathcal{V}_1 \Delta \ln GDP_{t-i} + \sum_{i=1}^{w} \mathcal{V}_2 \Delta LGE_{t-i} + \sum_{i=1}^{w} \mathcal{V}_3 \Delta LRQ_{t-i} + \sum_{i=1}^{w} \mathcal{V}_4 \Delta CC_{t-i} + \sum_{i=1}^{w} \mathcal{V}_5 \Delta RL_{t-i} + \sum_{i=1}^{w} \mathcal{V}_6 \Delta PSV_{t-i} + \sum_{i=1}^{w} \mathcal{V}_7 \Delta VA_{t-i} + \ell ECT_{t-i} + \epsilon_t \quad (6)$$

Where the speed of adjustment is denoted by ℓ

3.3.5 Pairwise Granger Causality test

The Pairwise Granger Causality test is a widely used econometric technique employed to determine whether one time series can predict another, thereby inferring a directional causal relationship between two variables. Originating from the work of Clive Granger in 1969, this test is grounded in the principle that if a variable X "Granger-causes" variable Y, then past values of X contain information that helps predict Y beyond the information contained in past values of Y alone. In short, this method allows researchers to search for predictive links between factors, which helps with analysis, policy-making and future models in their fields.

The following equation (7) demonstrates the causal connection between Xt and Yt:

$$E(Y_{t+h} | J_t, X_t) = E(Y_{t+h} | J_t) \quad (7)$$

3.3.6 Diagnostics Check

To ensure the robustness of the results, several diagnostic tests were conducted after estimating the ARDL model. The Breusch-Godfrey test has been used to check for serial correlation in the residuals, while the White or Breusch-Pagan test assessed heteroscedasticity. The Jarque-Bera test is applied to verify the normality of the residuals. Additionally, the CUSUM and CUSUMSQ tests evaluated the stability of the model coefficients over time. These tests help ensure that the model's results are reliable and valid. The ARDL model's goodness-of-fit will be assessed using metrics like R2R^2R2 and adjusted R2R^2R2, as well as the Akaike Information Criterion and Schwarz Bayesian Criterion. The ARDL model is robust to endogeneity concerns, but instrumental variables may be used if reverse causality arises. The study focuses on the ARDL approach for consistent estimates (Pujiati et al., 2023).

In conclusion, this methodology utilizes the ARDL approach to examine the relationships between GDP per capita and key institutional variables, providing insights into both short-term and long-term dynamics. The model's robustness will be tested through various diagnostic checks, ensuring the accuracy and reliability of the findings.

4. RESULTS AND DISCUSSION

The study's summary statistics in Table 4.1 reveal minimal variability in the log of GDP per capita, suggesting a symmetric distribution. The three institutional variables, Government Effectiveness, Regulatory Quality, and Control of Corruption, show moderate fluctuations. Rule of Law has the least variability, while Voice and Accountability have the highest standard deviation.

The data distribution is asymmetrical, with negative skewness for GE and RQ, and positive skewness for LGDPPC. The largest positive skewness is VA (2.032989), indicating a long right tail with high values. The kurtosis values indicate near-normal distributions, but excessive kurtosis for VA (6.171699) highlights extreme values.

The Jarque-Bera test indicates normal distribution of variables like LGDPPC, CC, and VA. Variables like GE and RQ have higher p-values, suggesting normal distribution. The dataset has 57 observations, ensuring a sufficient sample size for statistical analysis. VA, with high dispersion, positive skewness, and extreme kurtosis, indicates more fluctuations in governance participation across observations, indicating moderate variation in most institutional variables.

