Nonlinear Interactions of Exchange Rate and Stock Market in Iran

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Abstract: A group of economists believes that with the increase and severe fluctuations in the exchange rate, the stock market, due to the rising stock prices, serves as a suitable haven for individuals' assets. However, others argue that with the sharp increase in the exchange rate and the associated risk, individuals lose interest in investing in the stock market. This study examines the effects of the exchange rate on the stock market and the changes in stock market prices on the exchange rate during the period from 1983 to 2021 using the nonlinear Markov-switching method. The results indicate that the effect of the exchange rate on stock market prices is significant, and the means in the first and second regimes of the model are also significant. For a one percent increase in the exchange rate, the stock market price index increases by 0.65 percent. This hypothesis is confirmed and aligns with flow-oriented models. Flow-oriented models assume that a country's current account and balance of payments are two important determinants of the exchange rate. Accordingly, changes in the exchange rate affect international competitiveness and the trade balance, thereby impacting real economic variables such as production and income, as well as the future and current cash flows of companies and their stock prices. The results show a positive effect of stock prices on the exchange rate, which is statistically and theoretically significant. For a one percent increase in stock prices, the exchange rate decreases by 0.21 percent, which is also statistically and theoretically significant.

Keywords: Nonlinear, Exchange Rate, Stock Market, Markov-Switching, Iranian Economy

1. Introduction

The interaction between stock markets and macroeconomic factors, such as exchange rates, oil prices, inflation, and interest rates, has long been a central focus in economic research. Particularly in developing economies, where stock markets are often subject to greater volatility due to external factors such as international trade relationships, currency fluctuations, and geopolitical tensions, understanding these dynamics is crucial for investors, policymakers, and academics alike. Among the macroeconomic variables influencing stock markets, exchange rate fluctuations and oil price shocks are of paramount importance, especially for countries reliant on oil exports. In this context, the Iranian economy, which is heavily dependent on oil revenues, provides a compelling case for studying the intricate relationship between these factors and stock market behavior [1, 2].

Exchange rate volatility has been shown to have significant implications for financial markets. As global financial markets become increasingly interconnected, fluctuations in exchange rates can have ripple effects on various economic sectors, including stock markets [3]. In particular, the exchange rate's impact on stock prices is particularly pronounced in oil-dependent economies, such as Iran, where exchange rate movements often reflect changes in oil prices or broader economic conditions [4]. The Iranian stock market, particularly the Tehran Stock Exchange (TSE), has long been subject to such fluctuations, driven by external factors such as the sanctions regime and global commodity price movements. For instance, the imposition of international sanctions on Iran has led to significant depreciation of the Iranian Rial, which in turn has affected stock prices, investor confidence, and market liquidity [5]. Understanding the role of exchange rate volatility in the Iranian market is thus crucial for developing effective economic policies and investment strategies.

Oil price shocks represent another significant factor that can shape stock market dynamics. Iran, being a major oil exporter, is especially vulnerable to changes in global oil prices. As oil revenues constitute a substantial portion of the country's national income, any fluctuation in oil prices directly affects the economy, and by extension, stock market performance [6]. The impact of oil price volatility on stock markets is not uniform, however. In oil-exporting countries like Iran, rising oil prices tend to bolster stock market performance due to increased national revenue, whereas declining oil prices can lead to economic contraction, reduced government spending, and lower corporate profits, all of which negatively affect the stock market [3]. Studies examining the effects of oil price shocks on stock markets have produced mixed results, with some finding positive relationships between oil prices and stock returns, while others suggest that oil price shocks lead to increased market volatility and reduced investor confidence [7].

The relationship between exchange rates, oil prices, and stock prices in Iran has been further complicated by macroeconomic factors such as inflation, interest rates, and government monetary policy. Inflation, particularly in countries experiencing high levels of currency devaluation, tends to erode the real value of investments, thereby influencing stock market returns. In the case of Iran, inflationary pressures, exacerbated by exchange rate depreciation and external economic sanctions, have contributed to heightened stock market volatility [2]. Furthermore, the Iranian government's monetary policies, including decisions related to interest rates and foreign exchange controls, play a significant role in determining the broader economic environment in which stock markets operate [8]. As such, the interplay between these macroeconomic variables creates a complex web of influences that requires careful analysis to understand fully.

