



# Asymmetric Effects of Government Size, Resource Governance, and Institutional Quality on Per Capita Economic Growth in Iran

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## Abstract

The present study examines the asymmetric effects of government size, resource governance, and institutional quality on per capita economic growth in Iran. The results indicate that positive and negative fluctuations in each of these variables exert distinct and inverse effects on economic growth. These findings highlight the importance of considering the asymmetric dimensions of institutional and economic factors in the analysis of economic growth. The findings of the study show that the effects of positive and negative fluctuations in government size, resource governance, and institutional quality on per capita economic growth in Iran are asymmetric. Negative fluctuations in government size have a positive effect, whereas positive fluctuations have a negative effect on economic growth, indicating an inverse relationship between government size and growth. Institutional quality also exhibits a direct and asymmetric effect on economic growth, such that positive fluctuations have a positive impact, while negative fluctuations exert a negative impact. Similarly, positive fluctuations in resource governance have a positive effect, whereas negative fluctuations have a negative effect on per capita economic growth. The variables of financial development, physical investment, population, and foreign direct investment have positive and statistically significant effects on per capita economic growth. In contrast, the inflation rate and total external debt have negative effects on economic growth, with the effect of inflation being statistically significant at the 90% confidence level. The Phillips–Perron test indicates non-stationarity in some variables, leading to the selection of the nonlinear autoregressive distributed lag (NARDL) model for asymmetric estimation. The Johansen and Engle–Granger cointegration tests confirm the existence of long-run relationships among the variables. The error correction term (ECM) is negative and statistically significant, indicating convergence from short-run disequilibrium to long-run equilibrium with an appropriate speed of adjustment. The Wald test confirms the asymmetric effects of the main variables. Overall, the study emphasizes that examining the asymmetric effects of economic and institutional variables provides a more precise understanding of per capita economic growth in Iran.

**Keywords:** Government size, natural resource governance, institutional quality, good governance, per capita economic growth, economic development

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## 1. Introduction

Economic growth remains one of the central objectives of macroeconomic policy and development planning, particularly in emerging and resource-dependent economies where structural vulnerabilities and institutional constraints are more pronounced. In recent decades, the analytical focus

has gradually shifted from purely quantitative determinants of growth—such as capital accumulation and labor expansion—toward more qualitative and structural dimensions, including institutional quality, governance mechanisms, and the role of the public sector. This shift reflects a growing consensus that economic performance cannot be fully understood without considering the



institutional environment within which economic activities take place. Empirical evidence suggests that differences in governance quality, regulatory effectiveness, and institutional arrangements explain a substantial portion of cross-country variation in growth trajectories [1, 2].

Among the key determinants of economic growth, government size has attracted considerable attention in both theoretical and empirical literature. The relationship between government size and economic growth is inherently complex and often nonlinear, as public sector expansion can generate both positive and negative effects depending on the efficiency of resource allocation and the quality of governance. On the one hand, government expenditure can enhance economic growth through the provision of public goods, infrastructure development, and social services. On the other hand, excessive government intervention may lead to inefficiencies, rent-seeking behavior, and crowding-out effects on private investment. Recent studies emphasize that this relationship is not symmetric, meaning that increases and decreases in government size may exert different impacts on economic growth [3, 4].

In parallel, the concept of institutional quality has emerged as a fundamental pillar in explaining economic performance. Institutions shape the incentives and constraints faced by economic agents, thereby influencing productivity, investment decisions, and innovation. High-quality institutions—characterized by strong rule of law, transparency, and accountability—facilitate economic growth by reducing transaction costs and uncertainty. Conversely, weak institutions, corruption, and governance failures hinder economic efficiency and distort resource allocation. Empirical research consistently demonstrates that institutional quality has both direct and indirect effects on economic growth, often interacting with other macroeconomic variables such as inflation, trade openness, and financial development [5-7].

Another critical dimension in the growth process, particularly in resource-rich economies, is the governance of natural resources. While natural resource abundance has the potential to generate substantial economic benefits, it is often associated with the so-called “resource curse,” where mismanagement, institutional weaknesses, and rent-seeking behaviors undermine long-term growth prospects. The effectiveness of resource governance determines whether resource revenues are efficiently invested in productive sectors or dissipated through inefficiencies and corruption. Recent empirical studies highlight that the interaction between resource governance and institutional quality plays

a decisive role in shaping economic outcomes in oil-exporting and developing countries [8, 9].