Table 4.1: Summary Statistics of Variables

Statistic	LGDPPC	GE	RQ	CC	RL	POS	VA
Mean	9.875795	0.253057	0.446361	0.396199	0.464445	0.786274	-0.82182
Median	9.887954	0.289	0.468971	0.323442	0.4735	0.763909	-1.05431
Maximum	10.038	0.4763	0.696084	0.90364	0.592685	1.2154	0.8515
Minimum	9.779184	-0.15516	-0.0538	0.0524	0.286413	0.419729	-1.19188
Std. Dev.	0.059371	0.1583	0.177262	0.248437	0.068623	0.237388	0.520705
Skewness	0.867388	-0.52284	-0.68334	0.590313	0.63564	0.041092	2.032989
Kurtosis	3.376014	2.351028	2.896036	2.087614	3.283156	1.806488	6.171699
Jarque-Bera	7.488231	3.597249	4.461777	5.287582	4.002834	2.399161	63.15601
Probability	0.023716	0.165526	0.107433	0.071081	0.135144	0.18276	0
Sum	562.9203	14.42427	25.44258	22.58337	26.47336	44.81762	-46.8436
Sum Sq. Dev.	0.197383	1.403305	1.759623	3.456366	0.283712	3.155782	15.18437
Observations	57	57	57	57	57	57	57

4.1 Results of the Unit Root Test

The study analyses macroeconomic variables using unit root tests using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. The results show that most variables, including lnGDP and PSV, remain non-stationary at level (I(0)), indicating they have trends or are subject to shocks. The GE variable shows stationarity under both intercept and trend specifications in the ADF and PP tests at the 1% significance level. The RQ variable remains stationary at levels under both test specifications, indicating that these variables are subject to trends or shocks.

The data shows that GE and RQ show deterministic trends or are stationary, and stationarity improves when they transition to the first difference (I(1)). The ADF and PP tests show that lnGDPPC, RQ, CC, RL, PSV, and VA achieve stationarity through first differencing, with statistical significance reaching the 1% level. The variables RQ, CC, and RL show strong stationarity evidence following first differencing, while VA achieves stationarity post-differencing but only achieves marginal significance. Most variables display non-stationary behavior at initial levels but exhibit stationarity once first differences are applied, aligning with standard patterns in economic time series analysis. Only limited variables, including GE and RQ, display stationarity at their current level, requiring additional structural data analysis.

Table 2. Result of Unit Root Test

Note: 1. ***, **, and * are 1%, 5% and 10% of significance levels, respectively. 2. The optimal lag length is selected automatically using the Schwarz information criteria for the ADF test, and the bandwidth has been selected by using the Newey–West method for the PP test.

4.2 Correlation Heat-map

The heat-map shows the correlation between lnGDP per capita and six governance indicators: Government Effectiveness (GE), Regulatory Quality (RQ), Control of Corruption (CC), Rule of Law (RL), Political Stability and Absence of Violence (PSV), and Voice and Accountability (VA). The data indicates a moderate link between lnGDPPC and GE, suggesting improvements in government effectiveness tend to occur as income levels rise. Political stability has a minor impact on economic growth, but VA and lnGDPPC have a very low correlation. Strong governance leads to less corruption and more stability, with strong links between GE, CC, and PSV.

LEVEL I (0)	ADF Unit Root		PP Unit Root	
	Intercept	Intercept and Trend	Intercept	Intercept and Trend
lnGDP	-2.140(2)	-2.281(2)	-1.959(4)	-2.303(4)
GE	-1.535(0)	-4.377(1)***	-1.146(7)	-3.889**(3)
RQ	-3.401(0)**	-3.333(0)*	-3.404(5)**	-3.323(5)*
CC	-1.402(0)	-3.619(0)**	-1.288(3)	-3.730(2)**
RL	-3.447(0)**	-3.429(0)*	-3.596(1)***	-3.577**(1)
PSV	-1.621(0)	-2.913(0)	-1.568(2)	-2.913(0)
VA	-5.266(9)***	-20.382(10)***	-4.160(10)***	-5.537(7)***
First differ I(1)	ADF Unit Root		PP Unit Root	
	Intercept	Intercept and Trend	Intercept	Intercept and Trend
lnGDPPC	-3.316(1)**	-3.211(1)*	-7.354(3)***	-7.275(3)***
GE	-7.479(1)***	-7.405(1)***	-11.076(11)***	-10.970(10)***
RQ	-7.511(0)***	-7.423(0)***	-10.339(18)***	-10.395(19)***
CC	-7.009(1)***	-6.925(1)***	-10.150(11)***	-10.211(11)***
RL	-7.324(0)***	-7.248(0)***	-7.439(4)***	-7.347(4)***
PSV	-7.630(0)***	-7.558(0)***	-7.707(3)***	-7.634(3)***
VA	-2.354(7)	-2.700(7)	-12.233(13)***	-14.148(13)***