One of the most significant challenges in studying stock market dynamics in Iran lies in the limited availability and reliability of financial data. The Iranian financial system has long been characterized by opacity, with limited access to market information and a lack of transparency in corporate financial reporting [9]. This issue has been exacerbated by the international sanctions regime, which has restricted access to foreign financial markets and limited the ability of Iranian companies to raise capital from international investors. As a result, Iranian investors are often left with little information about the underlying factors influencing stock prices, which can lead to suboptimal investment decisions and heightened market volatility. Despite these challenges, recent advances in econometric modeling and data analysis techniques have enabled researchers to better understand the relationship between macroeconomic factors and stock market performance in emerging economies, including Iran [10].

Several studies have attempted to examine the relationship between exchange rate fluctuations and stock market performance in the context of Iran. For instance, Askar et al. (2022) investigated the link between exchange rate movements and stock prices, highlighting how fluctuations in the Iranian Rial are often mirrored in the performance of the stock market. Similarly, Sadeghi et al. (2022) explored the role of financial intermediaries in shaping stock market dynamics, emphasizing how the volatility of exchange rates can influence investor behavior and market liquidity [2]. More recently, studies such as those by Abdulhadi et al. (2023) and Mamipour et al. (2022) have focused on the interaction between oil prices, exchange rate movements, and stock market returns, shedding light on the mechanisms through which oil price shocks transmit to the broader economy and affect investor sentiment [1, 7].

Despite the wealth of research in this area, there remains a significant gap in understanding the dynamic and interdependent relationship between exchange rates, oil prices, and stock market performance in Iran. Existing studies have often focused on one or two macroeconomic variables in isolation, with limited attention paid to the simultaneous effects of multiple factors. For example, while some studies have examined the impact of oil price shocks on stock market performance [3], few have explored how exchange rate movements interact with oil price volatility to influence stock returns in the Iranian context. Moreover, while macroeconomic factors such as inflation and interest rates are recognized as important determinants of stock market behavior, they have not been thoroughly integrated into existing models examining the exchange rate-stock market relationship [11]. This study aims to investigate how exchange rate volatility, oil price movements, and macroeconomic factors influence stock market performance in Iran, providing new insights into the mechanisms at play in an emerging market economy.

2. Methodology

This research is applied in terms of nature and objectives. Since this study uses documents, reports, and financial statements from the Central Bank to measure research variables and examine the impact of the exchange rate on the stock market price index, Iran has been selected as the geographical domain. For data analysis, the Markov-switching multivariate regression model was employed according to the research needs. The OxMetrics software was used for data analysis. The time domain of this study spans from the beginning of 1983 to the end of 2017. Due to the unavailability of some quarterly data, annual data were used.

The common method for studying the dynamic behavior of economic and financial variables is using time series models. These models are either linear models such as Autoregressive (AR) models and Moving Average (MA) models or nonlinear Markov-switching (MS) models. The Markov-switching model was first introduced by Quandt in 1972, Quandt and Goldfeld in 1973, and further developed by Hamilton in 1989, becoming known as the regime-switching model. In nonlinear models, it is assumed that the behavior of the variable to be modeled changes in different states. The Markov model is derived from Hamilton's business cycle model, which identified the cycle as a two-state process with random regime changes.

Markov-switching models are classified based on which part of the model depends on the regime. If the introduced model includes S_t values of 1, 2, ..., then depending on which component of the equation is dependent on the state variable, several scenarios arise. One advantage of the Markov-switching method over other methods is its flexibility, allowing for the presence of both permanent and temporary changes, which can occur repeatedly and for short periods.

This model endogenously determines the exact timing of changes and structural breaks, which is particularly significant in economic studies. The Markov-switching models generally include four types: Markov-switching in mean (MSM), intercept (MSI), heteroskedasticity (MSH), and autoregressive parameters (MSA). Various types of autoregressive models can be explained as follows:

Table 1. Different States of the Markov-Switching Model

Regime-dependent component	Distribution of error terms	Equation	Model name
Mean	$\varepsilon_t \sim IID(0, \sigma^2)$	$\Delta y_t - \mu(S_t) = c + \sum_{i=1}^{p} \alpha_i (\Delta y_{t-i}) \mu(S_{t-i}) + \varepsilon_t$	MSM(m)-AR(P)
Intercept	$\varepsilon_t \sim IID(0, \sigma^2)$	$\Delta y_t = c(S_t) + \sum_{i=1}^{p} \alpha_i (\Delta y_{t-i}) + \varepsilon_t$	MSI(m)-AR(P)
Variance of error terms	$\varepsilon_t \sim IID(0, \sigma^2(S_t))$	$\Delta y_t = c + \sum_{i=1}^{p} \alpha_i (\Delta y_{t-i}) + \varepsilon_t$	MSH(m)-AR(P)
Autoregressive coefficients	$\varepsilon_t \sim IID(0, \sigma^2)$	$\Delta y_t = c + \sum_{i=1}^{p} \alpha_i (S_t)(\Delta y_{t-i}) + \varepsilon_t$	MSA(m)-AR(P)

By combining the first and second states with the third and fourth models, more detailed models can be obtained. Table (1) summarizes the different states of the Markov-switching model. Before estimating the model, it is necessary to consider which component of the regression equation depends on the regime. If the mean of the equation is regime-dependent, it is denoted as MSM. If the intercept is regime-dependent, it is denoted as MSI. The difference between the first and second states is that regime changes in the first state occur gradually, while in the second state, these changes happen rapidly. In the third state, the variance of the error terms is regime-dependent and is denoted as MSH. In the fourth state, the autoregressive coefficients are regime-dependent and are denoted as MSA. In the third state, the variance of the error terms is regime-dependent, which is why the variance is considered as a function of S_t.

3. Findings and Results

Based on previous studies, theoretical foundations, and economic theories, the research model is as follows:

LSMP = F(LOP, LEXR, LINF)

LEXR = F(LOP, LSMP, LINF)

In the above equations, LINF represents the logarithm of the inflation rate in percentage (from Central Bank statistics), LOP is the logarithm of the price of Iranian light crude oil (in USD), LSMP is the logarithm of the stock market price index (unitless), and LEXR is the logarithm of the nominal exchange rate in rials (the prevailing exchange rate in the market).

The first equation examines the effect of the exchange rate on the stock market price index. The second equation shows the effect of changes in oil prices, stock market price index, and inflation rate on the nominal exchange rate. Data on inflation rates, oil revenues, and exchange rates were obtained from the Central Bank's time series data, and the stock market price index data were collected from the Tehran Stock Exchange Organization.

Two methods exist for examining nonlinear effects and estimating the desired regressions: the threshold method and the Markov-switching method. The threshold approach and other methods usually do not provide an exact time change in the strategic variable of the exchange rate. Our work employs the nonlinear Markov-switching model analysis, which specifies the exact timing of changes in the strategic exchange rate parameter and its number of regimes. Two important and common features in switching models that are absent in the threshold method are, first, that past states (regimes) can reoccur over time, and second, that the number of states (regimes) is limited, usually considered to be two and at most four.

The literature on ERPT dynamics is reported in several nonlinear studies and articles, indicating that the extent of exchange rate pass-through may be related to some macroeconomic variables. Markov-switching allows us to model long-term volatilities in data and discrete switches in series dynamics. These models assume that regimes are not directly observable but are determined by an unobservable stochastic process.

Markov-switching models are classified based on which part of the autoregressive model depends on the regime and is affected by it. What is mostly considered in economic studies includes four types of Markov-switching models: mean (MSM), intercept (MSI), autoregressive parameters (MSA), and heteroskedasticity in variance (MSH).

Using Akaike's criterion as well as likelihood ratio tests (LR), the degrees of autoregressive and moving average components are determined. Different MS models are estimated, and the model with the minimum Akaike value is selected as the best model. It is essential to note that two tests, maximum likelihood and Akaike's criterion, are used to explain the explanatory power of competing models. The first test has some drawbacks, and therefore, the results based on the Akaike statistic are considered more reliable. The likelihood function is not suitable as it does not account for degrees of freedom, whereas Akaike's criterion incorporates the degrees of freedom.

Table 2. LM Test Results

Coefficient	Statistic
245.658	Model 1: Log-likelihood
208.952	Model 2: Log-likelihood

Table 3. AIC-SC Test Results

Coefficient	Statistic
-3.44	Model 1: AIC
-2.73	Model 1: SC (Schwartz)
-3.15	Model 2: AIC
-2.85	Model 2: SC (Schwartz)

The most critical part of the results concerns whether the nonlinear model used in the research is appropriate and has contributed to increasing the explanatory power of the model. This test is also for setting constraints. In a nonlinear model, the mean differs, and each regime has its mean. The null hypothesis is that the means are equal, and the model is linear, while the alternative hypothesis is that the means are not equal, and the model is nonlinear. If the statistic obtained from this test is greater than the critical value of the $\chi 2$ distribution at the 0.95 level, the null hypothesis is rejected, indicating that the nonlinear model is more suitable. In this case, the Davies method can be used, which requires calculating the approximate distribution of the transition parameters, as shown under the upperbound approximate output.