In addition to domestic institutional and structural factors, external economic linkages—particularly foreign direct investment (FDI)—have been widely recognized as important drivers of economic growth. FDI contributes to economic development through technology transfer, capital inflows, employment generation, and integration into global value chains. However, the impact of FDI on economic growth is not uniform and depends critically on the absorptive capacity of the host economy, including the level of institutional development, human capital, and financial system efficiency. Empirical evidence from developing regions indicates that the growth-enhancing effects of FDI are significantly amplified in the presence of strong governance structures and sound institutional frameworks [10-12].

Furthermore, the relationship between FDI and sustainable development has attracted increasing attention, particularly in the context of environmental and social outcomes. While FDI can promote economic growth, it may also lead to environmental degradation if not properly regulated. Therefore, the role of institutions becomes crucial in ensuring that FDI contributes positively to sustainable development objectives. Studies across different regions, including Africa and Asia-Pacific, emphasize that institutional quality and regulatory frameworks determine whether FDI inflows translate into long-term economic and environmental benefits [13-15].

Financial development is another important channel through which economic growth can be stimulated. A well-functioning financial system facilitates the mobilization of savings, efficient allocation of capital, and risk diversification. It also enhances the effectiveness of monetary policy and supports entrepreneurial activities. However, the relationship between financial development and economic growth is often contingent upon institutional quality, as weak institutions may lead to financial instability and inefficient credit allocation. Empirical findings suggest that financial development, when complemented by strong institutional frameworks, significantly contributes to economic growth and stability [1, 2].

Macroeconomic stability variables, including inflation and external debt, also play a significant role in shaping economic growth dynamics. High inflation rates create uncertainty, reduce purchasing power, and discourage investment, thereby negatively affecting growth. Similarly, excessive external debt can constrain fiscal space and

increase vulnerability to external shocks, particularly in developing economies. However, the impact of these variables is often mediated by institutional factors, as effective governance can mitigate the adverse effects of macroeconomic imbalances and enhance policy credibility [5, 16].

Population growth and physical investment are additional determinants that influence economic performance. While population growth can contribute to a larger labor force and market size, it may also exert pressure on resources and infrastructure if not accompanied by adequate economic planning. Physical investment, particularly in infrastructure and capital formation, remains a key driver of productivity and long-term growth. The effectiveness of these factors, however, depends largely on institutional arrangements and governance quality, which determine how resources are allocated and utilized [17, 18].

Recent empirical literature increasingly emphasizes the importance of nonlinear and asymmetric relationships in economic modeling. Traditional linear models assume that positive and negative changes in explanatory variables have symmetric effects on the dependent variable, which may not reflect real-world dynamics. In contrast, nonlinear approaches, such as the NARDL model, allow for the identification of asymmetric effects, providing a more nuanced understanding of economic relationships. For instance, increases in government size may have different implications compared to decreases, and improvements in institutional quality may not mirror the effects of institutional deterioration. This asymmetry is particularly relevant in volatile and structurally complex economies such as Iran [3, 19].

Moreover, the interaction between institutional quality, government policies, and external economic factors underscores the multidimensional nature of economic growth. Studies highlight that governance indicators, including accountability, transparency, and regulatory quality, not only affect economic growth directly but also shape the effectiveness of other growth determinants. For example, the impact of FDI, financial development, and public expenditure on economic growth is significantly conditioned by the institutional environment [20-22].

In the context of Iran, the analysis of economic growth is particularly important due to the country's reliance on natural resources, exposure to external shocks, and evolving institutional framework. The Iranian economy exhibits characteristics that make it an appropriate case for examining the asymmetric effects of key economic and

institutional variables. Issues such as fluctuations in government size, variability in institutional quality, and challenges in resource governance highlight the need for a comprehensive analytical framework that captures both linear and nonlinear dynamics. Existing studies on Iran have primarily focused on linear relationships, leaving a gap in understanding the asymmetric nature of these effects [1, 7].

Given the theoretical and empirical considerations discussed above, it becomes evident that a comprehensive analysis of economic growth requires the integration of multiple dimensions, including government size, institutional quality, resource governance, and external economic factors. Furthermore, the recognition of asymmetric effects provides deeper insights into the mechanisms through which these variables influence economic performance. By employing advanced econometric techniques, such as the NARDL model, it is possible to capture these complex relationships and provide more accurate policy implications.