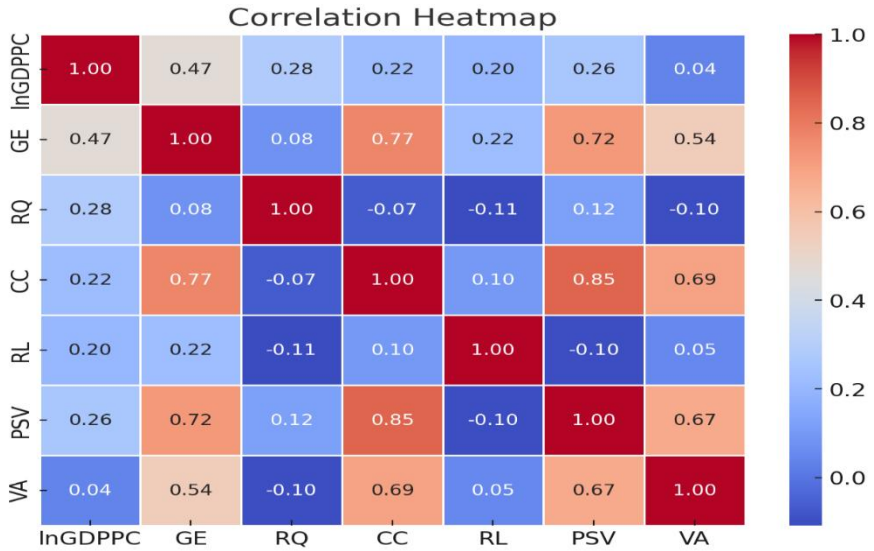

Figure 2. Correlation heatmap of the Model

4.3 ARDL bound test

The ARDL bounds test for the Model shows that the F-statistic is 3.754421 when lnGDPpc functions as the dependent variable against independent variables GE, RQ, CC, RL, PSV, and VA. The F-statistic surpasses critical values at 10% (2.94), 5% (3.28), and 2.5% (3.61) significance levels, thereby validating the long-run relationship at these thresholds. The F-statistic fails to surpass the upper bound for the 1% level (3.99), which means the relationship lacks statistical significance at this stringent level. The analysis demonstrates a significant long-run relationship at the 10%, 5%, and 2.5% levels but fails to show significance at the 1% level. Figure 2 shows a correlation heatmap of the variables for model.

Table 3: ARDL Bound test-Model

Test Statistic	Value	Significance	I(0)	I(1)
F-statistic	3.754421	10%	1.99	2.94
k	6	5%	2.27	3.28
		2.50%	2.55	3.61
		1%	2.88	3.99
		Asymptotic: n=1000		

4.4 ARDL short-run and long-run

The ARDL long-run estimation reveals a significant positive long-term link between government effectiveness and Oman's economic growth. Every 1% improvement in government effectiveness leads to a 0.28% growth in per capita GDP. This aligns with previous research, which evaluates public service quality, civil servant competence, and government policy formulation and implementation. Oman has invested in institutional capacity building through its Vision 2040 framework to diversify its economy, improve public sector efficiency, and achieve economic benefits through improved governance, digital public service transformation, efficient investment processes, and greater transparency. Oman's civil service professionalization and policy enhancements have improved private investment and entrepreneurship growth, leading to productivity improvements. Robust government effectiveness reduces oil price impacts through improved fiscal management and public investment efficiency. Strategic allocation of resources for human capital development and innovation infrastructure supports long-term economic growth, highlighting the importance of institutional quality in Oman's development path.

