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The Impacts of Oil Revenues on the Exchange Rate Using the FMOLS Method: A Case Study of Iran

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Highlights

- There is a significant long-term relationship between oil revenues and the exchange rate.
- Non-oil exports, with a significant coefficient, indicate that a one percent increase in non-oil exports reduces the exchange rate by 0.72 percent, thereby strengthening the rial.
- These findings underscore the necessity of reducing dependence on oil revenues and optimizing foreign exchange management to stabilize the exchange rate.

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Abstract

This study investigates the long-term relationship between oil revenues and the exchange rate in Iran, an economy heavily dependent on oil exports and susceptible to external shocks and international sanctions. Utilizing quarterly data from 2002 to 2024 and employing the Fully Modified Ordinary Least Squares (FMOLS) estimation method, the analysis identifies stable long-run cointegration among key macroeconomic variables. Following tests for stationarity and confirmation of cointegration, the model demonstrates that oil revenues and non-oil exports exert significant negative effects on the exchange rate, indicating that higher oil income and export diversification strengthen the Iranian rial. In contrast, liquidity (M2), real gross domestic product (GDP), global oil prices, and inflation have positive effects, contributing to currency depreciation. The observed positive impact of global oil prices is attributed to export restrictions during sanction periods, which limit foreign currency inflows despite higher global prices. These findings confirm the presence of Dutch Disease characteristics in Iran's economy, whereby rising oil revenues can undermine non-oil sectors through currency appreciation and macroeconomic volatility. Policy implications emphasize the need to diversify revenue sources, enhance non-oil exports, manage liquidity growth, and control inflation to promote exchange rate stability. By providing a comprehensive long-term analysis through the FMOLS framework, this research advances understanding of the structural determinants of Iran's exchange rate and offers actionable insights for policymakers aiming to achieve sustainable and resilient exchange rate management amid volatile oil markets and persistent international sanctions.

Keywords: Oil revenues, Exchange rate, FMOLS, Non-oil exports, Global oil price

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1. Introduction

The exchange rate is one of the most critical macroeconomic indicators, shaping the design of monetary, fiscal, and trade policies. In Iran, an economy highly dependent on oil exports and revenues, the exchange rate interacts closely with oil income, creating a unique economic structure vulnerable to external shocks and international sanctions. This dependence has long positioned Iran within the theoretical framework of the so-called "Dutch Disease," whereby substantial inflows of foreign currency from oil exports lead to national currency appreciation and, consequently, reduce the competitiveness of non-oil sectors. Accordingly, identifying the determinants of the exchange rate in Iran carries considerable theoretical and policy significance. Within Iran's economic architecture, oil revenues and the exchange rate are two fundamental variables that jointly shape broader macroeconomic stability. The heavy reliance of the fiscal budget and balance of payments on oil revenues has rendered domestic monetary indicators highly sensitive to fluctuations in global oil markets (Davoudi et al., 2018). According to the U.S. Energy Information Administration (EIA, 2024), even during sanction periods, covert oil sales generated over 53 billion USD in revenues in 2022–2023, directly influencing the value of the rial. Theoretically, rising oil revenues tend to strengthen the rial, consistent with Dutch Disease dynamics. However, as Bromand et al. (2019) note, the substantial contribution of the oil sector to GDP amplifies macroeconomic volatility and increases exposure to external shocks. Conversely, international sanctions and geopolitical tensions have directly constrained Iran's oil revenues. Heydarian et al. (2024) demonstrate that sanctions reduce foreign exchange inflows, causing rial depreciation. Although growth in non-oil exports partially offsets declines in oil income, it remains insufficient to fully compensate for lost foreign exchange. Laudati et al. (2021) further emphasize that Iran's exchange rate often responds rapidly and disproportionately to sanctions, with psychological effects outweighing tangible economic impacts.

Domestic empirical studies over the past decade confirm a significant long-term relationship between oil revenues and the exchange rate. For example, Abdolaziz et al. (2018), employing the Fully Modified Ordinary Least Squares (FMOLS) method, found negative and significant long-run effects of oil prices and the real exchange rate on value added in Iran's agricultural sector, indicating Dutch Disease-type distortions. Nonetheless, most existing analyses rely on short- or medium-term data and thus fail to capture systematic long-run interactions. Moreover, the influence of sanctions on the oil–exchange rate nexus remains underexplored in domestic research despite its prominence in global literature. To address this gap, the present study utilizes quarterly data spanning 2002–2024 and applies the FMOLS econometric approach to examine long-term comovement between oil revenues and the exchange rate in Iran. The model also incorporates shock and sanction variables to provide insights for the Central Bank of Iran and national policymakers in designing strategies that ensure exchange rate stability and reduce vulnerability to oil price fluctuations.