Moreover, according to the Ang and Beckert method, due to the presence of the transition parameter in the alternative hypothesis, the chi-square statistic with 3 degrees of freedom should be referenced, as there is one constraint of equal means plus two transition parameters. As seen in Table 4, the obtained statistic exceeds the critical value of the $\chi 2$ distribution with three degrees of freedom. Based on the p-value, the null hypothesis is rejected at the 5% level, and therefore, the nonlinear model is considered more appropriate. In fact, in the nonlinear model, two means exist. The mean differs across regimes and states.

Linearity LR-test Results

Linearity LR-test Chi^2(3) = 143.01 [0.0000]** approximate upperbound: [0.0000]**

Linearity LR-test Chi^2(3) = 117.12 [0.0000]** approximate upperbound: [0.0000]**

To select the optimal model, the following procedure should be followed, with the optimal choice based on economic theory. The best fit and the highest explanatory power on the data must be achieved, as indicated by a high Log-likelihood value. However, since this criterion does not consider degrees of freedom, the minimum Akaike criterion should also be considered. Additionally, the optimal model should have the highest significance for the coefficients, particularly for the regime-dependent components. The standard deviation should also be minimal. Another criterion for model selection is ensuring the best alignment with theory, and the model with the most significant coefficients should be chosen. In this case, the significance of the regime-dependent components should be prioritized, and the error components' standard deviation should be minimal.

Various criteria exist for selecting the optimal model. Based on the minimum Akaike criterion, Model 2 is selected. However, based on the most significant estimated coefficients, Model 3 is selected. This model includes regime-dependent standard deviations, with each regime having a separate standard deviation.

In Markov-switching models, three essential issues must be addressed when selecting the optimal state in the absence of theory based on the Akaike criterion: the selection of lags based on the Akaike criterion and the determination of regimes based on the Akaike criterion. Therefore, different combinations of lags and regimes are considered in various estimation states, and the Akaike criterion for each combination and state is adjusted, as shown in the tables below.

Considering the above criteria, the second state is selected as the optimal state. This state includes an intercept dependent on the regime. In this case, classical assumptions must be met. Based on all four states, the nonlinear model is confirmed, and the nonlinear model is considered more appropriate than the linear method.

Based on Tables 4 and onwards, various switching models in all four states are considered with a maximum of three regimes and a maximum of two lags. Based on these estimates, different combinations of regimes and lags are considered, aiming for the lowest Akaike criterion and the highest explanatory power. Thus, the second state is chosen as the optimal state with the lowest Akaike criterion.

Table 4. Determining the Optimal State for Estimation Based on the Akaike Criterion in State 1

Regime/Lag	3	2
-3.10	-3.10	1
-3.10	-	3.25

Table 5. Determining the Optimal State for Estimation Based on the Akaike Criterion in State 2

Regime/Lag	3	2
-3.52	-	1
-	-2.56	2

Table 6. Determining the Optimal State for Estimation Based on the Akaike Criterion in State 3

Regime/Lag	3	2
-	-3.85	1
-	-3.85	2

Table 7. Determining the Optimal State for Estimation Based on the Akaike Criterion in State 4

Regime/Lag	3	2
-3.20	-2.99	2
-3.20	-2.99	3

The second state of the model involves a change in the intercept. The results indicate a high explanatory power of the model. If the mean of the equation is a function of the regime, it is represented by MSM. In this case, the number of regimes, representing the behavior of the variable in each state, is considered to be 2 and remains unchanged. The next step is to determine the number of autoregressive and moving average lags. In the second state, the default AR lag is 1. According to the results, the coefficient of the variable CONSTANT represents the intercept in the two regimes. The results of the second state are exactly the same as the first state, with the only difference being that in the first state, the CONSTANT variable is interpreted as the mean, while in the second state, it is interpreted as the intercept.