Therefore, the main objective of this study is to investigate the asymmetric effects of government size, resource governance, and institutional quality on per capita economic growth in Iran.

## 2. Methodology

The present study is applied in terms of objective and descriptive–analytical in terms of nature. It is also classified as an ex post facto study. The statistical population consists of annual macroeconomic data for Iran over the period 1991–2023. The model is estimated using a nonlinear threshold framework (NARDL) within a time-series context employing EViews software. For model estimation, the specification of the model and the definition of variables are first presented. Subsequently, the stationarity of variables is examined using the Phillips–Perron unit root test, followed by the application of cointegration tests. Finally, the model is estimated using the NARDL approach.

In this study, to examine the asymmetric effects of government size, resource governance, and institutional quality on per capita economic growth in Iran, the following model is employed based on the theoretical literature and prior studies such as Al-Biree et al. (2020), Imran Hunjra et al. (2020), Ahmad et al. (2021), and Siaw et al. (2022).

$$GP_i = \beta_0 + \beta_1 GS_i + \beta_2 RQ_i + \beta_3 RA_i + \beta_4 FIN_i + \beta_5 INF_i + \beta_6 INV_i + \beta_7 ED_i + \beta_8 POP_i + \beta_9 FDI_i + \varepsilon_{it}$$

By rewriting Equation (1) in an error correction form and decomposing the variables—government size (GS), resource governance (RA), and institutional quality (RQ)—into partial sums of positive and negative changes, namely:

$$GS_t^+ = \sum_{j=1}^t \Delta G S_j^+, GS_t^- = \sum_{j=1}^t \Delta G S_j^-$$

$$RA_t^+ = \sum_{j=1}^t \Delta R A_j^+, RA_t^- = \sum_{j=1}^t \Delta R A_j^-$$

$$RQ_t^+ = \sum_{j=1}^t \Delta R Q_j^+, RQ_t^- = \sum_{j=1}^t \Delta R Q_j^-$$

it becomes possible to estimate the nonlinear (asymmetric) short-run and long-run effects:

$$GP_t = \mu + \sum_{i=1}^{n_1} \beta_i \Delta GS_{t-i} + \sum_{i=1}^{n_2} \beta_i \Delta RA_{t-i} + \sum_{i=1}^{n_3} \beta_i \Delta RQ_{t-i} + \sum_{i=1}^{n_4} \beta_i \Delta X_{t-i}$$

$$+ \sum_{i=1}^{n_5} \beta_{1,i} \Delta \ln GS_{t-i}^+ + \sum_{i=1}^{n_6} \beta_{2,i} \Delta \ln GS_{t-i}^-$$

$$+ \sum_{i=1}^{n_7} \beta_{3,i} \Delta \ln RA_{t-i}^+ + \sum_{i=1}^{n_8} \beta_{4,i} \Delta \ln RA_{t-i}^-$$

$$+ \sum_{i=1}^{n_9} \beta_{5,i} \Delta \ln RQ_{t-i}^+ + \sum_{i=1}^{n_{10}} \beta_{6,i} \Delta \ln RQ_{t-i}^- + \varepsilon_t$$

Per capita economic growth (GP) is proxied by gross domestic product per capita based on purchasing power parity (PPP) in constant 2010 U.S. dollars.

Institutional quality (RQ) is measured as the average of five sub-indices: (1) government size, (2) legal system and property rights, (3) accountability and transparency, (4) freedom to trade internationally, and (5) regulation of credit, labor, and business. The Fraser Institute assigns a score to each category, and the average of these five indices forms a composite institutional quality index, where 0 indicates the lowest and 5 indicates the highest institutional quality.

Resource governance (RA) is measured as natural resource abundance, calculated as:

$$RA_t = \frac{\alpha_1 \cdot \text{Coal} + \alpha_2 \cdot \text{Oil} + \alpha_3 \cdot \text{Gas}}{\text{Population}}$$

Government size (GS) is used as an indicator of government effectiveness, ranging from 0 to 100, where higher values indicate better performance.

Financial development (FIN) is measured by liquidity as a percentage of GDP.

Inflation (INF) represents the inflation rate.

Physical investment (INV) is measured by gross fixed capital formation as a percentage of GDP.

External debt (ED) is measured as total external debt as a percentage of GDP.