The novelty of this study lies in its analytical depth and contextual relevance. Unlike previous research, which relied on annual data or short-term estimations, this study employs quarterly data over a long horizon (2002–2024) and applies the FMOLS method to uncover long-run cointegration dynamics between oil revenues and the exchange rate in Iran. Additionally, the paper integrates the effects of sanctions and global oil price shocks, thereby reflecting the actual policy environment of Iran's economy in recent decades. This integrated approach distinguishes the study from prior works that examined either oil revenues or exchange rate fluctuations in isolation. Consequently, the research contributes a long-run, sanctions-adjusted perspective on the oil–exchange rate nexus, offering empirically grounded insights for sustainable exchange rate management. The remainder of the paper is organized as follows: Section 2 reviews the theoretical background and literature; Section 3 presents

the methodology and data description; Section 4 discusses empirical findings; and Section 5 concludes with policy implications.

2. Literature review

2.1. Theoretical foundations

The exchange rate is one of the most important macroeconomic variables and serves as a key indicator for monetary, fiscal, and trade policymaking. It reflects the relative price of a country's currency against foreign currencies and plays a central role in determining economic competitiveness, the trade balance, and financial stability. One foundational theory in exchange rate analysis is the Purchasing Power Parity (PPP) theory, which posits that the exchange rate between two countries should adjust to equalize the purchasing power of a comparable basket of goods. This theory is particularly relevant to Iran's economy, which is characterized by structural inflation. According to PPP, an increase in domestic inflation relative to trading partners leads to depreciation of the national currency and, consequently, a rise in the exchange rate. In Iran, high inflation driven by expanding liquidity and persistent fiscal deficits has been identified as a major cause of rial depreciation. Empirical evidence, such as Abdolaziz et al. (2018), confirms this inverse relationship between inflation and the value of the national currency.

In resource-dependent economies such as Iran, where a large portion of foreign currency earnings derives from oil exports, the exchange rate is also influenced by fluctuations in oil revenues and other macroeconomic factors, including gross domestic product (GDP), liquidity growth, inflation, and global oil prices. According to the supply and demand theory of foreign exchange, greater inflows of foreign currency from oil and non-oil exports tend to strengthen the national currency, whereas increased demand for foreign exchange resulting from inflation or high import levels leads to depreciation. An increase in oil revenues, by injecting foreign currency into the domestic market, typically appreciates the national currency—a phenomenon widely known as Dutch Disease—which can weaken productive sectors such as agriculture and industry. Bromand et al. (2019) demonstrated that oil revenues exert a strengthening effect on Iran's real exchange rate, although international sanctions have substantially reduced this influence. Conversely, economic growth, liquidity expansion, and rising imports—all of which increase demand for foreign exchange—tend to elevate the exchange rate.

This theoretical framework has been extensively analyzed using econometric models such as FMOLS and ARDL, which allow examination of long-term relationships among currency supply and demand variables. For instance, Moeini et al. (2018) found that oil price shocks and exchange rate fluctuations significantly affect foreign trade and inflation. Under normal conditions, an increase in global oil prices enhances foreign exchange earnings and strengthens the national currency. However, international sanctions since 2012, and particularly following the U.S. withdrawal from the JCPOA in 2018, have constrained Iran's ability to capitalize on these opportunities. The decline in oil exports from approximately 2.5 million barrels per day to less than 0.4 million barrels per day has effectively offset the positive effects of high oil prices (U.S. Energy Information Administration, 2024). Sanctions have undermined the value of the rial not only by reducing oil income but also through their psychological impact on the foreign exchange market, highlighting the complex relationship between global oil prices and Iran's exchange rate (Heydarian et al., 2024).

Liquidity (M2) is another significant factor influencing the exchange rate. Increases in liquidity, mainly resulting from financing fiscal deficits through money creation, contribute to inflation and, by reducing the rial's purchasing power, increase demand for foreign currency. This relationship is further supported by the quantity theory of money (Davoudi et al., 2018). Finally, non-oil exports serve as a sustainable source of foreign currency and play a key role in exchange rate stabilization, becoming especially

important under sanctions. Although non-oil exports have grown, studies such as Laudati et al. (2021) indicate that while this growth has alleviated some pressure on the exchange rate, it has not yet fully compensated for lost oil revenues.

