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The Impact of Political Risk and Crude Oil Price Shocks on Gross Domestic Product in Iran Using Structural Cyclical Models

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ABSTRACT

Oil-dependent developing countries are characterized by a high degree of uncertainty in macroeconomic variables. Economic growth, inflation, oil prices, liquidity, exchange rates, and other macroeconomic indicators are more volatile compared to those in industrialized economies, and the persistence of such fluctuations can lead to the emergence of structural problems across different sectors of these economies. Fluctuations in these indicators, through the generation of risk and uncertainty, influence investment and investors' decision-making processes, thereby affecting production. In Iran, such fluctuations have significant impacts on liquidity, investment, exports and imports, and overall production, making them highly important for economic policymakers. Consequently, instability in global oil markets can result in imbalances and even crises. The present study examines the impact of political risk and crude oil price shocks on gross domestic product (GDP) in Iran using structural cyclical models. This research is applied in nature and adopts a descriptive-analytical approach. In terms of data collection, it is categorized as an ex post facto study. The statistical population pertains to Iran, and the study period spans from 1991 to 2023. The results obtained from the estimation of the Structural Vector Autoregression (SVAR) model indicate that the coefficients of the main variables and the interacting shocks in the matrix equations are statistically significant and consistent with the conditions of the Iranian economy. The key variables identified in the SVAR model reveal that shocks arising from oil price volatility and inflation lead to a decrease in GDP, whereas shocks related to political stability, rule of law, government effectiveness, regulatory quality, and the interaction term (PS*OP) contribute to improvements in GDP. Specifically, a shock stemming from oil price volatility reduces GDP by approximately 32%, while an inflation shock leads to a 43% decrease in GDP. In contrast, a shock related to political stability improves GDP by approximately 35%. The response of GDP to shocks in rule of law, government effectiveness, and regulatory quality is estimated at approximately 12%, 15%, and 2%, respectively.

Keywords: *Political Risk, Crude Oil Price, Gross Domestic Product, Structural Cyclical Models, Governance Indicators*

1. Introduction

Oil remains one of the most strategically important commodities in the global economy, and fluctuations in its price continue to shape macroeconomic performance, financial stability, public budgeting, and investment behavior across both advanced and developing countries. For oil-exporting economies, and especially for economies with substantial fiscal and external dependence on hydrocarbon revenues, oil-price movements are not merely sectoral shocks; they are broad macroeconomic disturbances that propagate through government revenues, exchange rates, inflation, employment, trade balances, and aggregate output. Recent empirical work has confirmed that the oil market is deeply intertwined with wider financial and economic systems, with oil-price dynamics affecting stock returns, systemic risk, and the transmission of uncertainty across markets and institutions (Chatziantoniou et al., 2025; Magazzino et al., 2023; Mensi et al., 2025). In such settings, the macroeconomic consequences of oil shocks cannot be understood independently of the political and institutional environment in which they occur.

A growing body of literature suggests that the impact of oil-price shocks depends not only on the magnitude and direction of price movements, but also on the structure of the domestic economy, the credibility of policy institutions, and the broader uncertainty environment. In emerging and developing economies, oil shocks often interact with fiscal cyclicality, exchange-rate pressures, monetary instability, and external vulnerability in ways that amplify output fluctuations. Research on developing oil economies has shown that macroeconomic adjustment to shocks is highly sensitive to the policy regime, exchange-rate arrangement, and fiscal response mechanism (Algozhina, 2022). At the same time, the macroeconomic significance of oil volatility has expanded beyond conventional channels of trade and government finance to include sentiment, expectations, risk pricing, and financial contagion, thereby making oil shocks more complex and persistent in their effects (Agarwalla et al., 2021; De Medeiros et al., 2023).

Within this broader framework, political risk has emerged as a critical factor in shaping the economic effects of oil-market shocks. Political instability, regulatory weakness, poor governance, fragile institutional quality, and heightened geopolitical tension can influence both the exposure of an economy to oil shocks and its ability to absorb them. Studies increasingly show that politically unstable environments experience more severe distortions in trade, capital allocation, and energy-related transmission mechanisms. For example, evidence indicates that international trade relations in politically unstable economies alter the dynamics of crude-oil effects and can intensify macroeconomic vulnerability (Lan et al., 2023). Similarly, network-based analysis has shown that the relationship among crude oil, international trade, and political stability is structurally interconnected rather than linear, implying that economic outcomes depend on the configuration of political and commercial linkages rather than on isolated variables alone (Cappelli et al., 2023). These findings are especially relevant for economies in which oil revenues play a central developmental and fiscal role.

The conceptual importance of political risk is further reinforced by the broader literature on geopolitical uncertainty and market behavior. Political and geopolitical shocks affect asset prices, risk premia, investment decisions, and cross-market co-movements, particularly in energy-sensitive and externally exposed economies. Dynamic correlation analyses in the Gulf Cooperation Council region, for instance, show that different sources of geopolitical risk influence stock markets differently and that such risk is neither homogeneous nor static over time (Alqahtani et al., 2021). More recent work has also documented a significant nexus between geopolitical risk, oil-price volatility, and renewable energy investment, suggesting that political uncertainty reshapes not only fossil-energy markets but also broader strategic investment decisions (Zhao et al., 2024). These findings imply that political risk should not be treated as an external background condition; rather, it is a substantive macroeconomic force that can alter the direction, speed, and persistence of oil-shock transmission.