Population growth (POP) represents the population growth rate.

Foreign direct investment (FDI) refers to inward FDI flows.

### 3. Findings and Results

Initially, the Phillips–Perron unit root test is used to examine the stationarity of the variables. The results are presented in Table 1.

**Table 1.** Phillips–Perron Unit Root Test Results

Variable	Test Statistic	Probability	Integration Order
ED	0.499018	0.8177	—
D(ED)	-7.245129	0.0000	I(1)
FDI	-1.008525	0.2747	—
D(FDI)	-6.506971	0.0000	I(1)
FIN	-3.117958	0.0029	I(0)
GP	-4.020724	0.0002	I(0)
GS	-0.502884	0.4905	—
D(GS)	-12.767470	0.0000	I(1)
INF	-0.179377	0.6137	—

D(INF)	-9.809054	0.0000	I(1)
INV	-1.425946	0.1406	—
D(INV)	-13.707540	0.0000	I(1)
POP	-1.333090	0.1652	—
D(POP)	-6.467929	0.0000	I(1)
RA	-0.060136	0.6551	—
D(RA)	-6.776930	0.0000	I(1)
RQ	0.722060	0.8659	—
D(RQ)	-9.701317	0.0000	I(1)

Given the non-stationarity of variables and their mixed integration orders, traditional cointegration tests such as Johansen are not appropriate. Therefore, the NARDL model is employed. One of the advantages of the NARDL approach is that it allows estimation regardless of whether variables are integrated of order I(0), I(1), or I(2), while providing consistent long-run coefficient estimates.

Two primary approaches are used to examine convergence: the Engle–Granger method and the Johansen method. The Engle–Granger approach evaluates only a single long-run relationship and becomes problematic when

more than two variables are involved (Nouferesti, 2008). Additionally, differencing leads to loss of long-run information.

The Johansen method offers several advantages, including avoiding differencing and preserving long-run equilibrium properties. It estimates cointegrating vectors and incorporates the error correction term in a system of equations (Johansen & Juselius, 1991). The trace statistic ( $\lambda$  Trace) and maximum eigenvalue statistic ( $\lambda$  max) are used to determine the number of cointegrating relationships.

**Table 2.** Johansen Cointegration Test (Trace Statistic)

Hypothesis	Eigenvalue	Trace Statistic	Critical Value (0.05)	Probability
None *	0.994638	515.7110	239.2354	0.0000
At most 1 *	0.954697	353.6278	197.3709	0.0000
At most 2 *	0.918796	257.7016	159.5297	0.0000
At most 3 *	0.878690	179.8669	125.6154	0.0000
At most 4 *	0.689303	114.4753	95.75366	0.0014
At most 5 *	0.654683	78.23821	69.81889	0.0091
At most 6	0.481593	45.27615	47.85613	0.0857
At most 7	0.398458	24.90931	29.79707	0.1647
At most 8	0.204876	9.153257	15.49471	0.3514
At most 9	0.063878	2.046300	3.841466	0.1526

Trace test indicates 6 cointegrating equations at the 0.05 level.

**Table 3.** Johansen Cointegration Test (Maximum Eigenvalue Statistic)

Hypothesis	Eigenvalue	Max-Eigen Statistic	Critical Value (0.05)	Probability
None *	0.994638	162.0833	64.50472	0.0000
At most 1 *	0.954697	95.92618	58.43354	0.0000
At most 2 *	0.918796	77.83465	52.36261	0.0000
At most 3 *	0.878690	65.39163	46.23142	0.0002
At most 4	0.689303	36.23709	40.07757	0.1272
At most 5	0.654683	32.96205	33.87687	0.0640
At most 6	0.481593	20.36685	27.58434	0.3163
At most 7	0.398458	15.75605	21.13162	0.2394
At most 8	0.204876	7.106957	14.26460	0.4766
At most 9	0.063878	2.046300	3.841466	0.1526

The results of both tests confirm the existence of at least four cointegrating vectors.

**Augmented Engle–Granger (AEG) Test:**

$$\Delta \hat{\epsilon}_t = \gamma \hat{\epsilon}_{t-1} + \sum_{i=1}^p \delta_i \Delta \hat{\epsilon}_{t-i} + u_t$$

Engle and Granger (1987) stated that if the Dickey–Fuller test is applied to the residuals of the model and the residual

time series is found to be stationary, this confirms the existence of cointegration. However, caution must be exercised when using this method, as the critical values are not fully appropriate and the specific critical values provided

by Engle and Granger should be used. In this framework, stationarity and non-stationarity are examined using the Dickey–Fuller unit root test.