2.2. Literature review

Shakerami et al. (2024) employed the Johansen cointegration method to analyze the impact of oil revenue and exchange rate shocks on Iran's trade deficit. Their findings indicate significant short-, medium-, and long-term effects of these shocks on the country's current account balance. Hajimolamiri Zaei et al. (2022) applied the Autoregressive Distributed Lag (ARDL) approach to assess how oil price and exchange rate uncertainty influence the optimal design of monetary policy in Iran. Using quarterly data, they found that both types of uncertainty exert negative and significant effects in the short and long run. Khosrow Sershaki and Kikha (2022) utilized the Bai-Perron test to examine exchange rate pass-through under varying inflationary conditions, demonstrating that pass-through decreases during high inflation periods and increases during low inflation periods, highlighting the importance of exchange rate anchors and import dependency.

Mahdavi et al. (2022) applied a structural VAR model with monthly data from 2004 to 2018 to evaluate the effects of oil price shocks on uncertainty in Iran's currency, gold, and equity markets. They concluded that oil shocks substantially increase market uncertainty. Kazerooni et al. (2019) combined the Exponential GARCH (EGARCH) model with a Markov switching approach to investigate how instability in oil revenues affects the relationship between the exchange rate and trade balance in Iran. Their results indicate that fluctuations in oil income weaken the stabilizing role of the exchange rate under both high and low trade deficit regimes.

Nato (2024) applied the ARDL model to Saudi Arabia for 2000–2020 and found that oil revenue volatility positively and significantly influences economic growth in both the short and long term, recommending that a portion of oil revenues be invested in sovereign wealth funds for diversification. Chen et al. (2024) employed a Time-Varying Parameter VAR (TVP-VAR) model to study the link between oil prices and exchange rates across oil-exporting and oil-importing countries, showing that the strength and direction of these linkages vary by country type and crisis periods, such as the COVID-19 pandemic and the 2008 global financial crisis. Chek and Nafityev (2021) used a Structural VAR (SVAR) model to explore how oil price changes affect exchange rates in Azerbaijan and Kazakhstan, finding that rising oil prices appreciate both currencies—especially during crises—and directly influence Azerbaijan's foreign reserves. Nandlanga and Simpasa (2020) analyzed volatility spillovers between exchange rates and global crude oil prices in developing and emerging economies using copula models with daily data from 2000 to 2018. Their findings revealed symmetric dependence, which intensified after the global financial crisis, indicating direct transmission of oil price risks into currency markets.

Although previous studies have examined the relationship between oil prices, oil revenues, and exchange rates in Iran and other oil-exporting economies, most have focused on short-term fluctuations or annual data and have not fully captured the persistent long-run dynamics of these variables. Furthermore, limited attention has been given to the role of international sanctions in disrupting the traditional transmission mechanism between oil prices and the exchange rate. This study addresses these gaps by employing quarterly data from 2002 to 2024 and applying the Fully Modified Ordinary Least Squares (FMOLS) method, which enables the estimation of consistent long-run cointegration relationships among non-stationary variables. The primary innovation of this research lies in its simultaneous consideration of oil revenues, non-oil exports, liquidity, real GDP, inflation, and global oil prices within a unified framework to uncover their structural interactions under sanction conditions.

Consequently, this study provides a novel and comprehensive understanding of the long-term determinants of Iran's exchange rate and offers fresh empirical evidence of Dutch Disease symptoms in an economy constrained by sanctions.

