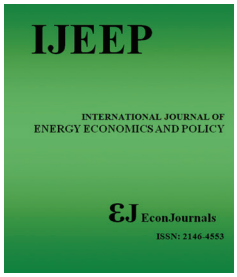

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The Impact of Oil Revenue Shocks on the Volatility of Iran's Stock Market Return

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ABSTRACT

The aim of this study was to examine the impact of oil revenue shocks on the volatility of Tehran's stock market return, by applying Generalized Auto Regressive Conditional Heteroscedasticity (GARCH) model with seasonal data from January 1993 to March 2014. After calculating the volatility stock returns via GARCH models, we employed Auto Regressive Distributed Lag (ARDL) model to estimate the oil shocks effects. The population is consisted of all active companies in Tehran's stock market during the period of this research. Study results showed that oil shocks are associated with positive effects on the stock market volatility, representing that this shocks are one of the main motivators of stock price index growth in Iran's case. More ever, exchange rate and liquidity had same effects on the stock market return through increasing the volatility. On the other hand our results indicated that there were no relations between consumer price index and stock market volatility. Other result of this study refers to effects of sanctions imposed by the US and Europe, which elicits the increase of stock market volatility from the day they have been taken place.

Keywords: Oil Revenue, Stock Market Returns Volatility, Sanctions, Exchange Rate, Consumer Price Index, Portfolio Management
JEL Classifications: M21, G11, E10

1.INTRODUCTION

Previous studies and investigations indicate that fluctuations in total revenues, whether as a result of rise and falls and economic instabilities, or international sanctions, can create serious challenges for market participants. For example, oil prices and related shocks can lead to stagnation in stock markets and, consequently, to fluctuations in revenues which can in turn be a moderator of consumer prices and a prospect for growth and development. The rise in oil prices in exporting countries yields a higher income for them as well. Since minimizing the risk of the intended portfolio is one of the most important duties of the policy makers, investors and, ultimately, financial managers, paying attention to the impacts of fluctuations and shocks from markets and other external factors, such as oil price changes, exchange rates, and imposition of sanctions have become more and more significant, all of which are demonstrated through the revenues of governments on the macro level.

Based on statistical evidence and the study of the outcome of sanctions imposed by the United Nations, EU and the US on Iran's economy, oil revenues in Iran have encountered various fluctuations over the past two decades. On the other hand, studies on the Iranian stock market in the last two decades indicate that fluctuations in the stock market and, consequently, the volatility of this market's return are significant. The main question is what connection can be discovered between stock return volatility in the stock market and oil revenues fluctuations. The purpose of the present study is to investigate the impacts of fluctuations in oil revenues of the country alongside official exchange rate, price index, liquidity supply, and sanctions on Iranian stock market fluctuations in order to create a field for selection and management of the portfolio with the least risk of oil revenue shocks. In this regard, after presenting the introduction, the theoretical foundations and the theoretical origins of the issue concerning the impacts of macroeconomic variables on stock return volatility in different countries will be presented. Afterwards, previous domestic and foreign studies will

be reviewed and the methodology of the research and the model estimation will be presented. In conclusion, the summaries and suggestions will be presented for the article.

2. THEORETICAL BASICS

The importance of examining the impact of oil market shocks on the Iranian economy as the third largest producer in the Organization of Petroleum Exporting Countries in 2010 and the fifth largest exporter according to the latest statistics of the Organization of Petroleum Exporting Countries (OPEC) in 2014, is due to the large volume of oil export revenues and the annual government budget, in a way that fluctuation in the world oil prices and, consequently, changes in government revenues from oil sales play a major role in the country's economic performance and the Iranian stock market (Table 1 and Chart 1).

It is believed that stock returns are determined by some macroeconomic variables such as macro revenues of governments, interest rates, currency, liquidity, and inflation. Several studies have been conducted to demonstrate the effect of economic forces on stock returns in different countries. For example, the Arbitrage Pricing Theory, first proposed by Stefan Ross in 1976, was later used by Chen et al. (1986) to illustrate the impact of some macroeconomic variables on stock return of capital markets in the United States. Their findings indicated that industrial productions and changes in the risk and periodical structure have positive relationship with expected stock returns. However, the relationship between the predicted and unpredicted inflation ratio and the expected stock returns is significantly negative.