Governance quality is equally central to this discussion because it conditions how political and economic shocks are mediated. Institutional dimensions such as political stability, rule of law, government effectiveness, and regulatory quality influence the degree to which uncertainty becomes economically disruptive. Better governance can reduce transaction costs, improve policy credibility, stabilize expectations, and facilitate more efficient adjustment to shocks. Conversely, weak governance may magnify inflationary pressures, reduce investment responsiveness, and weaken growth performance. Evidence from North African countries shows that institutional quality has a nonlinear relationship with financial stability and competition, underscoring that intervention quality and governance effectiveness are central to systemic outcomes (Ghazouani & Basty, 2023). In the context of oil-dependent economies, this insight suggests that the same oil shock may generate different growth consequences depending on the institutional capacity of the state.

Iran provides a particularly important setting for examining these interrelationships. As a major oil-exporting economy with a long history of exposure to oil-price cycles, sanctions, macroeconomic volatility, exchange-rate instability, and political uncertainty, Iran exhibits many of the structural characteristics that make the study of oil and political-risk shocks especially consequential. Domestic empirical studies have repeatedly shown that oil-price changes affect key macroeconomic indicators such as economic growth, inflation, unemployment, and budget deficits in Iran (Ghalevandi & Zandi, 2021). Other Iranian studies have found asymmetric effects of oil prices, oil-price uncertainty, and interest rates on unemployment, indicating that oil-related disturbances do not operate uniformly across labor-market outcomes (Sanjari Kenarsandal et al., 2022). More recent evidence also shows that economic uncertainty and oil-price volatility significantly affect unemployment in Iran under both linear and nonlinear specifications (Sharifi & Hosseini, 2024). Together, these findings reveal that oil shocks in Iran are broad macroeconomic events rather than isolated energy-market disturbances.

At the same time, Iran's macroeconomic structure suggests that the effect of oil shocks on GDP is likely to be mediated by institutional and political conditions. The political economy literature on post-revolutionary Iran has emphasized the relevance of governance patterns, state capacity, and policy orientation in explaining the performance and limitations of macroeconomic management (Noudijeh, 2021). Research on the Iranian financial system also shows that monetary and fiscal shocks significantly affect stock returns and sectoral performance, highlighting the sensitivity of domestic markets to policy disturbances and macro-financial conditions (Hosseini & Dadras Moghaddam, 2022). Studies on economic, financial, and political risk in the Tehran Stock Exchange further confirm that political risk materially affects return and risk formation in Iranian financial markets (Keshavarz & Rezaei, 2021). These insights support the proposition that the macroeconomic effects of oil-price volatility in Iran cannot be fully understood without explicitly incorporating political-risk and governance-related variables into the analytical framework.

The global experience of recent crises has strengthened this argument. The COVID-19 pandemic and the associated collapse in demand, mobility, and trade created unprecedented disruptions in oil markets and macroeconomic systems. Research has shown that the pandemic reshaped global governance and exposed weaknesses in coordination, crisis management, and human-security responses (Akl, 2021). In oil-exporting and financially open economies, the combined effect of the health crisis and oil-price shocks generated significant instability in stock markets and macroeconomic indicators (AlRefai et al., 2022; Sanei Far et al., 2020). Because such crises overlap with domestic structural vulnerabilities, their macroeconomic impact tends to be magnified in countries with limited institutional resilience. For Iran, where external shocks often combine with domestic uncertainty, this interaction is especially important.

Another reason for focusing on Iran is that oil shocks increasingly operate through multiple linked channels rather than through a single revenue mechanism. Exchange-rate dependence, inflation dynamics, and economic fundamentals jointly affect the manner in which external shocks feed into domestic output (Gong et al., 2022). Oil-price uncertainty can also affect firm behavior, including capital structure and leverage decisions, which in turn shape investment and growth (Fan et al., 2021). In addition, uncertainty linked to climate policy, energy transition, and new forms of forecasting and information processing is changing the informational environment of energy markets, making oil-price dynamics more complex and forward-looking (Liang et al., 2022; Wu et al., 2026). Recent machine-learning evidence on oil-price prediction and related asset behavior underscores that the oil market is now embedded in high-dimensional networks of information, sentiment, and cross-asset linkages (Ibrahim et al., 2025). Therefore, a contemporary analysis of oil shocks and GDP must account for this broader uncertainty architecture.

The relevance of such an approach is also supported by cross-country and regional evidence. Studies on oil-importing Middle Eastern and North African economies show that oil-price shocks significantly affect stock-market performance, even in countries that do not benefit fiscally from higher oil prices, implying that the transmission mechanism extends beyond export revenues (Daradkah et al., 2021). Research on oil-exporting countries similarly demonstrates that oil prices, exchange rates, and their respective uncertainties shape labor-market outcomes in asymmetric ways (Shavvalpour Arani et al., 2024). Furthermore, risk transmission between oil-price shocks and major equity indices varies across bull and bear markets and across time horizons, suggesting that the macroeconomic implications of oil volatility are state-dependent and nonlinear (Mensi et al., 2025). Such evidence reinforces the need for analytical frameworks capable of capturing dynamic, interdependent, and possibly asymmetric responses.

Structural Vector Autoregression (SVAR) models are particularly well suited to this task because they allow researchers to identify structurally meaningful shocks and distinguish contemporaneous from long-run effects among interrelated macroeconomic variables. Unlike purely reduced-form specifications, SVAR models can impose theoretically grounded restrictions that help isolate oil-price shocks, inflation shocks, governance-related shocks, and production responses within a coherent dynamic system. This is especially useful in economies like Iran, where oil prices, inflation, institutional quality, and GDP are jointly determined and where simple single-equation models may obscure causal structure. The recent literature on oil-market sentiment and macroeconomic variables further supports the use of structurally informed dynamic models, as the effects of oil-related disturbances are shown to unfold over time and across multiple macroeconomic dimensions (De Medeiros et al., 2023). By embedding political-risk indicators and governance variables within an SVAR framework, it becomes possible to assess not only whether these shocks matter, but also how their effects evolve and dissipate.