3. Proposed model and data

The primary objective of the present study is to examine the impact of oil revenues on the exchange rate in Iran's economy using the Fully Modified Ordinary Least Squares (FMOLS) method. This research employs the seasonal cointegration approach and the seasonal error correction model to assess the existence of a long-term relationship and to analyze the dynamic behavior of the exchange rate. Upon confirming the absence of spurious regression, the long-run coefficients of the proposed model are estimated to quantify these effects.

$$Exch = \beta 0 + \beta 1 oilr + \beta 2 m2 + \beta 3 gdp + \beta 4 Noilexp + \beta 5 Goilp + \beta 6 Infr + U1 \quad (1)$$

Table 1

Descriptions

Data form used in the model	Variable	Acronym	Unit
Natural logarithm of the quarterly average nominal exchange rate.	Exchange Rate	Exch	USD/IRR
Natural logarithm of total quarterly oil export revenues (current USD).	Oil Revenues	Oilr	Million USD
Natural logarithm of total quarterly liquidity (nominal).	M2	M2	Trillion IRR
Natural logarithm of real GDP at constant 2002 prices (total, not per capita).	GDP	GDP	Trillion IRR
Natural logarithm of total quarterly non-oil export receipts (current USD).	Non-Oil Exports	Noilexp	Million USD
Natural logarithm of the quarterly Brent crude spot price.	Global Oil Price	GoilP	Brent
Quarterly percentage change in the Consumer Price Index (CPI), entered in level form rather than logarithmic form.	Rate Inflation	Infr	Percent (%)

In this study, all variables are expressed in natural logarithmic form using quarterly data for the period 2002–2024 to facilitate the interpretation of long-run elasticities. The exchange rate (Exch) is defined as the quarterly average nominal rate of the U.S. dollar against the Iranian rial. Oil revenues (Oilr) represent total foreign currency receipts from crude oil exports. The liquidity variable (M2) reflects the nominal stock of money and quasi-money. Gross domestic product (GDP) is measured as real output at constant 2002 prices, rather than as growth rates or per capita GDP. Non-oil exports (Noilexp) encompass total foreign currency earnings from non-oil commodity exports. The global oil price (GoilP) is based on Brent crude spot prices in the international market, and the inflation rate (Infr) corresponds to the quarterly percentage change in the Consumer Price Index (CPI), incorporated into the model in level form rather than logarithmic form.

3.1. Research method

In this study, the Fully Modified Ordinary Least Squares (FMOLS) regression model, introduced by Phillips in 1995, is employed to estimate long-term relationships among cointegrated variables. Prior to estimation, unit root and cointegration tests are conducted to ensure the validity of the long-run analysis. Within this framework, the existence of a long-term relationship among the time series

variables is first assessed using cointegration techniques, taking into account the presence of unit roots. Subsequently, the FMOLS method is applied.

FMOLS is a widely used econometric technique specifically designed for estimating regression models with cointegrated variables, making it particularly suitable for analyzing long-term relationships, such as those between economic growth and energy consumption or the impact of fiscal policies on macroeconomic variables. The method is appropriate when variables are non-stationary but exhibit cointegration relationships. Its primary objective is to address issues arising from non-stationarity and serial correlation in regression errors, which can lead to biased and inconsistent estimates when using conventional Ordinary Least Squares (OLS) techniques.

Among the advantages of FMOLS are its consistency, efficiency, and flexibility. The method yields estimates that converge to the true parameter values with minimal variance as the number of observations increases. FMOLS also corrects biases introduced by non-stationarity and serial correlation in OLS estimates. Moreover, it accommodates models with variables integrated of different orders (e.g., I(1) or I(2)) and does not require exact specification of the serial correlation structure, as it employs semi-parametric techniques. Importantly, FMOLS is not sensitive to the selection of lag length.

Implementation in this study begins with assessing the stationarity of variables using unit root tests, such as the Augmented Dickey-Fuller (ADF) or Phillips-Perron (PP) tests. Typically, non-stationary economic time series variables are integrated of order one (I(1)), becoming stationary after first differencing. Once non-stationarity is confirmed, cointegration among the variables is examined using tests such as the Engle-Granger or Johansen tests. Cointegration implies that, although individual variables are non-stationary, a linear combination of them is stationary, indicating a long-term equilibrium relationship.

Next, the initial regression model is estimated using OLS. However, in the presence of cointegrated variables, OLS estimates can be biased and inconsistent due to serial correlation in residuals and the non-stationarity of the variables. FMOLS corrects these issues by adjusting for the effects of non-stationarity and serial correlation, employing semi-parametric estimators for the long-run covariance matrix of errors and explanatory variables. This procedure yields consistent and efficient parameter estimates. Finally, the statistical significance of the coefficients is assessed using t-tests, and the overall significance of the model is evaluated with the F-test.