Chen et al. (1986) proposed the Arbitrage Pricing Theory as a substitute for Capital Asset Pricing Model. The process of the Capital Asset Pricing Model starts with the question of how investors cannot create an Effective Portfolio, while Arbitrage Pricing Theory observes the risk issues and its measurement from a completely different point of view and does not pursue effective investment portfolios; it argues on the basis that stock prices are moderated as shareholders seek for arbitrage profits. In other words, the Capital Asset Pricing Model was in fact a simplified version of the Arbitrage Pricing Theory which assumed that only a systematic factor affects the yield of securities (Bodie et al., 2011). The experiments performed on the Arbitrage pricing Model indicated that it overtakes the Capital Asset Pricing Model (Chen, 1983). With such an understanding of the Arbitrage Pricing Theory, the relationship between stock return and the factors of such a model and its ability to predict the future can be estimated through modeling based on economic factors and assuming that the stock market has a reasonable performance.

2.1. The Concept of Return Volatility

Uncertainty is unpredictable changes in an economic variable and as such changes cannot be predicted in the future, it can have great impacts on other economic variables; therefore, it cannot be treated as a lateral issue, but should be addressed in a context, aspects of which would be accepted as pervasive reality and to create proper theory and mechanism to compete with it (Morad Pour Olaadi et al., 1999).

Uncertainty is often defined as standard deviation of variance which has a specific meaning in each example and subject. For example, in relation to stock returns, standard deviation is indicative of risk. Volatility refers to the degree of uncertainty or risk of changes in the value of any type of securities. High volatility means that the value of securities, for example, and the stock price can fluctuate in a greater range, meaning that, the stock price can vary considerably in both directions over a short period of time, but changes in value do not occur at a constant rate over time. The stock return alone encompasses information content and most of the actual and potential investors practice it in their predictions and financial analyses (Gha'emi and Tousi, 2005).

2.2. Oil Revenues as a Result of Total Demand and Global Fluctuations in Oil Prices

The vast majority of OPEC member countries are almost one-product exporters in their export sectors; in other words, oil revenues are considered as the main source of export income, or at least as one of the most important sources of export income in such countries; they may feel direct effect of oil prices due to great dependence on oil. Oil exports provide a large part of foreign and government revenues and budgets for these countries, and uncertainty in the changes in their incomes through oil pricing plays a key role in the development of these countries and their financial markets. It can be demonstrated through evidence that, apart from the years when oil prices have fallen sharply, in other years, the cost of oil production is less than 10% of the oil price; in fact, 90% of the revenue from oil production is net or profits (Sameti et al., 2009). Since the mentioned revenue is deposited to the treasury account and is distributed in accordance with the government's attitude, it is important to examine its changes over time alongside with the change in the rate of other macroeconomic variables, such as exchange rate, liquidity growth rate, and so on. In addition, the share of oil revenues in the general government budget was more than 80%, which has been fluctuating between 60-80% in recent years (Behboudi et al., 2009).

In the following, the approaches and mechanisms affecting oil revenues and its fluctuations will be analyzed theoretically. To this end, the mechanisms affecting oil revenues from the two perspectives of oil price fluctuations and total demand will be examined.

2.2.1. Oil price

Oil price volatility is a significant issue for oil-exporting countries. The relationship among macroeconomics, stock market, and oil price fluctuations has been investigated widely in the past. Researchers such as Jones and Kaul (1996) and Sadorsky (1999) were true investigators of the relationship between oil price fluctuations and stock returns percentage and demonstrated that fluctuations in oil prices were one of the most important determinants of the stock market returns. In general, oil price fluctuations have direct or indirect impact on the stock market performance. The direct impact could be explained by the fact that the upward movement of oil price creates uncertainty in the financial markets, which in turn, leads to a fall in stock prices. The indirect impact could be explained in this way that an increase in oil price fluctuations results in a decrease in production and stock

prices and returns causing the inflation to increase. Economic theoreticians believe that the price of each asset is determined by its expected cash flows; therefore, any factor that can change the expected cash flows has a significant effect on the asset price, and as a consequence, any increase in oil price fluctuations results in an increase in costs, changes in cash flows and in a larger scale, cause the investors' capital value to decrease. In conclusion, any increase in oil price fluctuations will be accompanied by a decrease in stock value.