**Table 4.** Cointegration Test (Engle–Granger)

Test Statistic	Probability
-5.725879	0.0000

Based on the above discussion and in order to test the study hypotheses, the dynamic coefficients of the model and the error correction model (ECM) are estimated to determine the speed of adjustment from short-run disequilibrium to long-run equilibrium. The NARDL model is selected to

estimate both long-run coefficients and the error correction term, as well as short-run coefficients. The results of the estimation of the dynamic coefficients are presented in Table 5.

**Table 5.** Estimation Results of the Per Capita Economic Growth Model

Variable	Coefficient	Std. Error	t-Statistic	Probability
GG(-1)	0.022717	0.010298	2.205968	0.0274
DLnGS POS	-0.158886	0.075984	-2.091051	0.0419
DLnGS NEGE	0.582868	0.239013	2.438644	0.0149
DLnRQ POS	0.096233	0.026454	3.637702	0.0003
DLnRQ NEGE	-0.496421	0.175702	-2.825358	0.0069
DLnRA POS	0.212527	0.090308	2.353357	0.0356
DLnRA NEGE	-0.393667	0.142781	-2.757139	0.0201
DLnFIN	0.642607	0.230948	2.782475	0.0200
DLnINF	-0.097980	0.028983	-3.380603	0.0008
DLnINV	0.433451	0.159418	2.718959	0.0218
DLnED	-0.204690	0.089165	-2.295631	0.0300
DLnPOP	0.089278	0.027937	3.195642	0.0015
DLnFDI	0.197885	0.085146	2.324058	0.0201
ECM(-1)	-0.329059	0.136048	-2.418698	0.0234
Diagnostic Tests				
Normality Test	Wald Test	Heteroskedasticity Test	LM Test	Normality Test
48.3696 (0.0000)	25.374 (0.0000)	0.5236 (0.9952)	0.2156 (0.3024)	48.3696 (0.0000)

The results of the Wald test reported at the bottom of the table for examining the symmetry or asymmetry of positive and negative shocks in government size, resource governance, and institutional quality on per capita economic growth in the short run indicate that the null hypothesis of equality of coefficients for positive and negative shocks is rejected, and the alternative hypothesis is accepted. Therefore, the asymmetric effects of positive and negative shocks in these variables on per capita economic growth are confirmed.

The estimation results indicate that all model variables are statistically significant. The findings show that negative fluctuations in government size have a positive effect, while positive fluctuations have a negative effect on per capita economic growth in the short run. Therefore, in this model, government size has an inverse effect on per capita economic growth. By separating positive and negative

shocks in government size, the estimated coefficients indicate that the response of per capita economic growth differs across these fluctuations, confirming the presence of asymmetric effects. To further verify the validity of asymmetric effects, the t-test is applied. Since the null hypothesis of equal coefficients is rejected, the inequality of coefficients is confirmed, supporting the asymmetric effect of government size fluctuations on economic growth.

The findings indicate that negative fluctuations in institutional quality have a negative effect, while positive fluctuations have a positive effect on per capita economic growth in the short run. Therefore, in this model, institutional quality has a direct effect on per capita economic growth. By decomposing positive and negative changes in institutional quality, the results show that the response of economic growth differs across these shocks, confirming asymmetric effects. The t-test results further

validate this conclusion, as the null hypothesis of equal coefficients is rejected.

The findings also indicate that negative fluctuations in resource governance have a negative effect, while positive fluctuations have a positive effect on per capita economic growth in the short run. Therefore, resource governance has a direct effect on economic growth. By separating positive and negative fluctuations, the estimated coefficients show that economic growth responds differently to each type of shock, confirming asymmetric effects. The t-test results support this conclusion, as the null hypothesis of equal coefficients is rejected.