The present study is also relevant from a policy perspective. For oil-dependent economies, macroeconomic stabilization requires more than reactive management of oil revenues; it requires institutional capacity to absorb uncertainty, maintain policy credibility, and prevent transitory shocks from becoming persistent output losses. Evidence from monetary-policy spillovers and firm-level transmission mechanisms indicates that international shocks can propagate strongly into domestic economies when underlying vulnerabilities are not contained (Arbatli-Saxegaard et al., 2022). At the firm and market level, oil-related shocks are increasingly associated with volatility in financial reporting, market expectations, and balance-sheet behavior, including in downstream oil industries (Zamanianfar et al., 2026). These patterns imply that the interaction between political conditions and oil-price fluctuations may have consequences extending from macroeconomic aggregates to sectoral and corporate outcomes.

From a theoretical standpoint, the relationship among oil prices, political risk, and GDP is neither purely direct nor purely exogenous. Oil-price shocks may worsen inflation, weaken investment confidence, and reduce output, but the magnitude of these effects depends on governance quality and institutional effectiveness. Political stability may mitigate the adverse effects of external shocks by anchoring expectations and enabling coherent policy responses, whereas political instability may intensify uncertainty and amplify downturns. Regulatory quality and rule of law may influence how quickly markets adjust, how effectively resources are reallocated, and how credible fiscal and monetary interventions appear to economic agents. Thus, the interaction between oil prices and political risk should be modeled explicitly rather than assumed to be additive or separable. This view is consistent with the broader literature on oil-market relations, institutional environments, and uncertainty transmission (Cappelli et al., 2023; Lan et al., 2023; Magazzino et al., 2023; Zhao et al., 2024).

Although prior studies have examined separate links among oil prices, inflation, unemployment, stock markets, and uncertainty, fewer studies have integrated political-risk dimensions such as political stability, rule of law, government effectiveness, and regulatory quality into a unified macroeconomic model of GDP for Iran. Existing Iranian studies provide important evidence on oil and macroeconomic performance (Ghalevandi & Zandi, 2021; Sanjari Kenarsandal et al., 2022; Sharifi & Hosseini, 2024), while international studies document the broader significance of oil volatility, systemic risk, and institutional quality (Chatziantoniou et al., 2025; Ghazouani & Basty, 2023; Mensi et al., 2025). However, the joint dynamic effects of oil-price shocks and political-risk shocks on GDP in Iran remain underexplored, particularly within a structural cyclical modeling framework that can capture interaction effects and long-run equilibrium behavior. This gap is analytically important because it concerns not only how external commodity shocks affect output, but also how governance quality conditions national resilience to those shocks.

Given these considerations, the present study contributes to the literature by linking macroeconomic instability, political-risk shocks, and oil-market volatility within a structural dynamic framework tailored to the Iranian economy. By incorporating political stability, rule of law, government effectiveness, regulatory quality, oil-price fluctuations, inflation, and their interactions into an SVAR setting, the study seeks to provide a more comprehensive account of GDP dynamics under conditions of uncertainty. Such an approach can enrich both the empirical literature on oil-dependent economies and the policy debate on stabilization, governance reform, and resilience in the face of external shocks. Accordingly, the aim of this study is to investigate the impact of political-risk shocks and crude-oil price shocks on gross domestic product in Iran using structural cyclical models.

2. Methods and Materials

The present study is categorized as applied research and adopts a descriptive-analytical approach in terms of its nature. In terms of statistical data collection, it falls within the category of ex post facto research. The statistical population of this study pertains to Iran, and the time period under investigation spans from 1991 to 2023.

In this study, following De Medeiros et al. (2023), the impact of political risk shocks and crude oil price shocks on gross domestic product (GDP) in Iran is examined using structural cyclical models. In the following structural equation, it is clearly observable that, due to the shock effects of political risk in the oil market, the variables of political stability, rule of law, government effectiveness, and regulatory quality are incorporated into the equation. Subsequently, due to the interaction between political risk and the oil market, the oil price variable enters the equation, and their effects—considering global financial crises and the COVID-19 pandemic—on inflation and production in Iran are analyzed. Therefore, the ordering of the structural equations in the matrix is designed based on the economic conditions of Iran.

$$\Delta \ln Y_t = A(L)Y_{t-1} + E_t$$

The left-hand side of the above equation represents the first difference of the logarithm of the dependent variables. On the right-hand side, the matrix $A(L)$is a square matrix containing polynomials in terms of the lag operator. For instance, the element in the i-th row and j-th column of the matrix $A(L)$, denoted as $a_{ij}(L)$, represents the response of the i-th variable to the j-th structural variable. The vector $E = [u_{ij}]$includes the structural disturbance terms, which are defined as follows: shocks related to political stability, shocks related to rule of law, shocks related to government effectiveness, shocks related to regulatory quality, shocks related to oil prices, shocks related to the global financial crisis of 2008 and the global health crisis of 2020, shocks related to inflation rate, and shocks related to production. In the Blanchard–Quah identification approach (1989), the identification of structural shocks is carried out by imposing a set of long-run restrictions on the effects of shocks on certain variables.