2.2.2. Total Demand

In all the OPEC member countries, oil revenue forms most of the government budget and a high dependence in the government's budget on oil revenues can be observed; in this regard, in the absence of designing mechanisms for stabilizing the government budget, the oil shocks of the budget will affect the activity of economic agencies and stock return volatility in the short and long term.

The total demand of the Iranian oil has undergone lots of ups and downs due to global sanctions on this vital industry which has had impacts on macroeconomic indexes over the past years. Oil exporters are not immune from the consequences and impacts of oil crises, just like oil consuming countries. According to economic theories, changes in the price of crude oil affects the economy through the two channels of supply and demand. The effect of the supply side can indicate that oil is the raw material of various productions; therefore, rising oil prices will reduce demand for oil. The demand side influences the economy through consumption and investment as well.

Consumption is indirectly influenced by changes in oil prices due to its positive relationship with disposable income. With rising oil prices, a transfer of income will be witnessed from importing to exporting countries; therefore, consumption in oil-importing countries will decrease. Furthermore, rising oil prices will have an adverse impact on investment by increasing the cost of companies. In addition to the effects the changes in the price of crude oil through supply and demand might have, it also influences the economy through the exchange rate and inflation (Shahbazi et al., 2013).

2.3. Effective Macroeconomic Variables on the Iranian Stock Market Return

2.3.1. Exchange rate

There must be accordance in the trade between products and goods in the world with the values that are accepted and approved by all the countries. This value is nothing but the national currency of the country of origin (and the so-called currency of the trading country as its national money). In fact, goods and services are priced and traded in international trade in terms of the mentioned currency. Undoubtedly, the price (credit) of the currency and its fluctuations depend on a condition which is not the subject of the current study, but in the business environment of the economic agencies, the process of supply-production and distribution of companies' products are influenced by exchange rate fluctuations.

When the level of risk and uncertainty increases in macro variables such as the exchange rate, the flow of capital and savings will move towards centers of the economy where the impact of the turbulence is less felt (Mehrabian and Chegni, 2013). The uncertainty of exchange rate fluctuations is considered as a kind of risk (uncertainty) for each agency, which can affect the company's performance framework (Brown, 2001).

Determining the exact exchange rate in a floating exchange rate system is typically difficult since the balance is determined by the supply and demand of the market; accordingly, any change in the exchange rate will affect buyers' and sellers' predictions (Hu and Motwani, 2014).

2.3.2. Consumer price index (CPI)

Chen et al. in 1986 used Eugene Fama's article titled "Stock returns, real activity, inflation, and money" for defining and explaining the inflation. In this article, according to the theory and definition of Fama, the index of goods price and consumer services were used to measure inflation, which was divided into two predictable and unpredictable components. This index measures the cost of purchasing fixed goods that represents consumer purchasing power. This basket of goods is fixed every year (Fisher, 1930); CPI is normally used to know about inflation rate.

The CPI is one of the most important tools for economic planners to determine the country's economic situation at different times and to guide determining monetary and financial policies; it is however considered as one of the main measures of inflation. Investors pay more attention to the inflation percentage because the net benefits of their investment depend on the percentage of inflation. In other words, whenever the distance between investment and operating costs increases, the amount that an investor obtains as a gain in investment has less purchasing power and, therefore, the real return on investment will be less than expected (Saeedi and Kouhsarian, 2009).

2.3.3. The liquidity supply

The government sells oil resources exclusively and transfers the currencies from this exchange to the Central Bank in order to receive national currency in return, some of which will be converted into monetary base. Therefore, it seems that the volume of money in the economy is largely affected by oil revenue fluctuations. If the Central Bank does not succeed in neutralizing (aborting) the mentioned effects, the volume of liquidity can also be affected equally; such a situation would mean that the Central Bank loses the control of the money supply and fails at making decisions. The obvious difference between the growth rate of liquidity in the first program of economic development and the performance rate of liquidity growth during the years of the mentioned program through 1989-1993 is a clear evidence for the issue (Mohammadi and Baratzadeh, 2013).