Table 8. Mean in Two Regimes

Probability	t-statistic	Coefficients	Mean	Regime
0.041	-2.04	-0.38	CONSTANT(1)	1
0.000	-4.01	-0.51	CONSTANT(2)	2

Table 9. Parameter Estimation Results for the Second State, Equation 1

t-statistic	prob	t-value	Standard Deviation	Coefficients	Variable Name
0.000	4.43	0.012	0.053	(DL2LSMP-1)	Lag 1 coefficient of dependent variable
0.001	3.61	0.018	0.065	(DL2LSMP-2)	Lag 2 of dependent variable
0.031	2.27	0.018	0.041	(DL2LSMP-3)	Lag 3 of dependent variable
0.003	2.47	0.174	0.43	(DL2LINF)	Inflation rate logarithm
0.00	6.5	0.100	0.65	(DL2LRE)	Exchange rate logarithm
0.018	2.83	0.113	0.32	(DPOIL)	Oil price changes
0.410	-1.07	0.235	-0.25	CONSTANT(1)	
0.003	-4.70	0.124	-0.58	CONSTANT(2)	

The results show a difference in the intercept between the first and second regimes. The coefficient of both is statistically significant. The results indicate a positive effect of inflation on stock market prices, which is significant both statistically and theoretically. Furthermore, the results reveal the significant impact of the exchange rate on stock market prices and the significant mean in both regimes 1 and 2. For a one percent increase in inflation, the stock market price index increases by 0.43 percent, which is significant both statistically and theoretically. For a one percent increase in the exchange rate, the stock market price index increases by 0.65 percent. The first lag of the dependent variable is significant, and the effect of oil price changes on the stock market price index is positive and significant. Assuming all other factors are constant, a one percent increase in oil prices leads to a 0.32 percent increase in the stock market price index.

In this method, in addition to the model's main parameters, the probabilities of transition and regime standard deviation are estimated, with results presented as follows. The standard deviation of error terms, transition probabilities from regime 0 to 0, and from regime 1 to 1 are estimated, as shown in Table 11. Based on Table 11, the standard deviation in the first state is not a function of the regime, and the estimated standard deviation is 0.003. Due to the existence of transition parameters in the model and the different states for the examined variables, these two parameters presented in Table 10 must be estimated.

Table 10. Results of Estimating Transition Parameters in State 1

Standard Deviation	Coefficients	Variable Name
0.002	0.044	SIGMA
0.33	0.68	P{0 | 0}
0.21	0.44	P{1 | 1}

The transition probability matrix (c) indicates the probability of remaining in regime 0 or transitioning to regime 1. If in regime 0 at time t, the probability of staying in regime 0 at time t+1 is 0.75, while the probability of transitioning to regime 1 is 0.14. If in regime 1 at time t, the probability of staying in regime 1 at time t+1 is 0.96, and the probability of transitioning to regime 0 is 0.021. Overall, the tendency to switch regimes at different times is low, with a higher tendency to remain in the same regime.

Table 11. Transition Probability Matrix

Regime 0, t	Regime 1, t
Regime 0, t+1	0.54
Regime 1, t+1	0.18

In Figure 1, the disturbances of the estimated model are shown. This chart, like the previous equation chart, has been normalized. In this case, where the standard deviation is not regime-dependent, no difference occurs between the error terms and normalized terms. In the upper-left of the chart, the red line represents the actual value of the dependent variable, and the blue line represents the fitted model. The closer the fitted line is to the red line, the higher the explanatory power of the model.