The ARDL long-run estimation shows that Regulatory Quality (RQ) has no significant effect on per capita GDP in Oman, indicating that enhanced regulatory frameworks alone do not drive economic growth unless combined with strong implementation and enforcement measures. This finding is consistent with previous research suggesting that regulations have a limited impact on economic growth and that regulatory quality only drives growth if it meets certain standards, which may not be achievable in all contexts. Rahman et al. (2022) found that better regulation compliance can sometimes negatively impact economic growth, indicating that positive changes may not always lead to increased growth.

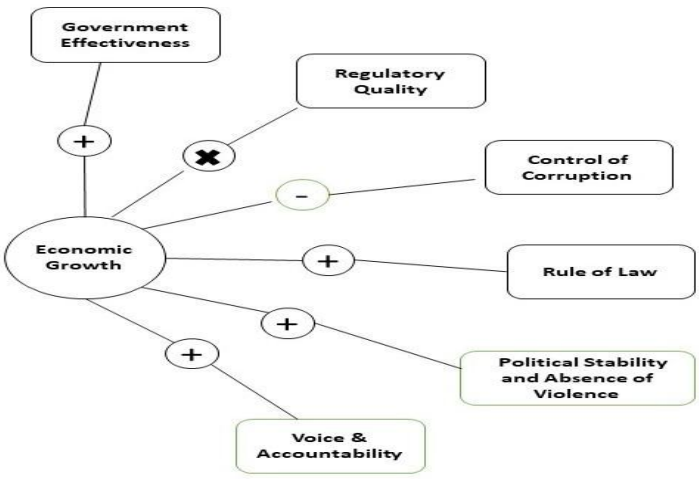

Figure 03: ARDL long-run estimation for the model

The ARDL long-run estimation shows a negative long-run relationship between Control of Corruption (CC) and per capita GDP in Oman, contradicting standard economic theory. This suggests that underlying structural and institutional factors may be at play, as increased anti-corruption enforcement efforts may lead to broader institutional turmoil or economic disturbances. Aggressive anti-corruption campaigns can disrupt existing economic networks, causing investor uncertainty and project delays. Business transactions relying on informal networks may experience slowed economic activity unless institutions strengthen and increase transparency. The relationship between corruption control and economic growth in Oman reflects similar patterns in other regions.

Corruption can enhance bureaucratic efficiency in weak institutions, leading to short-term economic improvements. In Oman, combating corruption could hinder growth by disrupting foreign investor engagement (Aidt, 2009). However, the Rule of Law (ARDL) has a positive and statistically significant influence on per capita GDP. Strong legal frameworks drive economic progress by ensuring contract enforcement, protecting property rights, and building investor trust. Al-Saadi and Khudari (2024) study shows that increased RL scores correlate with GDP growth in Oman. Stable legal institutions reduce uncertainty, uphold property rights, and enhance investor confidence, promoting long-term economic growth. Adherence to the rule of law attracts foreign investment and contributes to a robust, long-term economy (Shamugia, 2025).

The ARDL analysis shows that political stability and absence of violence significantly increase per capita GDP in Oman, reducing investor risk and increasing governmental policy predictability. This aligns with recent research highlighting the importance of a safe and stable political environment for economic growth. Al-Saadi and Khudari (2024) note that political stability in Oman enhances investor confidence, reduces policy uncertainty, and facilitates long-term investments. Udovičić and Marošević (2024) also emphasize that lower levels of political violence and instability correlate with higher GDP growth, as they minimize disruptions to economic activities. The World Bank (2023) identifies stable governance as a key factor in long-term economic growth for resource-rich countries. Shamugia (2025) reinforces this idea, demonstrating that political stability significantly reduces transaction costs and promotes the efficient use of resources, thereby accelerating growth.