2.3.4. Sanctions (EU and US)

The sanction hypothesis was first stated by Galtung in 1967 to express dissatisfaction and restrain some countries from certain behaviors. In the year 2000, Chan and Drury expanded this theory and described sanctions as a way of sending messages to other countries in order to have similar behavior with the target country. Lindsay (1986) believes that the four possible objectives of economic sanctions

are: Compliance, subversion, domestic symbolism, deterrence and international symbolism. The sanctions literature evaluates the effectiveness of unilateral and multilateral sanctions, as well as the cost of sanctions for both sides. Hufbauer et al. (1990) and Farmer (2000) have conducted some studies in this field; some researchers such as Hufbauer generally do not consider sanction policies to be effective after the Cold War. Others, such as Cortright and Lopez (2002), believe that sanctions can be an effective tool of foreign policy when a country pursues a specific objective.

The strategic position of Iran through the course of history has been a source of pressure and sanctions against this country. Economic sanctions has affected the economy of Iran from several directions, including a decline in oil revenues, the rise in the exchange rate and its volatility, the multi-currency exchange system, a decline in economic security, and formation of barriers to foreign direct investment.

3. LITERATURE REVIEW

In some cases, the existing literature explains and clarifies the negative relationship between oil and stock prices. Several theoretical views describe the negative relationship between oil prices and market movements. From the microeconomic point of view, rising oil prices have an adverse effect on the profit of companies which oil is either their direct or indirect cost of production. If companies could not fully transfer this increase in their total cost of production to consumers, the company's profits and dividends per share as the main stimuli for determining the stock price will decrease (Al-Fayoumi, 2009).

However, by reviewing recent studies, the main issue is many researchers believe that the effect of fluctuations in oil prices has indirect impact on the stock market which occurs by macroeconomic indicators; therefore, it is expected that as in oil-exporting countries the income of the country increases, the increase in oil price fluctuations would have a positive effect (Bjorland, 2009).

Hosseini Nasab et al. (2011) in an article titled "The Effect of Oil Price Fluctuations on the Stock Return in Tehran Stock Exchange: Wavelet Analysis and Markov Switching Model", examined the effect of oil market shocks on stock return in Tehran Stock Exchange during the period March 1997 to August 2010. According to the results of the article, in the downturn and flourishing phase the stock market returns had severe fluctuations and in the flourishing phase the stock market returns met mild fluctuations; however, the effect of oil price fluctuations on the stock market returns was positive. Furthermore, in the downturn phase, the stock returns had mild fluctuations and the effect of oil price fluctuations on stock market returns was negative; this was in a way that, the rise in oil prices has been a factor in continuing the recession in Tehran Stock Exchange.

Arouri et al. (2012) investigated the fluctuations in oil prices for European countries and the US through the VAR- Generalized Auto Regressive Conditional Heteroscedasticity (GARCH) approach, and while acknowledging the superiority of this model in examining the transfer of fluctuations comparing to other previous models of econometrics, discovered an indirect fluctuation transfer from global oil markets to European stock markets as well as a direct transfer to the US.

Abbasi and Shafaghat (2012) in their study compared the effect of oil price volatility on the stock market index of Iran as an oil exporter country and Germany as a European industrial pole, and used the VAR-GARCH method to examine the comparisons. According to the results of the current study, the oil price fluctuations have more permanent effects on the market index of Iran, and play a more significant role in the trend of the stock market index in the long-term.

Chortareas and Noikokyris (2014), in a study titled "Oil shocks, stock market prices, and the U.S. dividend yield decomposition", investigated the effects of oil supply and demand shocks in the U.S. by using the methodology of Campbell and Vuolteenaho, known as good and bad Beta. The results indicated that there is a positive relationship between the rising of oil price and dividend yield.

Yahyazadehfar et al. (2012) used a frequency domain model in his dissertation titled "Impacts of Oil Shocks on Stock Returns: An Application of Frequency Domain Method" to investigate the immediate and permanent effects of oil price fluctuations. The results of the research indicated that the midterm impacts of oil shocks on stock returns are positive; oil shocks with short-term impacts do not have a significant effect on stock returns, and the exchange rate had a negative and significant impact on stock returns.