3. Findings and Results

Initially, to ensure the absence of spurious regression, stationarity and cointegration tests are employed. In this study, the conventional Phillips–Perron (PP) test is utilized.

Table 1

Results of the Phillips–Perron (PP) Test on Model Variables

Variable Status	Probability	PP Statistic	Variable
Non-stationary	0.1267	-3.08	GDP
I(1)	0.0000	-9.79	D(GDP)
Non-stationary	0.1487	-2.99	GE
I(1)	0.0000	-10.18	D(GE)
Non-stationary	0.3367	-2.47	OP
I(1)	0.0005	-5.47	D(OP)
Non-stationary	0.3692	-2.40	PS
I(1)	0.0000	-6.61	D(PS)
Non-stationary	0.8200	0.20	RL
I(1)	0.0001	-18.75	D(RL)
Non-stationary	0.9100	0.48	RQ
I(1)	0.0000	-13.63	D(RQ)
Non-stationary	0.7040	0.05	INF
I(1)	0.0000	-9.69	D(INF)

Based on the theoretical foundations of stationarity tests, the null hypothesis H_0in these tests indicates non-stationarity of variables. Considering the calculated probabilities for each variable in the model, all variables become stationary at first difference, i.e., they are integrated of order one $I(1)$.

Initially, since the variables in the model share the same order of integration $I(1)$, the Johansen–Juselius method is employed to test for the existence of a long-run equilibrium relationship among the variables. To implement this test, the number of cointegrating vectors must be determined. For interpreting the cointegration test results, it is necessary to select an appropriate model regarding the presence or absence of a deterministic trend and intercept in the cointegration vector. In this regard, five models are considered: the first model includes neither intercept nor trend; the second model includes a restricted intercept without a trend; the third model includes an unrestricted intercept without a trend; the fourth model includes an unrestricted intercept with a restricted trend; and the fifth model includes both an unrestricted intercept and an unrestricted trend. These five models range from the most restricted (Model 1) to the least restricted (Model 5).

Subsequently, the null hypothesis of no cointegrating vector is tested against the existence of one cointegrating vector, followed by testing the hypothesis of at most one cointegrating vector against the existence of two. This process continues until $n-1$cointegrating vectors (where $n$is the number of variables) are identified. The summary of the Trace test $(\lambda_{Trace})$and Maximum Eigenvalue test (λ_{Max})results for determining the number of cointegrating vectors under the five specified models is presented in Table 2. As observed, the null hypothesis of no cointegrating vector is rejected, indicating the existence of at least one cointegrating relationship among the variables.

Table 2

Summary of the Number of Cointegrating Vectors

Model	Model 1	Model 2	Model 3	Model 4	Model 5
Trace Test	4	6	4	3	4
Max-Eigenvalue Test	2	3	2	1	2

The estimation results of the model and the associated cointegration tests are reported in Table 3. Based on the Trace test results, the existence of four cointegrating vectors is confirmed, while the Maximum Eigenvalue test indicates the presence of two cointegrating vectors at the 5% significance level. As noted by Søren Johansen, in cases of inconsistency between the two tests, the Maximum Eigenvalue test is preferred due to its stronger alternative hypothesis. Therefore, the presence of four cointegrating vectors among the model variables can be accepted.

Table 3

Results of the Cointegration Test

Max-Eigen Statistic	95% Critical Value	Probability	Trace Statistic	95% Critical Value	Probability	H1	H0
79.01611	40.07757	0.0000	190.2576	95.75366	0.0000	r=1	r=0
60.74473	33.87687	0.0000	111.2415	69.81889	0.0000	r=2	r≤1
20.02921	27.58434	0.3391	50.49676	47.85613	0.0276	r=3	r≤2
18.46238	21.13162	0.1135	30.46755	29.79707	0.0418	r=4	r≤3
10.12059	14.26460	0.2041	12.00517	15.49471	0.1567	r=5	r≤4
1.884585	3.841466	0.1698	1.884585	3.841466	0.1698	r=6	r≤5
14.26460	50.52698	0.0644	3.841466	4.139368	0.0054	r=7	r≤6
145.7896	125.6154	0.0016	370.6603	239.2354	0.0000	r=8	r≤7

After determining the stationarity of the model variables, the first issue in Vector Autoregression (VAR) models is the selection of the optimal lag length. In this study, the Schwarz–Bayesian Criterion (SC), Akaike Information Criterion (AIC), Final Prediction Error (FPE), Hannan–Quinn Criterion (HQ), and Likelihood Ratio (LR) test are employed for lag selection. The results reported in Table 4 indicate that, based on the LR, FPE, AIC, and HQ criteria, a lag length of one is selected as the optimal lag for the model. Similarly, the Schwarz–Bayesian criterion also selects lag one as the optimal lag. Ultimately, since the Schwarz–Bayesian criterion follows the principle of parsimony—placing greater emphasis on reducing the number of parameters or simplifying the model rather than improving fit—it is more appropriate for small sample sizes, particularly the sample used in this study. Therefore, lag one is selected as the optimal lag length for the model.