The ARDL long-run analysis reveals that Voice and Accountability (VA) positively impacts per capita GDP in Oman, with a modest connection to better civic participation, freedom of expression, and government accountability. This positive correlation is supported by recent empirical research, demonstrating that VA improves government effectiveness and reduces rent-seeking behavior, promoting inclusive and sustainable economic growth. Al-Saadi and Khudari (2024) point out that Oman's improved public participation and political responsiveness have contributed to macroeconomic stability and the legitimacy of policies. Similarly, Shamugia (2025) demonstrates that democratic accountability processes enhance institutional performance and strengthen investor confidence, which is vital for sustained prosperity. The World Bank (2023) notes that countries with high ratings in voice and accountability often experience better economic performance due to more effective policies and stronger social cohesion. Udovičić and Marošević (2024) also argue that institutional trust and participatory governance significantly boost productivity and create favorable economic conditions.

Table 4: ARDL long-run estimation for the model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GE	0.280947	0.110834	2.534837	0.0182
RQ	-0.07751	0.116907	-0.66304	0.5136
CC	-1.14115	0.251636	-4.54394	0.0001
RL	0.939652	0.221236	4.247285	0.0003
PSV	1.07306	0.290341	3.695861	0.0011
VA	0.076348	0.040468	1.7325	0.0960
C	9.068638	0.213061	42.56348	0.0000

The short-run ARDL estimation shows different dynamics based on the base lag of each variable. Government Effectiveness has no immediate effect on GDP per capita, while Regulatory Quality has a minimal impact. Control of Corruption has a negative effect, while Rule of Law and Political Stability, and Absence of Violence have positive short-term effects. Long-run equilibrium exists, with short-run disequilibrium reduced by 36% each period.

Table 5: ARDL short-run estimation for the model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGDPPC(-1))	-0.17149	0.101571	-1.68841	0.1043
D(LNGDPPC(-2))	0.304412	0.107949	2.81995	0.0095
D(GE)	-0.08768	0.118779	-0.73945	0.4609
D(GE(-1))	-0.1071	0.119457	-0.89663	0.3717
D(GE(-2))	-0.23801	0.037689	-6.31985	0.0000
D(GE(-3))	-0.03876	0.05525	-0.7011	0.4845
D(RQ)	0.025919	0.021177	1.21794	0.2527
D(RQ(-1))	0.00783	0.022791	0.343348	0.7318
D(RQ(-2))	0.152251	0.032059	4.749143	0.0000
D(CC)	-0.10175	0.039109	-2.59929	0.0163
D(CC(-1))	-0.00583	0.040623	-0.14382	0.8852
D(CC(-2))	0.00013	0.037381	0.003474	0.9977
D(RL)	0.26628	0.066017	4.035587	0.0001
D(RL(-1))	-0.1409	0.043928	-3.20854	0.0088
D(PSV)	0.303917	0.052311	5.789777	0.0000
D(PSV(-1))	0.302071	0.053221	5.67032	0.0000
D(PSV(-2))	-0.16609	0.0411	-4.04103	0.0000
D(PSV(-3))	0.121727	0.047202	2.578349	0.0178
CointEq(-1)*	-0.35642	0.057223	-6.22862	0.0000

4.5 Pairwise Granger Causality test

The Pairwise Granger Causality Test for Model 01 reveals no significant causal impact of lnGDP per capita on six governance indicators: GE, RQ, RL, CC, PSV, and VA. The causality between PSV and lnGDP per capita is marginal but fails to reach conventional statistical significance standards.