Bouri (2015), in a study titled "The Returns and Fluctuations between Oil Price and Lebanon Stock Market during the Crisis" examines the volatility of the returns in the relationship between Lebanon's oil price and stock market using the newly developed VAR-GARCH model, with data from January 30, 1998 to May 30, 2014. The results, in contrary to previous studies, indicate that there is a transition and return volatility from oil prices to stock markets of oil-exporting countries. Experimental results for the entire period demonstrate that the effects of oil price returns to Lebanon's stock market are unstable, while the mutual relationship between Lebanon's oil prices and its stock market has increased during the crisis, but it has declined significantly in the post-crisis period.

Several field studies have been conducted with regard to the relationship between macroeconomic variables and oil prices, while many studies have concentrated on stock returns in developed economies through financial theoretical basis due to oil price shocks. A few of the mentioned studies have investigated the relationship between revenue changes from oil sales and stock returns in developing countries; nevertheless, studies focusing on the relationship between stock returns and stock market fluctuations with the volatility of oil revenues in Iran, using time series analysis and seasonal data, are few.

4. METHODOLOGY

4.1. Data Analysis Methodology

E-Views and Microfit software were used for analyzing the data. After collecting the field data, the analysis was carried out

Table 1: The value of Iran's oil exports during the 4-year period (2011-2014) - $ billions

OPEC members	2011	2012	2013	2014
Algeria	77.668	77.12	69.659	040.60
Angola	67.31	93.71	69.562	63.908
Ecuador	22.322	23.765	24.848	266.01
Iran	144.874	107.409	91.793	98.981
Iraq	83.226	94.39	89.742	85.298
Kuwait	102.052	118.917	115.084	104.165
Libya	19.060	61.26	46.018	15.186
Nigeria	93.676	95.360	95.118	83.897
Qatar	112.912	132.985	136.767	131.716
Saudi Arabia	364.699	388.401	375.873	372.829
Emirates	302.036	349.481	378.660	380.347
Venezuela	92.811	97.34	88.962	80.663

Source: OPEC database. OPEC: Organization of Petroleum Exporting Countries

through econometric method using time series and Co-integration technique with ARDL model and Pesaran's Bound test based on Estimation approach and Unrestricted Error Correction Model. The research territory in the present study includes all companies active in Tehran Stock Exchange in the test period. Companies active in stock exchange are those effective companies whose prices were calculated in Dividend per Share index. If during the test years, some companies have withdrawn from the stock board, the indexes calculated by the stock exchange have been adjusted accordingly. Data concerning the theoretical foundations review and subject literature have been collected through desk studies and internet searching. The test index for estimating volatility includes the total index of Iranian stock exchange during the period of 1993-2013 so that the stock fluctuations returns of all active companies in the Iranian stock exchange are considered in the present study. Since the impacts of some oil shocks appear in a period shorter than 1 year, the data used in this article is episodic; therefore, if annual data are used, the mentioned impacts will be ignored in the model. Data related to exchange rate, CPI, liquidity supply, and Iran's oil revenues have all been extracted by the help of the Central Bank's site www.cbi.ir. Additionally, in the present study, by relying on the previous studies (Kazerouni et al., 2016), impacts of the sanctions on stock returns fluctuations in Iran will be analyzed from two aspects of the European and American sanctions during a 20-year period (3/20/1993 to 3/21/2013). The required tests for data analysis are conducted by software; final tables have been added, results of which are presented in Chapter 5.

4.2. Model Estimation

According to the studies carried out in the present research, as well as explanations and definitions of variables conducted in the chapter 2, the Multivariate Regression model was used to investigate the effect of each of the independent variables on the dependent variables (stock return fluctuations).

$$R_t = \ln\left(\frac{Pt}{Pt\text{-}1}\right)*100 \quad (1)$$

Lvol=f(LO,LP,LEx,LM,EXT,MOD)

LVol: Stock return volatility logarithm, LO: Virtual variable of oil revenues shock, so that if the oil income changes more than 10% comparing to the previous period, it is indicative of oil shock and number one is selected by the virtual variable, otherwise the zero number is considered for the variable. LP: Logarithm of CPI. LX: Logarithm of the unofficial market exchange rate. LM: Liquidity logarithm.