4. Research findings

4.1. Stationarity of variables

Prior to estimating the model, it is essential to examine the stationarity of the variables. One of the major methodological issues in empirical research is the failure to account for stationarity, which can lead to spurious regressions and misleading inferences. Stationarity ensures that the mean, variance, and autocorrelation structure of a time series remain constant over time, thereby validating econometric analyses (Noferesti, 1999). In unit root tests, the null hypothesis assumes that the variables are non-stationary, whereas the alternative hypothesis asserts stationarity.

The application of the FMOLS model requires that variables be stationary or transformed into stationary series through differencing. For seasonal data, it is necessary to adjust the series prior to estimation. In this study, seasonal adjustment was performed using the seasonal trend decomposition method, which employs regression-based smoothing of the estimated scatterplot at each point in the series.

Following this adjustment, the stationarity of all model variables was tested using the Augmented Dickey-Fuller (ADF) unit root test. The null hypothesis of this test indicates the presence of a unit root.

Results, presented in the table below, show that the first differences of all variables are stationary at all significance levels. Therefore, all variables in the model are integrated of order one, I(1). It should be noted that, because the target variables were non-stationary in levels and only became stationary after differencing, their natural logarithmic forms were used in the analysis instead of the original values.

Table 2

Results of unit root tests for variables in first differences

Stationary state	ADF statistics	Critical values			status	Variable name
		10%	5%	1%		
I (1)	–6.621817	–3.461686	–3.461686	–4.065702	With width from origin	LExch
I (1)	–8.723169	–2.584325	–2.894332	–3.505595	With width from origin	LOilr
I (1)	–6.766259	–3.156776	–3.461094	–4.064453	With width from origin	LM2
I (1)	–9.021940	–3.156776	–3.461094	–4.064453	With width from origin	LGDP
I (1)	–12.66279	–3.156776	–3.461094	–4.064453	With width from origin	LNoilexp
I (1)	–7.614157	–2.584325	–2.894332	–3.505595	With width from origin	LGoilP
I (0)	–5.084358	–3.156439	–3.460516	–4.063233	With width from origin	linfr

Based on the critical values of the Augmented Dickey-Fuller (ADF) test, the null hypothesis of a unit root is rejected for all variables at the 10%, 5%, and 1% significance levels. This indicates that the variables are stationary either in levels or after first differencing. In other words, the variables are integrated of order I(0) or I(1).

4.2. Cointegration test

Following the unit root tests, and to ensure the absence of spurious regression, it is necessary to examine the presence of cointegration relationships among the variables. Cointegration indicates a stable, long-term equilibrium relationship between two or more non-stationary variables. In the present study, since the variables become stationary either at levels or after first differencing, the Unrestricted Error Correction Cointegration Test has been employed to assess these long-run relationships.

Table 3

Unconstrained error correction cointegration test (UECM)

UECM	10%		5%		1%		F-statistic
stationary and non-stationary bounds	I (0)	I (1)	I (0)	I (1)	I (0)	I (1)	**5.421017**
	2.088	3.103	2.431	3.518	3.173	4.485	

Since the calculated value of the test statistic (F-statistic = 5.421017) exceeds the critical values at both the lower and upper bounds, a cointegration relationship exists among the variables in the specified model.

4.3. Model estimation

After confirming cointegration and the existence of a long-term relationship among the model variables, estimation can proceed without concern for spurious regression. Given the advantages of the FMOLS method—including consistent and unbiased estimates, correction for endogeneity, mitigation of autocorrelation in the error terms, and lower residual variance compared to other cointegration techniques—the model can be estimated using the FMOLS approach for the logarithmic quarterly data as follows:

$$LExch = 10.4070 - 0.4071Loilr + 0.4461Lm2 + 0.70560Lgdp - 0.7170LNoilexp + 0.1551LGoilp + 0.1207LInfr \quad (2)$$

Table 4

FMOLS model estimation results

Variables	Coefficient	t-statistic	Prob
LGDP	0.705597	4.666391	**0.0000**
LGOILP	0.155060	0.990995	**0.0146**
LM2	0.446014	2.435914	**0.0170**
LNOILEX	–0.717314	–4.554395	**0.0000**
LOILR	–0.407012	–3.957309	**0.0002**
INFR	0.120703	4.190938	**0.0001**
C	10.40738	14.81682	**0.0000**

R-squared	0.986922	Mean dependent var	10.48509
Adjusted R-squared	0.985977	S.D. dependent var	1.439751
S.E. of regression	0.170494	Sum squared resid	2.412669
Long-run variance	0.052650		