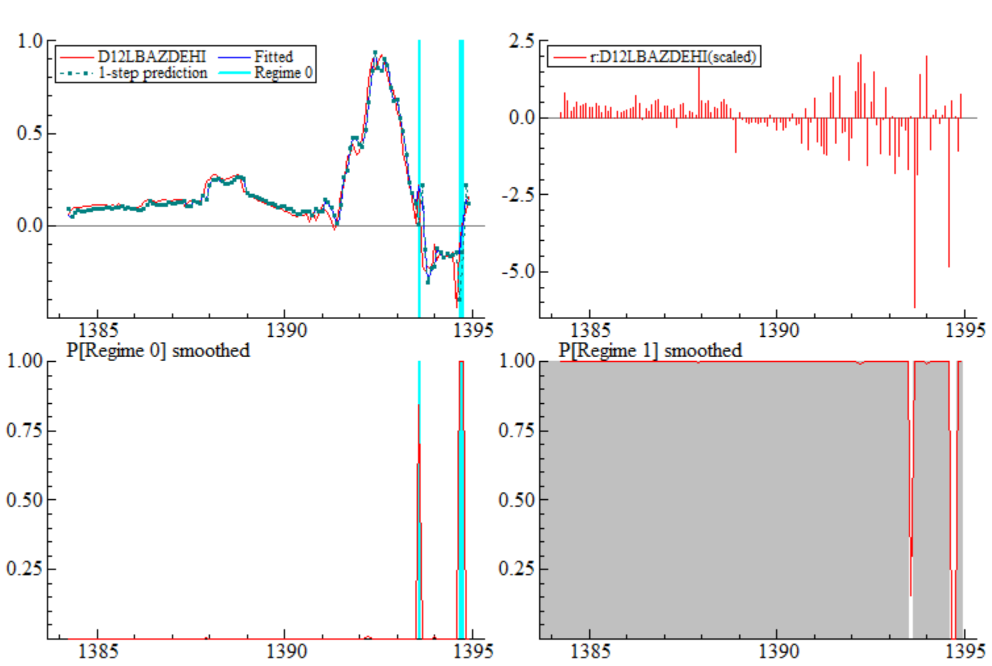

Figure 1. Disturbances and Explanatory Variable in State 2, Equation 1

The second state of the model in Equation 3 involves a change in the intercept. The results indicate a high explanatory power of the model. If the mean of the equation is a function of the regime, it is represented by MSM. In this case, the number of regimes, representing the behavior of the variable in each state, is considered to be 2 and remains unchanged. The next step is to determine the number of autoregressive and moving average lags. According to the results, the coefficient of the variable CONSTANT represents the intercept in the two regimes. The results of the second state are exactly the same as the first state, with the only difference being that in the first state, the CONSTANT variable is interpreted as the mean, while in the second state, it is interpreted as the intercept.

Table 12. Mean in Two Regimes

Probability	t-statistic	Coefficients	Mean	Regime
0.065	-1.65	-0.31	CONSTANT(1)	1
0.000	-4.56	-0.23	CONSTANT(2)	2

Table 13. Parameter Estimation Results for the Second State (Equation 3)

t-statistic	prob	t-value	Standard Deviation	Coefficients	Variable Name
0.000	5.45	0.008	0.043	(DL2LEXR-1)	Lag 1 coefficient of dependent variable
0.003	2.44	0.018	0.044	(DL2EXR-2)	Lag 2 of dependent variable
0.00	-3.43	0.023	0.079	(DL2LEXR-2)	Lag 3 of dependent variable
0.00	-4.66	0.045	0.21	(DL2LSPM)	Stock price logarithm
0.00	-3.85	0.132	0.51	(DL2LINFL)	Inflation rate logarithm
0.031	2.62	0.145	0.38	(DPOIL)	Oil price changes
0.410	-1.12	0.187	0.21	CONSTANT(1)	
0.000	-3.43	0.134	-0.46	CONSTANT(2)	

The results show a difference in the intercept between the first and second regimes. The results indicate a positive effect of stock prices on the exchange rate, which is significant both statistically and theoretically. The results also show the significance of the inflation rate logarithm and the mean in both regimes 1 and 2. For a one percent increase in stock prices, the exchange rate decreases by 0.21 percent, which is significant both statistically and theoretically. For a one percent increase in inflation, stock returns increase by 0.51 percent. The first lag of the dependent variable is significant, and the effect of oil price changes on the exchange rate is positive and significant.

In this method, in addition to the model's main parameters, the probabilities of transition and regime standard deviation are estimated, with results presented as follows. The standard deviation of error terms, transition probabilities from regime 0 to 0, and from regime 1 to 1 are estimated, as shown in Table 14. Based on Table 14, the standard deviation in the first state is not a function of the regime, and the estimated standard deviation is 0.001.

Table 14. Results of Estimating Transition Parameters in State 1

Standard Deviation	Coefficients	Variable Name
0.001	0.054	SIGMA
0.34	0.83	P{0 | 0}
0.021	0.54	P{1 | 1}

The transition probability matrix (c) indicates the probability of remaining in regime 0 or transitioning to regime 1. If in regime 0 at time t, the probability of staying in regime 0 at time t+1 is 0.64, while the probability of transitioning to regime 1 is 0.21. If in regime 1 at time t, the probability of staying in regime 1 at time t+1 is 0.96, and the probability of transitioning to regime 0 is 0.021. Overall, the tendency to switch regimes at different times is low, with a higher tendency to remain in the same regime.