EXT and MOD, European and the US sanctions respectively: The virtual variable has been used to calculate these variables, so that if sanctions were imposed on the side of the EU or the United States, number one, and in other situations number zero have been replaced.

$$R_t = \ln\left(\frac{Pt}{Pt\text{-}1}\right)*100 \quad (2)$$

In which R_t is the return of the stock price index, P_t is the index value in the current period, and P_{t-1} is its value in the previous period (Damodaran, 1996).

The first step in estimating the stock returns volatility index is examining the durability of this variable, using the generalized Right Tail Augmented Dickey-Fuller (Rtadf) test. The results of the study on stock returns durability are presented in Table 2:

The study results of the static stock return variable using ADF test statistic indicate that this variable is static and therefore the collective rank of this variable is zero.

In order to estimate the stock returns volatility, first the best ARIMA pattern (p, d, q) has to be selected. In order to get to this objective, regarding the results of the correlation graph analysis, it is indicated that p = 3 and q = 3. In addition, concerning the fact that the stock return variable is in the durable level, so d = 0. Using the resulting p as the stock return interruption and q as the lag of the interruption sentences, the ARIMA model is estimated.

The coefficients which are statistically less significant than other variables are deleted based on the Box and Jenkins methodology, and the model is re-estimated; this process is repeated so that all the model variables are statistically significant (Box and Pierce, 1970).

As the results of Table 3 demonstrate, all variables are statistically significant. In order to use ARCH models, the variance through the random sequence should not be constant and has to be a function of the behavior of error sentences. ARCH family models can explain the conditional variance trend according to their previous information, but it should be noted that volatility can only be estimated through GARCH methods when the existence of conditional heteroskedasticity is confirmed by the ARCH test; therefore, in this section, the conditional heteroscedasticity test of interruption sentences is examined using the LM-ARCH test.

The results of Table 4 demonstrate that the zero hypothesis of the LM test, which indicates the absence of heteroskedasticity variance, cannot be repudiated; therefore, the interruption sentences of the estimation model do not have the problem of heteroscedasticity variance. As a conclusion, using this model and the Eviews software, the stock returns volatility can be extracted,

Table 2: Generalized Dickey-Fuller test results for stock return variables

Variable	y-intercept			y-intercept and trend			Result
	Statistical test	Critical quantity on level 5%	Probability	Statistical test	Critical quantity on level 5%	Probability	
R	−6.37	−2.89	0.00	−6.38	−3.46	0.000	Durable

Source: Research findings

Table 3: Estimation of stock return volatility after applying the Jenkins box method

Variable	Coefficient	Standard deviation	t-statistics	P value
C	4.66	0.01	276.93	0.000
AR (1)	0.24	0.10	2.42	0.01

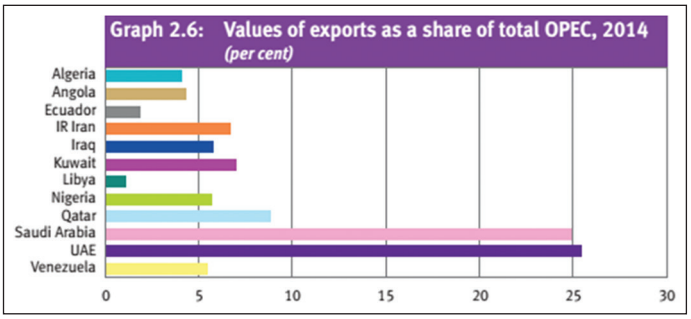
Source: Research findings

Table 4: The results of the heteroscedasticity variance test

Statistical test	Statistical quantity	Probability value
F statistic	0.132	0.716
2	0.135	0.712

Source: Research findings

Chart 1: Percentage share of Iranian oil exports among OPEC countries (2014)



Source: Organization of Petroleum Exporting Countries Database

which can be used as stock returns fluctuations in investigations. Chart 2 displays the stock market return volatility during the studied period.