Table 6: Pairwise Causality test for the model

Null Hypothesis	Obs	F-Statistic	Prob.
GE ≠ LNGDPPC	55	0.407116	0.5262
LNGDPPC ≠ GE	55	1.980464	0.1653
RQ ≠ LNGDPPC	55	0.096933	0.7568
LNGDPPC ≠ RQ	55	0.640959	0.4271
CC ≠ LNGDPPC	55	0.289211	0.5930
LNGDPPC ≠ CC	55	0.424427	0.5177
RL ≠ LNGDPPC	55	0.170868	0.6811
LNGDPPC ≠ RL	55	1.120784	0.2946
PSV ≠ LNGDPPC	55	3.713793	0.0594
LNGDPPC ≠ PSV	55	1.480621	0.2292
VA ≠ LNGDPPC	55	0.363644	0.5491
LNGDPPC ≠ VA	55	0.054136	0.8166

Table 7: Pairwise Causality Test for the Model

Causal Direction	**Significance (p-value)**	**Direction Type**
PSV → LNGDPPC	+ (0.059)	Marginal
All Others	✗	No causality

4.6 Diagnostic test

The model's robustness was assessed through diagnostic tests, revealing normal residual distribution, no serial association, and no model misspecification. These findings confirm the model's econometric validity and its use in examining the relationship between institutional quality and GDP per capita, used as a stand-in for economic competitiveness in Oman. The CUSUM & CUSUMSQ tests showed stable parameters for all models, confirming their econometric validity.

Table 8: Diagnostic test results.

Test	Model	
	Coefficient	P-Value
Jarque Bera test	0.5902	0.7444
Lagrance Multiflier Test	1.6793	0.8162
Breush Pagan Godprey Test	0.4451	0.6183
Ramsey Reset test	1.1095	0.2727