Table 15. Transition Probability Matrix

Regime 0, t	Regime 1, t
Regime 0, t+1	0.64
Regime 1, t+1	0.21

In Figure 2, the disturbances of the estimated model are shown. This chart, like the previous equation charts, has been normalized. The upper-left section of the chart shows the red line representing the actual value of the dependent variable, and the blue line represents the fitted model. The closer the fitted line is to the red line, the higher the explanatory power of the model. As seen in the upper-left of the chart, the volatility in regime 1 is greater than in regime 2.

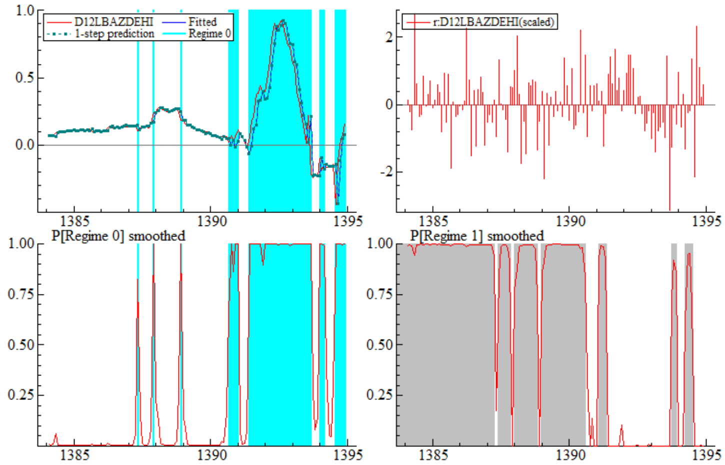

Figure 2. Disturbances and Explanatory Variable in State 3

4. Discussion and Conclusion

The results of this study provide important insights into the complex relationship between exchange rate volatility, oil price fluctuations, and stock market performance in Iran. Our findings suggest a significant correlation between exchange rate movements and stock prices, with fluctuations in the Iranian Rial having a direct impact on the performance of the Tehran Stock Exchange (TSE). Additionally, oil price volatility was found to be a critical factor influencing stock market performance, particularly due to Iran's reliance on oil revenues. These results align with previous research that has examined the interdependence of macroeconomic variables and stock market behavior in emerging economies, highlighting the importance of oil price movements and exchange rate volatility in shaping investor sentiment and market performance.

Several studies have explored the relationship between exchange rates and stock prices, with varying results depending on the economic context. For example, Askar et al. (2022) found a significant relationship between exchange rate movements and stock prices in Iran, with the Iranian Rial's depreciation correlating with a decrease in stock market performance [12]. This is consistent with our findings, which suggest that fluctuations in the exchange rate exacerbate stock market volatility, particularly during periods of economic uncertainty. The volatility of the Iranian Rial, often exacerbated by international sanctions, tends to increase investor risk perception, which, in turn, affects their behavior in the stock market. Similar findings have been reported by Hsueh et al. (2020), who demonstrated the linkage between exchange rate movements and stock price indices in South Africa, suggesting that exchange rate fluctuations are a key determinant of stock market behavior, especially in economies with heavy trade dependencies [11].

Moreover, the role of oil prices in influencing stock market dynamics has been widely discussed in the literature. Several studies have noted the impact of oil price shocks on the stock market, particularly in oil-exporting countries. Farhan and Zaidi (2021) highlighted how oil price shocks tend to have a positive impact on stock prices in oil-exporting countries, as higher oil prices lead to increased government revenue and economic growth. However, they also caution that oil price volatility can lead to market instability [3]. This is in line with our findings, where oil price increases were associated with positive stock market performance, whereas sharp declines in oil prices triggered market downturns and increased volatility. In the Iranian context, oil price volatility directly affects the national economy due to the heavy dependence on oil exports for revenue generation. Gholami et al. (2020)

similarly found that oil price shocks significantly influenced the stock market performance in Iran, with rising oil prices leading to improved stock market returns, while declines in oil prices often resulted in adverse market effects [6].