In order to select the optimal p and q in the GARCH (p, q) process, there are different criteria used; Schwarz criteria (SC) criteria has been applied in the present study:

Ivanov and Kilian (2005) have demonstrated that the most appropriate criterion for selecting optimal lag for models with a sample size less than 120 is the Schwartz criterion. At this stage, regarding the minimum value of the Schwarz criterion, the optimal lag of GARCH (p,q) is selected. According to the results of Table 5, by considering the GARCH (1,1) as the criterion for the estimation of stock returns volatility, the time series of stock returns volatility is estimated. Considering the difference in the total variables degrees, ARDL is used to examine dynamic, long-term, and error correction relationships. The ARDL dynamic model is estimated (Table 6) with lags determined by Schwartz-Bayesian using the system. The results of the selection of the ARDL model are displayed in Table 7. In order to ensure that the estimation regressions are not inaccurate, Dickey-Fuller test is required to

Table 5: Selecting optimal p and q in the GARCH process (p, q)

P&Q	(1&0)	(0&1)	(1&1)	(1&2)	(2&1)	(2&2)
Schwarz criteria	−1.23	−1.25	−1.35	−1.33	−1.29	−1.21

Source: Research findings

be carried out confirming the variance of the variables (Tables 8 and 9).

4.3. Long-term Pattern Estimation

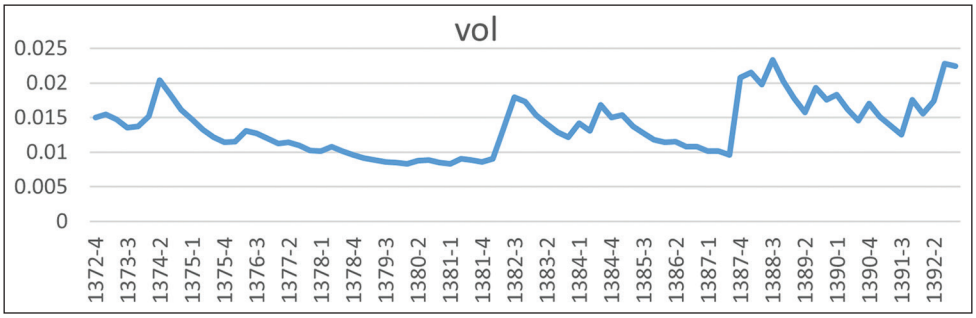
After ensuring the existence of classical assumptions, a long-term relationship, and coefficient stability test, the long-term results are presented. The results of the long-term estimation of the ARDL method have been presented in Table 10 with a maximum of three lags and based on the Schwartz-Bayesian criterion.

As it is demonstrated in Table 10, all variables are significant at 95% confidence level except for the price index variable. The liquidity variable has a positive and significant relationship with the stock return volatility; that is, if liquidity increases by one percent, stock returns volatility increases by 0.99%. The exchange rate variable also has a positive and significant relationship with stock return volatility; that is, if the exchange rate increases by one percent, the stock returns volatility increases by 0.71%. The shock variable of oil revenues causes stock return volatility to increase as well; meaning that an oil revenue shock results in a 0.17 % increase in stock market volatility. European and American sanctions variables also have positive and significant effects on stock return volatility in the studied period and lead to a 0.45% and 0.38% increase in stock return volatility respectively.

5. CONCLUSION

In present study, it is attempted to measure the effectiveness of the index of companies active in the stock market of the uncertainty caused by the volatility of Iranian crude oil revenues. We concluded that by estimating econometric models and especially Impulse Response Functions, the uncertainty caused by oil revenue shocks on the returns of the total stock market index has a direct and positive effect, and if in some cases the mentioned effect is negative its effect is imperceptible. In agreement with the results of the research, the effect of exchange rate changes was observed to be significant as well. The CPI and its effects on the stock returns fluctuations were discovered to be insignificant. In addition, more variables were added to improve the model. The liquidity supply and economic sanctions were also examined along with the previous variables in order to determine their clarification effect in the studied model. As a conclusion, these three variables caused stock return volatility to increase by 0.55%, 0.45% (Europe), and

Chart 2: Displays the stock market return volatility during the studied period.