The short-run coefficients derived from the asymmetric error correction model indicate that financial development, physical investment, population, and foreign direct investment have positive coefficients equal to 0.513400, 0.228524, 0.521203, and 0.123968, respectively. Based on the calculated probabilities, which are less than 0.05 (except

for population), these variables are statistically significant at the 95% confidence level. In contrast, inflation and total external debt have negative effects on per capita economic growth. Considering the probability level for external debt, this variable is statistically significant at the 95% confidence level. However, the probability value for inflation exceeds 0.05, indicating that it is not statistically significant at the 95% level (although it is significant at the 90% confidence level). Finally, the ECM coefficient is equal to -0.72, which indicates two important facts: first, due to its negative sign, convergence from short-run disequilibrium to long-run equilibrium is confirmed; second, its magnitude reflects the speed of adjustment toward long-run equilibrium.

In order to ensure the validity and accuracy of the estimated model results, the diagnostic tests for serial correlation and heteroskedasticity were examined for the residuals of the NARDL model.

**Table 6.** Results of the Model Diagnostic Tests

Diagnostic test	Result
LM serial correlation test	Prob = 0.2258
Breusch–Pagan–Godfrey heteroskedasticity test	Prob = 0.1598
Ramsey RESET specification error test	Prob = 0.6872

As the results of the diagnostic tests in the above table indicate, the estimated model does not suffer from heteroskedasticity, specification error, or serial correlation. This supports the validity of the estimated model results.

In addition, to calculate the long-run statistic of the model, the Banerjee and Dolado approach is applied using the same dynamic model. The computed statistic is equal to -94.90. Since, in absolute value, this figure is greater than the critical value reported by Banerjee, Dolado, and Mestre

( -3.27), the null hypothesis of no long-run relationship is rejected. Therefore, the model variables are cointegrated.

The computed statistic is obtained as follows:

$$\frac{(0.022717-1)}{0.010298} = -94.9002719$$

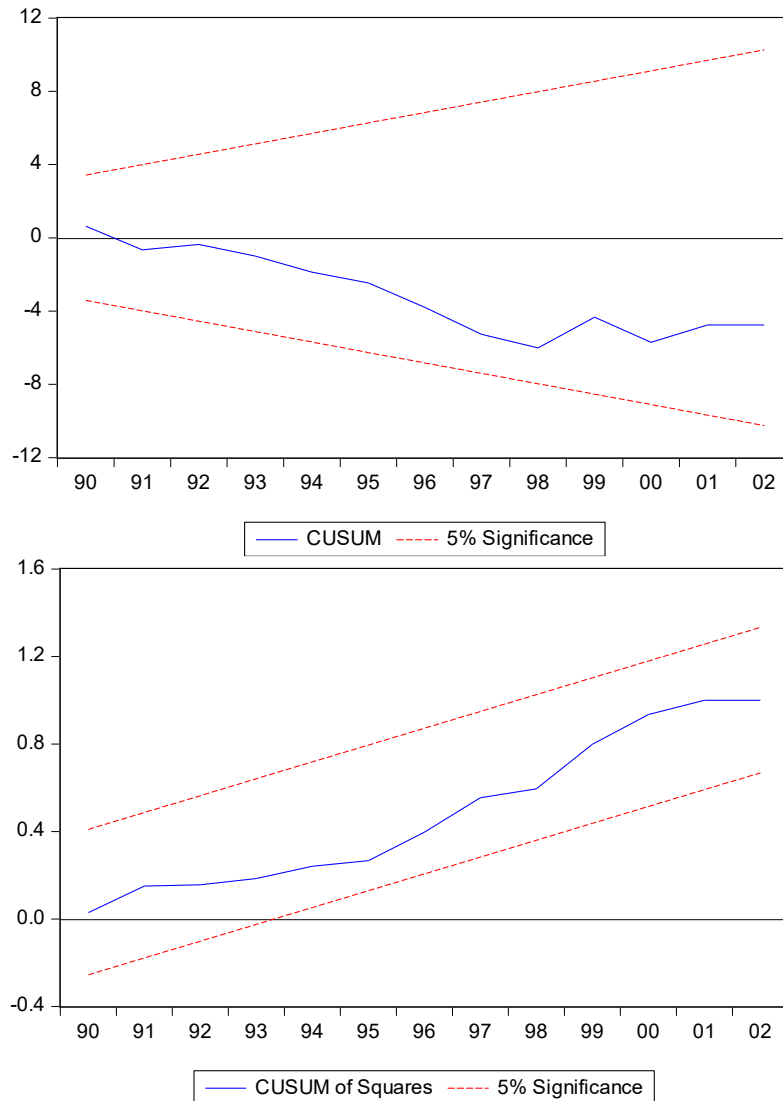
Table 7 presents the results of the long-run NARDL estimation.