Table 4

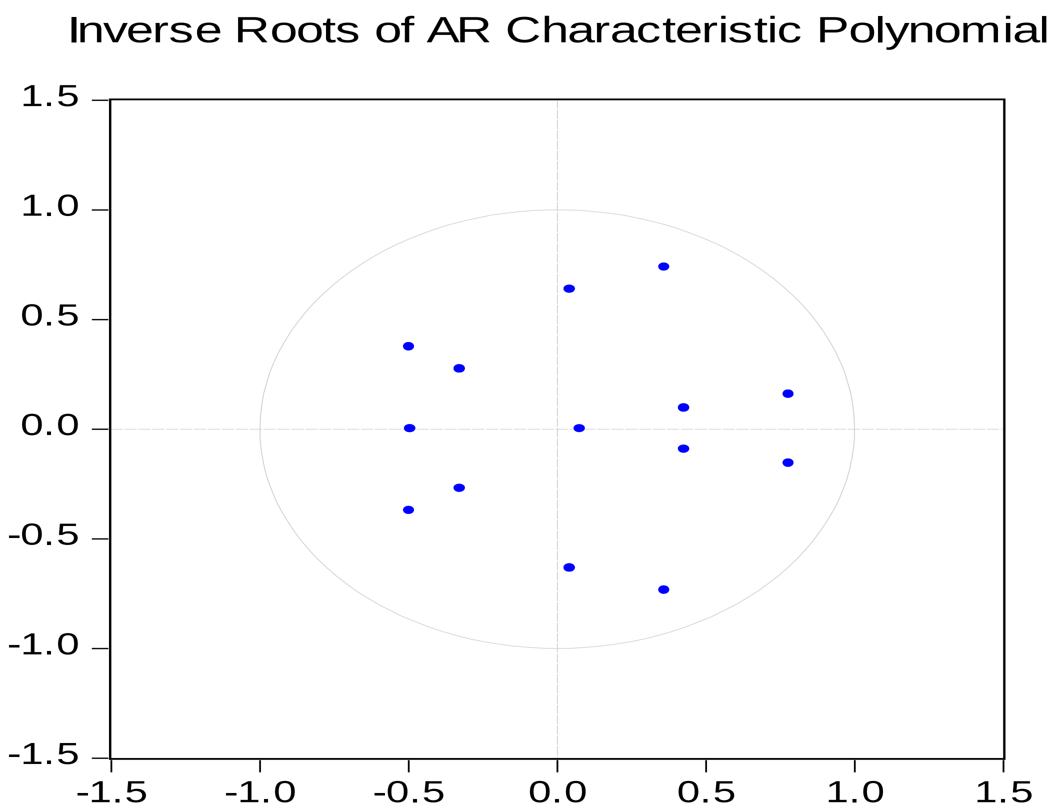
Determination of Optimal Lag Length in the VAR Model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-290.0005	—	1.854921	20.48279	20.81283	20.58615
1	-139.1055	218.5375*	0.001824*	13.45555	16.09585*	14.28246*
2	-88.79367	48.57693	0.003262	13.36508*	18.31563	14.91553

To ensure that the regression is not spurious, the unit root of the entire regression system is also examined. If the SVAR model is unstable, the estimated results are not reliable. To assess the stability of the estimated model, the AR characteristic roots diagram is used. This diagram displays the inverse roots of the characteristic polynomial of an autoregressive (AR) process. If the absolute values of all roots are less than one and lie within the unit circle, the estimated SVAR model is stable. The AR diagram presented in Figure 1 shows that the inverse roots of all characteristic roots lie within the unit circle; therefore, the estimated SVAR model satisfies the stability condition.

Figure 1

Unit Root Stability Test



The results of the SVAR model, examining the response of gross domestic product (GDP) to fluctuations in crude oil prices and political risk, are reported in Table 5. This table represents the system of equations for structural shocks and reduced-form shocks.

Table 5

Estimation of the Long-Run Equilibrium Relationship for the Research Model

Variable (Shock Coefficient in GDP Equation)	Coefficient	Standard Error	Test Statistic	Probability
Oil Price Volatility Shock	-0.329059	0.136048	-2.418698	0.0234
Political Stability Shock	0.356254	0.142352	2.502627	0.0202
Rule of Law Shock	0.120152	0.031329	3.835169	0.0001
Government Effectiveness Shock	0.158886	0.075984	2.091051	0.0419
Regulatory Quality Shock	0.027478	0.009527	2.884224	0.0184
Inflation Rate Shock	-0.433451	0.159418	-2.718959	0.0218
PS × OP Shock	0.016559	0.007091	2.335214	0.0355

To examine the statistical significance of the coefficients of independent variables in the model, the t-statistic is used. The null hypothesis in the t-test is defined as:

$$H_0: \beta_i = 0$$

The test statistic is calculated as:

$$t = \frac{\hat{\beta}_i}{SE(\hat{\beta}_i)}$$

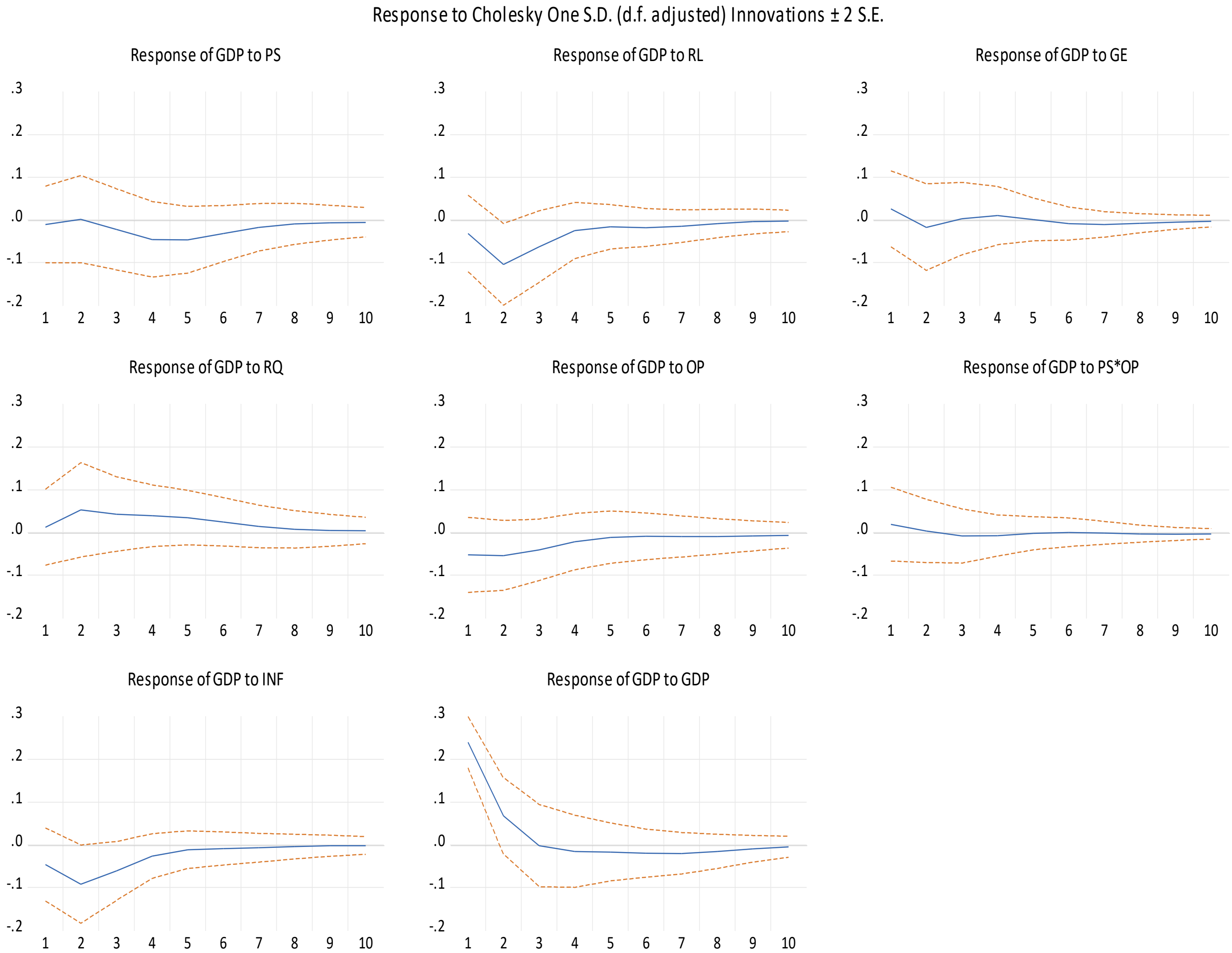
For decision-making regarding the acceptance or rejection of the null hypothesis, the calculated t-statistic is compared with the critical value from the t-distribution with $(N-K)$degrees of freedom at the 95% confidence level. If the absolute value of the calculated t-statistic exceeds the critical value, i.e., $|\ t\ |> t_{critical}$, the test statistic falls within the rejection region, and the null hypothesis $H_0$is rejected. In this case, the coefficient is statistically significant at the 95% confidence level, indicating the existence of a relationship between the independent and dependent variables.

The results obtained from the estimation of the SVAR model indicate that the coefficients of the main variables and the interacting shocks in the matrix equations are statistically significant and consistent with the economic conditions of Iran. The most important variables identified in the SVAR model results show that shocks arising from oil price volatility and inflation lead to a decrease in GDP, whereas shocks related to political stability, rule of law, government effectiveness, regulatory quality, and the interaction term (PS × OP) lead to improvements in GDP. Specifically, a shock originating from oil price volatility reduces GDP by approximately 32%, while an inflation shock leads to a 43% decrease in GDP. In contrast, a political stability shock increases GDP by approximately 35%. The responses of GDP to shocks in rule of law, government effectiveness, and regulatory quality are approximately 12%, 15%, and 2%, respectively.

In order to properly analyze the long-run equilibrium results of the Structural Vector Autoregression (SVAR) model, it is necessary to examine impulse response functions (IRFs) and variance decomposition. In fact, the SVAR model provides two powerful tools for analyzing economic fluctuations: impulse response functions (IRF) and variance decomposition. Therefore, after estimating the SVAR model, the results of IRFs and variance decomposition are analyzed. An impulse response function reflects the effects of a one standard deviation shock to the endogenous variables in the model. In the model used in this study, the response of GDP to a one standard deviation shock in each endogenous variable—including political stability, rule of law, government effectiveness, regulatory quality, crude oil price fluctuations, inflation rate, and PS × OP—is illustrated in Figure 2. The horizontal axis represents time in annual periods, and the vertical axis represents the percentage change in the variable.

Figure 2

Impulse Response Function Results for the Model



The results of the impulse response functions indicate that the response of GDP to shocks arising from political stability, rule of law, government effectiveness, regulatory quality, crude oil price fluctuations, and inflation ultimately converges to zero in the long run.

Variance decomposition allows for the examination of the extent to which changes in a time series are influenced by its own innovations and by shocks to other variables within the system {Enders, 2006}. Variance decomposition separates the variation in an endogenous variable into components attributable to shocks in other endogenous variables. In this method, the contribution of shocks to different variables in explaining the forecast error variance of a given variable is determined. Accordingly, it becomes possible to measure the contribution of each variable to the fluctuations of other variables over time. In essence, variance decomposition reveals the share of each shock in predicting a specific variable. The variance decomposition results for GDP are presented in Table 6. Variance decompositions are defined such that, in the initial period (short run), fluctuations in each variable are primarily explained by its own shocks. However, over longer time horizons, the contribution of other variables increases depending on their relative importance.