Source: Research findings

Table 6: Dynamic relation

Diagnostic Tests

Test Statistics	LM Version	F Version
A:Serial Correlation	CHSQ(4)= 1.2503[.870]	F(4, 64)= .26066[.902]
B:Functional Form	CHSQ(1)= .66568[.415]	F(1, 67)= .57672[.450]
C:Normality	CHSQ(2)= 1.7662[.861]	Not applicable
D:Heteroscedasticity	CHSQ(1)= .026023[.872]	F(1, 76)= .025364[.874]

A:Lagrange multiplier test of residual serial correlation
B:Ramsey's RESET test using the square of the fitted values
C:Based on a test of skewness and kurtosis of residuals
D:Based on the regression of squared residuals on squared fitted values

Autoregressive Distributed Lag Estimates
ARDL(1,0,0,2,0,0,0) selected based on Schwarz Bayesian Criterion

Dependent variable is LVOL
78 observations used for estimation from 1373Q3 to 1392Q4

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
LVOL(-1)	.63458	.073542	8.6288[.000]
LM	.16423	.05614	2.9237[.004]
LEX	.11864	.04973	2.3848[.021]
LP	-1.3262	.07430	-1.7848[.079]
LP(-1)	2.8218	.99773	2.8281[.006]
LP(-2)	-1.7561	.60494	-2.9030[.005]
LO	.02888	.01184	2.4381[.012]
EXT	-.07464	.08137	-.91729[.362]
MOD	-.06409	.04188	-1.5305[.131]
C	-2.8034	1.8806	-1.4907[.141]

R-Squared	.78833	R-Bar-Squared	.76032
S.E. of Regression	.13925	F-stat. F(9, 68)	28.1400[.000]
Mean of Dependent Variable	-4.3322	S.D. of Dependent Variable	.28443
Residual Sum of Squares	1.3186	Equation Log-likelihood	48.4491
Akaike Info. Criterion	38.4491	Schwarz Bayesian Criterion	26.6655
DW-statistic	1.8714	Durbin's h-statistic	.74713[.455]

Table 7: Dynamic model results (Lvol dependent variable)

Variable	Coefficient	t-statistic	Results
Lvol(−1)	0.634	8.62	Significant
LM	0.016	2.92	Significant
LEX	0.011	2.38	Significant
LP	−0.132	−1.78	Insignificant
LP (−1)	0.282	2.82	Significant
LP (−1)	−0.157	−2.90	Significant
LO	0.0028	2.43	Significant
EXT	−.0074	0.91	Insignificant
MOD	−0.0064	−1.53	Insignificant
C	−.0280	−1.49	Insignificant
		F=28.14	R^2=0.78

Source: Research findings

Table 8: Dickey-Fuller test results, generalized for variables level

Variable	y-intercept			y-intercept and trend			Result
	Statistical test	Critical quantity on level 5%	probability	Statistical test	Critical quantity on level 5%	probability	
Lvol	−5.45	−2.89	0.000	−5.90	−3.46	0.000	durable
Lex	−0.58	−2.89	0.867	−2.34	−3.46	0.403	Non-durable
LM	−0.57	−2.89	0.869	−2.05	−3.47	0.561	Non-durable
LP	−0.70	−2.89	0.839	−2.58	−3.47	0.287	Non-durable

Source: Study results

Table 9: Dickey-Fuller test results generalized for first order difference of variables

variable	y-intercept			y-intercept and trend			Result
	Statistical test	Critical quantity on level 5%	Probability	Statistical test	Critical quantity on level 5%	probability	
DLex	−8.17	−2.89	0.000	−8.12	3.46−	0.000	Durable
DLM	−3.39	−2.90	0.014	−3.40	−3.47	0.058	Durable
DLP	−5.34	−2.89	0.000	−5.32	−3.46	0.000	Durable

Source: Study results

Table 10: Results of long-term relationship (dependent variable LVOL)

Variable	Coefficient	t-statistics	Results
LM	0.99	2.14	Significant
LEX	0.71	2.40	Significant
LP	−0.157	−0.080	Insignificant
LO	0.17	2.23	Significant
EXT	0.45	2.44	Significant
MOD	0.38	2.78	Significant
C	−1.946	−2.31	Significant

Source: Research findings

0.38% (US) respectively. In the end, considering the identification of effective variables on stock returns, suggestions are being made to improve the current situation of the economy, capital markets, and economic agencies.

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