The study further revealed that macroeconomic factors such as inflation and interest rates also play significant roles in shaping stock market performance. In particular, inflation was found to negatively affect stock prices, as rising inflation erodes the purchasing power of consumers and increases the costs for businesses, leading to lower corporate profitability and reduced investor confidence. This finding aligns with previous research by Sadeghi et al. (2022), who explored the effects of inflation on stock market performance in Iran and found that inflationary pressures often lead to reduced market returns [2]. Similarly, studies by Polat et al. (2020) and Sreenu (2023) have shown that inflation significantly contributes to market volatility, especially in developing economies [13, 14]. The negative relationship between inflation and stock market performance is also consistent with broader theoretical models, which suggest that inflation acts as a tax on investment returns, reducing the real value of assets and leading to lower investor confidence.

In addition to inflation, interest rates also appear to have a substantial impact on the Iranian stock market. Higher interest rates, typically set by the central bank to control inflation, increase borrowing costs for businesses, which may negatively affect corporate profitability and, consequently, stock prices. Our study's findings are in line with previous research by Sadeghi et al. (2022), who found that changes in interest rates had a significant impact on stock prices in Iran [2]. The relationship between interest rates and stock market returns has also been discussed by Rady et al. (2024), who suggested that interest rates directly influence investor behavior, as rising rates reduce the attractiveness of stocks relative to other investment options, such as bonds.

The integration of these factors – exchange rate volatility, oil price movements, inflation, and interest rates – provides a more comprehensive understanding of the dynamics of the Iranian stock market. This is consistent with the findings of Mamipour et al. (2022), who demonstrated that multiple macroeconomic variables must be considered in analyzing stock market performance, particularly in oil-dependent economies like Iran. Our study's results emphasize the importance of considering the interplay of these variables, as they jointly shape investor behavior and market sentiment [8].

In terms of practical implications, our study highlights the vulnerability of the Iranian stock market to macroeconomic shocks, particularly those related to exchange rates and oil prices. Policymakers and investors must be cognizant of the significant role these factors play in market dynamics. For instance, the study underscores the importance of implementing policies that stabilize the exchange rate and mitigate the adverse effects of oil price volatility on the economy. As such, a diversified approach to economic policy, focusing on stabilizing both the currency and the oil sector, could help reduce the volatility experienced by the stock market and promote investor confidence.

Despite the valuable insights provided by this study, there are several limitations that should be considered when interpreting the results. First, the study relies on historical data, and as such, the findings may not fully capture future trends or the potential impacts of new economic policies or global events. Given the rapidly changing nature of global financial markets, the dynamics between exchange rates, oil prices, and stock market performance may evolve over time. Second, the study focuses primarily on the Iranian context, which may limit the generalizability of the findings to other emerging markets or oil-dependent economies. While the Iranian market shares similarities with other economies in the region, such as Venezuela or Russia, the unique political and economic conditions in Iran, particularly the sanctions regime, may produce different results in other contexts.

Third, the study relies on econometric models, which, while providing valuable insights into the relationships between macroeconomic variables, may not fully capture the complexity of investor behavior, market sentiment, and other qualitative factors that influence stock market performance.

Future research could build on the findings of this study by exploring the long-term impacts of exchange rate and oil price fluctuations on stock market performance in Iran and other oil-exporting countries. A longitudinal study that examines the effects of these factors over extended periods would provide a more comprehensive understanding of their lasting impact. Additionally, future studies could investigate the role of other macroeconomic variables, such as fiscal policy, political instability, and global economic conditions, in shaping stock market performance. Furthermore, a comparative study across different oil-exporting countries could help identify common patterns and unique country-specific factors that influence stock market dynamics. Finally, incorporating investor sentiment analysis and behavioral finance models could provide deeper insights into the psychological factors driving market reactions to economic shocks.

For investors, understanding the interplay between macroeconomic factors, particularly exchange rates and oil prices, is critical for making informed investment decisions. As demonstrated in this study, fluctuations in the Iranian Rial and global oil prices have significant implications for stock market performance. Investors should consider diversifying their portfolios to hedge against the risks associated with these volatile factors. For policymakers, stabilizing the national currency and reducing dependence on oil revenues are key strategies for promoting economic resilience and reducing stock market volatility. A focus on economic diversification, including investments in non-oil sectors, could help insulate the economy from the adverse effects of oil price fluctuations. Finally, regulators should enhance transparency and provide clear communication to the public about economic policies, as this would help reduce uncertainty and increase investor confidence in the market.

Authors' Contributions

Authors equally contributed to this article.

Ethical Considerations

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

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Conflict of Interest

The authors report no conflict of interest.

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