Table 6

Variance Decomposition for the Model (Dependent Variable: GDP)

Period	S.E.	GDP	RL	GE	OP	RQ	PS×OP	INF	PS
1	0.078659	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.106636	68.06060	7.567909	0.971346	12.56272	2.925555	0.044407	1.604174	6.263282
3	0.118113	58.57896	9.507609	3.141036	12.11405	3.858210	0.083508	2.229819	10.48681
4	0.123201	54.69497	9.685239	3.621176	11.72746	5.089541	0.278208	2.335043	12.56837
5	0.125371	53.39519	9.509780	3.761881	11.58889	5.882515	0.512188	2.338420	13.01114
6	0.126674	52.80393	9.410432	3.788933	11.64449	6.407151	0.657978	2.354059	12.93303
7	0.127687	52.37470	9.403306	3.801610	11.75851	6.730806	0.730895	2.411335	12.78883
8	0.128514	52.01358	9.449062	3.801420	11.87015	6.938084	0.767288	2.486341	12.67407
9	0.129144	51.75033	9.492811	3.795484	11.95625	7.066367	0.787590	2.546906	12.60426
10	0.129597	51.57627	9.519695	3.789321	12.01848	7.144463	0.799476	2.584525	12.56777

Based on the estimated model, the variance decomposition of the model variables is presented in Table 6. The S.E. column shows the forecast error of the respective variables over different periods. Since this error is calculated cumulatively based on the previous period's error and arises from changes in current values and future shocks, it increases over time. The results indicate that the forecast error is approximately 0.07 in the first period and 0.10 in the second period, and it increases over time. The remaining columns represent the percentage of variance attributable to each specific shock. According to the variance decomposition results, in the short run (periods 2 and 3), the greatest impact on GDP is attributed to political stability and crude oil price fluctuations. In the long run, these two variables continue to play the most significant role, each contributing approximately 12% to GDP fluctuations. Following these variables, the rule of law has the next highest impact on GDP fluctuations.

4. Discussion and Conclusion

The findings of the present study provide robust empirical evidence on the dynamic and structurally interdependent relationship between political-risk shocks, crude oil price fluctuations, and gross domestic product (GDP) in Iran. The estimation results derived from the Structural Vector Autoregression (SVAR) model indicate that shocks originating from oil price volatility and inflation exert statistically significant and negative effects on GDP, whereas shocks related to political stability, rule of law, government effectiveness, regulatory quality, and the interaction term between political stability and oil prices (PS × OP) have positive and significant impacts on economic output. These findings are consistent with the theoretical expectation that macroeconomic instability, particularly in oil-dependent economies, is largely driven by external commodity shocks and internal structural and institutional conditions.

The negative and statistically significant coefficient associated with oil price volatility shocks highlights the destabilizing role of oil-market uncertainty in Iran's economy. This result suggests that fluctuations in oil prices, rather than their level per se, play a critical role in shaping economic performance. Oil price volatility generates uncertainty in government revenues, disrupts fiscal planning, affects exchange rates, and ultimately reduces investment and production. This finding aligns with previous empirical evidence demonstrating that oil-price shocks significantly influence macroeconomic and financial variables across emerging markets (Magazzino et al., 2023; Mensi et al., 2025). In the context of Iran, similar results have been reported, indicating that oil-price changes and uncertainties negatively affect growth, inflation, and labor-market conditions (Ghalevandi & Zandi, 2021; Sharifi & Hosseini, 2024). Moreover, the findings are consistent with studies that emphasize the transmission of oil shocks to financial markets and broader economic systems, thereby reinforcing the systemic nature of oil-price volatility (Agarwalla et al., 2021; Chatziantoniou et al., 2025).

The results also reveal a strong negative impact of inflation shocks on GDP, which underscores the role of macroeconomic instability in constraining economic growth. Inflationary pressures often emerge as a consequence of oil-price fluctuations, exchange-rate depreciation, and expansionary fiscal policies in oil-dependent economies. In Iran, inflation has historically been a key channel through which external shocks affect real economic activity. The negative relationship identified in this study is consistent with prior research showing that macroeconomic instability and inflation reduce economic efficiency, discourage investment, and weaken output growth (Algozhina, 2022; Gong et al., 2022). Furthermore, the interaction between inflation and oil-price shocks may amplify economic downturns, as suggested by studies that highlight the nonlinear and asymmetric effects of oil-related disturbances on macroeconomic variables (Sanjari Kenarsandal et al., 2022; Shavvalpour Arani et al., 2024).

In contrast, the positive and statistically significant effects of political stability on GDP indicate that institutional and governance-related factors play a crucial role in mitigating the adverse effects of external shocks. Political stability enhances investor confidence, reduces uncertainty, and facilitates long-term economic planning. The magnitude of the positive coefficient suggests that improvements in political stability can substantially offset the negative impacts of oil-price volatility and inflation. This finding is supported by empirical studies demonstrating that political stability and institutional quality are key determinants of economic performance in both developed and developing economies (Cappelli et al., 2023; Lan et al., 2023). Additionally, the role of political stability in moderating the effects of oil shocks is consistent with research showing that geopolitical risk influences financial markets and economic outcomes through uncertainty channels (Alqahtani et al., 2021; Zhao et al., 2024).