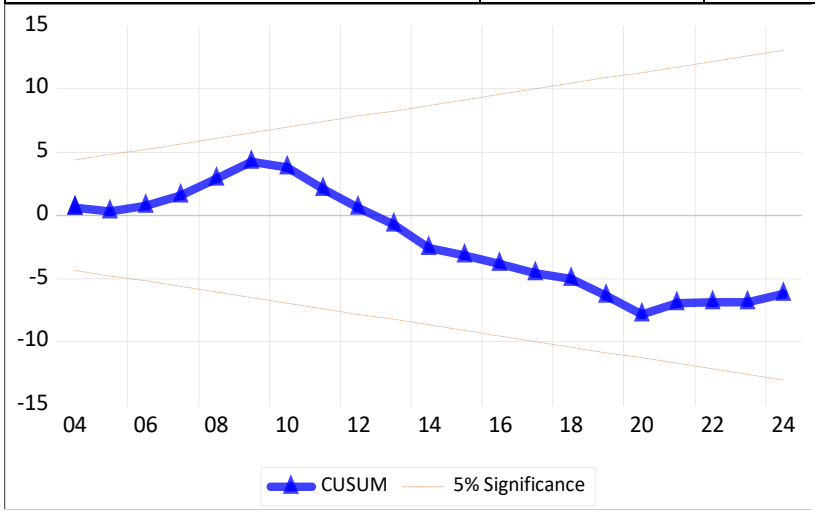

Figure 9: CUSUM & CUSUMSQ test for the model

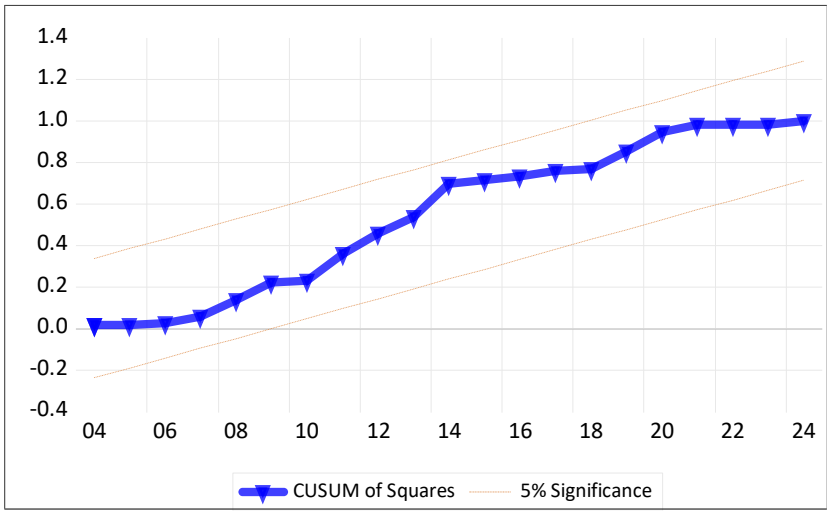

Figure 10: CUSUM & CUSUMSQ test for the model

5. CONCLUSION AND POLICY IMPLICATIONS

This research uses the Autoregressive Distributed Lag (ARDL) model to examine the relationship between Oman's GDP per capita and institutional quality. Institutional factors and GDP per capita data are taken from the World Bank's World Governance Indicators (WGI). The research makes use of yearly data from 1996 to 2024. Using the ARDL model, the study examines the short- and long-term correlations between GDP per capita and six institutional variables: GE, RQ, RL, CC, PSV, and VA. The study is based on endogenous growth theory and New Institutional Economics (NIE), which holds that robust institutions ensure efficient markets, lower transaction costs, and boost confidence in the private sector, all of which contribute to economic growth. The study used FMOLS, DOLS, and CCR for robustness checks, the

ARDL technique to look into short- and long-term correlations, and unit root tests to check for stationarity. To guarantee model accuracy, diagnostic tests are carried out.

Unit Root Tests: The stationarity of the variables is evaluated using the Dickey-Fuller Generalised Least Squares (DF-GLS), Phillips-Perron (P-P), and Augmented Dickey-Fuller (ADF) tests. According to the findings, at level I(0), LGDPPC, GE, CC, PSV, and VA are non-stationary; however, at first difference I(1), they become stationary. At level I(0), RQ and RL are determined to be stationary. There is a long-term relationship between GDP per capita and institutional quality indices, according to the ARDL limits test. The null hypothesis of no cointegration is rejected since the F-statistic (4.587834) is greater than the upper bound critical values. The validity of the regression model is assessed using diagnostic tests such as the Breusch-Pagan-Godfrey test, the Lagrange Multiplier test, and the Jarque-Bera test. The residuals are normally dispersed, according to the Jarque-Bera test. The Breusch-Pagan-Godfrey test and the Lagrange Multiplier test, however, indicate that the model has heteroscedasticity and serial correlation. In conclusion, the study reveals evidence of a sustained correlation between Oman's GDP per capita and institutional quality.

Given the proven long-term correlation between GDP per capita and strong institutions, authorities should prioritize enhancing institutional quality to promote economic growth in Oman. Enhancing particular institutional indicators like GE, RQ, RL, CC, PSV, and VA is one part of a complex strategy. Policymakers should guarantee that individuals have a significant voice in governmental decisions and that public servants are held accountable for their acts to advance voice and accountability. Enhancing the Quality of Regulatory Frameworks is imperative for the establishment of a business-conducive atmosphere that stimulates economic engagement. Augmenting government efficiency will guarantee the proficient and effective provision of public services. Reinforcing the Rule of Law is essential for safeguarding property rights, enforcing contractual obligations, and ensuring equitable treatment within the legal framework.

Mitigating corruption is critical to ensuring that public resources are allocated appropriately and foster economic advancement and development. Moreover, ensuring political stability and the absence of violence is fundamental for cultivating a reliable and predictable environment that draws in businesses and investors. In the execution of econometric analyses, policymakers ought to contemplate the employment of robust standard errors to mitigate the effects of heteroscedasticity and to incorporate supplementary variables, such as education, health, and infrastructure, to attain a more thorough comprehension of the nexus between institutional quality and GDP per capita. Additionally, addressing concerns of serial correlation and heteroscedasticity within models is paramount for enhancing both accuracy and reliability.

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