**Table 7.** Long-Run NARDL Estimation

Variable	Coefficient	Std. Error	t-Statistic	Probability
LnGS	-0.053752	0.022425	-2.396930	0.0165
LnRQ	0.012901	0.004822	2.675502	0.0077
LnRA	0.235516	0.085117	2.762255	0.0053
LnFIN	0.014838	0.006607	2.245690	0.0378
LnINF	-0.120700	0.060604	-1.991677	0.0487
LnINV	0.237879	0.061631	3.859691	0.0001
LnED	-0.139690	0.048299	-2.892296	0.0038
LnPOP	0.035862	0.014372	2.495362	0.0129
LnFDI	0.289564	0.208206	1.390754	0.1664
C	-0.177326	0.070478	-2.516070	0.0126

The obtained results indicate that, in the long run, all model variables are statistically significant at the 5% error level.

To test structural stability, the cumulative sum of recursive residuals and the cumulative sum of squares of recursive residuals, proposed by Brown, are used.



**Figure 1.** CUSUM and CUSUMSQ Tests

As can be observed, the plots of the cumulative residuals and the cumulative squared residuals lie between the two straight lines representing the 95% confidence interval.

If the plotted line remains within the confidence interval, the null hypothesis of no structural break is accepted. If the plotted line moves outside the confidence interval, that is, crosses the confidence bounds, the null hypothesis of no structural break is rejected and the existence of a structural break is accepted. In addition, the cumulative residual statistic is used to detect systematic changes in the regression coefficients, whereas the cumulative squared residual statistic is used when deviations from coefficient stability are random and sudden.

#### 4. Discussion and Conclusion

The results of the present study provide robust empirical evidence regarding the asymmetric effects of government size, institutional quality, and resource governance on per capita economic growth in Iran. The findings derived from the nonlinear autoregressive distributed lag (NARDL) model indicate that both short-run and long-run dynamics exhibit significant asymmetries. Specifically, the results demonstrate that negative shocks to government size exert a positive effect on economic growth, whereas positive shocks have a negative effect. This inverse and asymmetric relationship suggests that expansions in government size may lead to inefficiencies and distortions in resource allocation, while contractions may enhance economic efficiency by reducing bureaucratic inefficiencies and

improving fiscal discipline. These findings are consistent with previous empirical studies emphasizing the nonlinear and threshold-dependent nature of the relationship between government size and economic performance [3, 4].

The asymmetric impact of institutional quality is also strongly supported by the empirical results. Positive changes in institutional quality significantly enhance economic growth, while negative shocks exert a detrimental effect. This confirms the critical role of institutions as a foundational determinant of economic performance. Improved institutional quality reduces uncertainty, enhances investor confidence, and facilitates efficient allocation of resources, thereby promoting sustainable economic growth. Conversely, institutional deterioration leads to increased transaction costs, corruption, and inefficiencies, ultimately hindering economic activity. These findings align with prior studies highlighting the direct and interactive effects of institutional quality on growth, particularly in developing and resource-dependent economies [5-7].

The results further reveal that resource governance exerts a direct and asymmetric influence on economic growth. Positive shocks to resource governance contribute positively to economic growth, while negative shocks have adverse effects. This finding underscores the importance of effective management and governance of natural resources in transforming resource wealth into sustainable economic outcomes. In the context of Iran, where natural resources constitute a major component of the economy, efficient resource governance can mitigate the adverse effects of resource dependency and enhance economic resilience. These results are consistent with the literature emphasizing the role of institutional frameworks in determining whether resource abundance becomes a blessing or a curse [8, 9].

In addition to the main variables of interest, the study finds that financial development, physical investment, population growth, and foreign direct investment (FDI) have positive and statistically significant effects on economic growth. These findings highlight the importance of capital accumulation, financial deepening, and integration into the global economy as key drivers of economic performance. The positive effect of financial development suggests that improved access to financial resources facilitates investment and enhances productivity. Similarly, physical investment contributes to capital formation and infrastructure development, which are essential for long-term growth. These results are consistent with empirical evidence demonstrating the growth-enhancing effects of financial

development and investment, particularly when supported by strong institutional frameworks [1, 2].