Based on the results presented in Table 4, all estimated coefficients are highly significant. The findings indicate that gross domestic product at basic prices, liquidity, global oil prices, and the inflation rate exert positive and significant effects on the exchange rate. In contrast, non-oil exports and oil revenues have significant negative effects. Specifically, a one percent increase in oil revenues leads to a 0.41 percent decrease in the exchange rate, indicating a strengthening of the rial. A one percent increase in GDP results in a 0.71 percent rise in the exchange rate, a one percent increase in liquidity leads to a 0.45 percent increase, a one percent rise in global oil prices causes a 0.16 percent increase, and a one percent increase in the inflation rate results in a 0.13 percent increase. Furthermore, a one percent increase in non-oil exports leads to a 0.72 percent decrease in the exchange rate.

4.4. Analysis of results

Based on the obtained results, oil revenues have a negative and statistically significant effect on the exchange rate, such that a one percent increase in oil revenues leads to a 0.41 percent decrease in the exchange rate, indicating a strengthening of the rial. This finding aligns with expectations, as higher oil

revenues contribute to an increased supply of foreign currency and a stronger national currency. Given that oil revenues constitute Iran's principal source of foreign exchange, an increase in these revenues bolsters the foreign currency supply, lowers the exchange rate, and thereby strengthens the domestic currency. Empirical studies on oil-exporting countries similarly confirm that higher oil revenues generally lead to currency appreciation.

A one percent increase in liquidity results in a 0.45 percent rise in the exchange rate, indicating depreciation of the rial. This outcome is consistent with the economic perspective that excessive liquidity growth can fuel inflation, thereby weakening the national currency. In Iran, monetary policies sometimes involve money issuance to finance budget deficits, which increases both liquidity and inflation. Rising liquidity reduces domestic purchasing power and raises demand for foreign currency, leading to depreciation of the rial.

A one percent increase in GDP results in a 0.71 percent increase in the exchange rate, reflecting a depreciation of the rial. This effect can be attributed to heightened import demand associated with economic growth, which increases the need for foreign currency. In developing countries such as Iran, economic expansion is often accompanied by rising imports, exerting pressure on domestic currency reserves. This result aligns with economic theory, which suggests that GDP growth may weaken the national currency due to increased import demand. Broadly, studies indicate that in developing economies, GDP growth can sometimes lead to currency depreciation.

A one percent increase in non-oil exports leads to a 0.72 percent decrease in the exchange rate, signifying a strengthening of the rial. This outcome is logical, as higher exports increase the supply of foreign currency and support national currency appreciation. This effect is particularly important under sanctions, where the expansion of non-oil exports provides a critical source of foreign exchange for Iran and contributes to lowering the exchange rate.

A one percent increase in global oil prices results in a 0.16 percent increase in the exchange rate, indicating depreciation of the rial. This finding is unexpected for an oil-exporting country such as Iran, where higher oil prices would typically strengthen the national currency. However, the sanctions imposed since 2012, particularly following the U.S. withdrawal from the JCPOA in 2018, have restricted Iran's ability to export oil and benefit from higher prices. Consequently, despite rising global oil prices, foreign currency inflows may decline, explaining the observed weakening of the rial. Additionally, inflationary pressures generated by higher international oil prices may further contribute to exchange rate depreciation.

Finally, a one percent increase in the inflation rate leads to a 0.13 percent increase in the exchange rate, indicating depreciation of the rial. This result is consistent with the theory of purchasing power parity, which predicts that higher inflation causes currency depreciation. Elevated inflation reduces domestic purchasing power and increases demand for foreign currency, resulting in a weaker rial.

5. Conclusions

The exchange rate and oil revenues, as two key variables in Iran's economy, play a crucial role in shaping economic stability and guiding macroeconomic policymaking. Iran's heavy reliance on oil revenues—sometimes accounting for more than 80% of the country's foreign exchange earnings—means that fluctuations in the oil market are quickly transmitted to the exchange rate and other economic indicators. The findings of this study, based on the FMOLS method and quarterly data from 2002 to 2024, reveal a significant long-term relationship between oil revenues and the exchange rate. Specifically, a one percent increase in oil revenues leads to a 0.41 percent decrease in the exchange rate, indicating a strengthening of the rial. This result is consistent with economic theory and the experiences

of other oil-exporting countries. However, international sanctions, particularly after 2012 and following the U.S. withdrawal from the JCPOA in 2018, have at times constrained Iran's oil exports, limiting the country's ability to benefit from higher oil revenues and reducing their positive effect on the rial. These findings underscore the necessity of reducing dependence on oil revenues and optimizing foreign exchange management to stabilize the exchange rate.