The positive contributions of rule of law, government effectiveness, and regulatory quality further reinforce the importance of governance indicators in shaping economic resilience. These variables reflect the institutional capacity of the state to design and implement effective policies, enforce contracts, and maintain regulatory consistency. The findings suggest that stronger institutions not only support economic growth directly but also enhance the economy's ability to absorb and adjust to shocks. This is in line with studies indicating that institutional quality improves financial stability and reduces systemic risk (Ghazouani & Basty, 2023). In the Iranian context, the relevance of governance factors has been emphasized in analyses of political economy and policy effectiveness, which highlight the role of institutional structures in determining macroeconomic outcomes (Hosseini & Dadras Moghaddam, 2022; Noudijeh, 2021).

Another important finding of the study is the positive and significant effect of the interaction term (PS × OP), which captures the joint influence of political stability and oil prices. This result suggests that the impact of oil-price changes on GDP is conditional upon the level of political stability. In other words, oil-price shocks may have less adverse—or even beneficial—effects in a stable political environment. This interaction effect highlights the nonlinear and context-dependent nature of oil-price transmission mechanisms. Similar conclusions have been drawn in recent studies that emphasize the interconnectedness of oil markets, political conditions, and macroeconomic variables (De Medeiros et al., 2023; Lan et al., 2023). The finding also supports the argument that governance quality can transform external shocks into opportunities for growth, rather than sources of instability.

The impulse response function (IRF) analysis provides additional insights into the dynamic behavior of GDP in response to various shocks. The results indicate that the effects of shocks to political stability, rule of law, government effectiveness, regulatory quality, oil-price volatility, and inflation gradually dissipate over time, converging toward zero in the long run. This pattern suggests that the Iranian economy exhibits a degree of mean reversion, where short-term disturbances do not permanently alter the trajectory of output. However, the speed and magnitude of adjustment vary across different shocks, reflecting differences in transmission mechanisms and persistence. This finding is consistent with previous research showing that macroeconomic responses to shocks are time-dependent and influenced by structural characteristics of the economy (Fan et al., 2021; Mensi et al., 2025).

The variance decomposition results further confirm the relative importance of political stability and oil-price volatility in explaining GDP fluctuations. In the short run, GDP variations are primarily driven by its own shocks, but the contribution of political stability and oil-price shocks increases significantly over time. In the long run, these two variables account for a substantial share of GDP variance, indicating their dominant role in shaping economic dynamics. This finding aligns with studies demonstrating that oil shocks and political risk are key drivers of macroeconomic variability in oil-dependent economies (AlRefai et al., 2022; Daradkah et al., 2021). It also supports the view that external shocks become more influential over longer horizons as their effects propagate through multiple channels of the economy.

The results of this study also resonate with the broader literature on uncertainty and economic performance. Recent advances in forecasting and modeling techniques, including machine learning approaches, have highlighted the increasing complexity of oil-price dynamics and their interactions with macroeconomic variables (Ibrahim et al., 2025; Wu et al., 2026). These developments underscore the importance of incorporating multiple sources of uncertainty, including political and institutional factors, into macroeconomic models. By adopting a structural approach, the present study contributes to this line of research by providing a comprehensive framework for analyzing the joint effects of oil-price and political-risk shocks.

Furthermore, the findings have important implications for understanding the role of global crises, such as the COVID-19 pandemic and financial crises, in shaping macroeconomic outcomes. The inclusion of crisis-related shocks in the model reflects the reality that oil markets and political systems are increasingly interconnected with global events. Previous studies have shown that such crises can amplify the effects of oil-price shocks and exacerbate economic instability (Akl, 2021; Sanei Far et al., 2020). The results of this study suggest that strengthening institutional resilience and improving governance quality can help mitigate these effects and enhance economic stability.

Overall, the empirical evidence presented in this study highlights the central role of political risk and governance quality in determining the macroeconomic impact of oil-price shocks in Iran. The findings demonstrate that while oil-price volatility and inflation have adverse effects on GDP, improvements in political stability and institutional quality can significantly enhance economic performance and resilience. These results contribute to the existing literature by integrating political and economic dimensions within a unified analytical framework and provide valuable insights for policymakers seeking to manage macroeconomic instability in oil-dependent economies.

The study is subject to several limitations that should be acknowledged. First, the analysis is based on aggregate macroeconomic data, which may mask heterogeneity across sectors and regions within the economy. Second, the measurement of political risk and governance indicators relies on composite indices, which may not fully capture the complexity of institutional dynamics. Third, the SVAR model, while powerful, depends on identifying restrictions that may influence the interpretation of structural shocks. Finally, the study period, although relatively long, may still be insufficient to capture structural breaks and regime changes in the Iranian economy.

Future research can build upon this study by incorporating sectoral data to examine the differential impact of oil-price and political-risk shocks across industries. Additionally, the use of nonlinear and regime-switching models may provide deeper insights into the asymmetric effects of shocks under different economic conditions. Further studies could also explore the role of external factors such as international sanctions, global financial integration, and energy transition policies in shaping macroeconomic dynamics. Moreover, integrating high-frequency data and advanced machine-learning techniques may improve the accuracy and predictive power of macroeconomic models.

From a practical perspective, the findings suggest that policymakers should prioritize enhancing political stability, strengthening institutional quality, and improving regulatory frameworks to mitigate the adverse effects of oil-price volatility. Diversifying the economic structure and reducing dependence on oil revenues can also help increase resilience to external shocks. Additionally, maintaining macroeconomic stability through prudent fiscal and monetary policies is essential for controlling inflation and supporting sustainable economic growth.

Authors' Contributions

Authors contributed equally to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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