The positive impact of FDI on economic growth observed in this study is also supported by the existing literature. FDI inflows provide access to advanced technologies, managerial expertise, and international markets, thereby enhancing productivity and competitiveness. However, the effectiveness of FDI in promoting growth is contingent upon the quality of institutions and governance structures. In economies with strong institutional frameworks, FDI is more likely to generate positive spillover effects and contribute to sustainable development. This finding is in line with previous studies that emphasize the conditional nature of the FDI–growth nexus [10-12].

The study also identifies inflation and external debt as factors that negatively affect economic growth. High inflation rates create macroeconomic instability, reduce purchasing power, and discourage investment, thereby hindering economic growth. Similarly, excessive external debt can impose a significant burden on the economy, limiting fiscal flexibility and increasing vulnerability to external shocks. These findings are consistent with the literature highlighting the adverse effects of macroeconomic instability and debt accumulation on economic performance [5, 16].

An important contribution of this study lies in its methodological approach, which captures the asymmetric nature of economic relationships. The use of the NARDL model allows for the differentiation between positive and negative shocks, providing a more nuanced understanding of the dynamics of economic growth. The Wald test results confirm the presence of asymmetry in the effects of the main variables, reinforcing the argument that traditional linear models may fail to capture the complexity of economic interactions. This finding is consistent with recent studies advocating the use of nonlinear models to better understand the dynamics of economic growth and policy impacts [19, 20].

Furthermore, the existence of a stable long-run relationship among the variables, as confirmed by cointegration tests and the significance of the error correction term, indicates that deviations from equilibrium are corrected over time. The negative and significant coefficient of the error correction term reflects an appropriate speed of adjustment toward long-run equilibrium, suggesting that the Iranian economy possesses mechanisms for restoring equilibrium following short-term shocks. This finding is in line with empirical studies that

highlight the importance of dynamic adjustment processes in maintaining macroeconomic stability [1, 2].

The findings of this study also have important policy implications. The inverse relationship between government size and economic growth suggests that policymakers should focus on improving the efficiency of public expenditure rather than merely expanding the size of government. Enhancing transparency, accountability, and performance in the public sector can mitigate the negative effects associated with government expansion. Similarly, strengthening institutional quality should be a priority, as it plays a critical role in shaping economic outcomes and enhancing the effectiveness of other policy measures.

Moreover, the results highlight the importance of effective resource governance in resource-rich economies. Policymakers should implement strategies to ensure that resource revenues are invested in productive sectors and contribute to long-term economic development. This includes improving governance structures, reducing corruption, and enhancing transparency in resource management. Such measures can help transform natural resource wealth into a sustainable source of economic growth.

In addition, policies aimed at promoting financial development, attracting FDI, and encouraging investment can further enhance economic growth. However, these policies should be accompanied by institutional reforms to ensure that the benefits of economic integration and capital inflows are fully realized. Strengthening regulatory frameworks and improving governance can enhance the positive impact of these factors on economic performance.

One of the main limitations of this study is the reliance on aggregate macroeconomic data, which may not fully capture sectoral heterogeneity and micro-level dynamics within the economy. Additionally, the measurement of institutional quality and resource governance is subject to data constraints and may not fully reflect the complexity of these constructs. The use of annual data may also limit the ability to capture short-term fluctuations and high-frequency dynamics. Furthermore, the study focuses exclusively on Iran, which may limit the generalizability of the findings to other countries with different economic and institutional contexts.

Future studies could extend the analysis by incorporating panel data across multiple countries to enhance the generalizability of the findings. Researchers may also explore sector-specific effects of government size, institutional quality, and resource governance to provide more detailed insights into the mechanisms driving

economic growth. The use of alternative econometric approaches, such as regime-switching models or machine learning techniques, could further improve the understanding of nonlinear dynamics. Additionally, future research could examine the role of emerging factors, such as digital transformation and environmental sustainability, in shaping economic growth.

Policymakers should prioritize improving the efficiency and effectiveness of government operations rather than expanding public sector size. Strengthening institutional frameworks, enhancing transparency, and reducing corruption are essential for promoting sustainable economic growth. Effective management of natural resources should be emphasized to ensure that resource revenues contribute to long-term development. Furthermore, policies aimed at fostering financial development, encouraging investment, and attracting foreign direct investment should be implemented in conjunction with institutional reforms to maximize their positive impact on economic performance.

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Authors equally contributed to this article.

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### Declaration of Interest

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### Ethical Considerations

All procedures performed in this study were under the ethical standards.

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