According to the FMOLS model results, other macroeconomic variables also exert significant impacts. Non-oil exports, with a coefficient of –0.72, indicate that a one percent increase reduces the exchange rate by 0.72 percent, thereby strengthening the rial. This effect is particularly important under sanctions, when non-oil exports can partially substitute for oil revenues as a source of foreign currency. Conversely, GDP and liquidity (M2), with positive coefficients of 0.71 and 0.45, respectively, are associated with a weakening of the rial, primarily due to higher import demand and inflationary pressures. The inflation rate, with a coefficient of 0.13, suggests that a one percent increase in inflation raises the exchange rate by 0.13 percent, consistent with the theory of purchasing power parity.

Notably, the positive and unexpected effect of global oil prices (coefficient 0.16) on the exchange rate—contrary to classical expectations for oil-rich economies—results in depreciation of the rial. This phenomenon is likely attributable to export restrictions arising from sanctions, which prevent higher oil prices from translating into increased foreign currency inflows.

Compared with previous studies, these findings align with Broomand and Abdolaziz (2019) regarding the positive effect of oil revenues on the national currency and with Laudati et al. (2021) concerning the role of non-oil exports in mitigating currency pressure. The effects of liquidity, inflation, and economic growth on the exchange rate are also consistent with the results of Davoudi, Abdolaziz, and Babajani Babbli. The only notable divergence is the direction of the global oil price effect, which—unlike classical models—is consistent with Heydarian et al. (2024), highlighting the role of sanctions in disrupting the transmission of oil prices to the currency market.

From a policy perspective, these results emphasize the importance of diversifying Iran's revenue sources, particularly by strengthening non-oil exports. Controlling liquidity and managing inflation are also vital to reducing pressure on the exchange rate and supporting the value of the national currency. Policymakers should develop mechanisms to reduce dependence on oil revenues and increase the economy's resilience to external shocks, including sanctions and oil price fluctuations. Ultimately, this study, employing the FMOLS method and quarterly data, provides a comprehensive analysis of the relationship between oil revenues and the exchange rate, offering a foundation for sustainable exchange rate and economic policy planning in Iran.

Policy recommendations

Derived directly from the empirical findings of this study, the following policy recommendations are proposed to address the structural determinants of Iran's exchange rate performance. The FMOLS estimation results indicate that oil revenues and non-oil exports exert significant negative effects on the exchange rate, thereby strengthening the rial, whereas liquidity (M2), real GDP, global oil prices, and inflation exert positive pressure, leading to depreciation.

Based on these results, the government—particularly the Planning and Budget Organization—should reform the national budget structure to reduce dependence on oil revenues and stabilize the currency. Given that higher oil revenues appreciate the rial, allocating these revenues toward productive, export-oriented, and investment sectors rather than current expenditures would maximize their positive impact on the currency. The Islamic Council should enact legislation promoting economic diversification, increasing transparency in foreign exchange operations, and regulating the flow of oil income in line

with long-term stability objectives. This recommendation is supported by the empirical finding that non-oil exports play a significant role in strengthening the rial; hence, parliamentary support for export-driven investment policies is essential.

The Central Bank of Iran should manage liquidity expansion to curb inflationary pressures, as the model demonstrates positive coefficients for M2 and inflation, both contributing to rial depreciation. Implementing disciplined financial mechanisms and transparent foreign exchange interventions can mitigate liquidity-driven depreciation. Moreover, strategic use of foreign reserves is necessary to buffer the economy against external shocks and oil price volatility.

Finally, the Iran Trade Development Organization should prioritize enhancing non-oil exports and promoting trade diversification, since non-oil exports were found to counteract exchange rate depreciation effectively, particularly under sanctions. Expanding preferential trade agreements and improving access to regional and global markets will further strengthen the rial and contribute to long-term currency stability.

Nomenclature

Exch	Exchange rate
GDP	Gross domestic product
GoilP	Global oil price
Infr	Rate inflation
M2	Liquidity
Noilexp	Non-oil exports
Oilr	Oil revenues

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