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Analysis of Symmetric and Asymmetric Shocks of Oil Price on Stock Market Index: (NARDL Approach)

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Abstract:
In the developed world, capital markets are mentioned as one of the economic growth resources, and the fair distribution of wealth and also increasing per capita income. By attracting the micro capital of the society, while employ micro capitals in production, also generate income for real and legal shareholders. Another positive effects for this market is the absorption of market liquidity ,which is one of the main reasons for inflation in countries.One of the components that always causes the stock market to fluctuate is the price of oil. In countries such as Iran , which are heavily dependent on oil revenues.Fluctuation in oil prices and the stock market are more exposd to government interventions.Accordingly, in present study using the monthly data for the years from 2012 to 2019 with the method of Nonlinear Cointegrating Autoregressive Distributed Lag ,has been tried to test asymmetry in effectiveness.Research results show that fluctuation in oil prices ,exchange rate, money supply and consumer price index fluctuation in oil prices ,exchange rate, money supply and consumer price index can be effective among the channels in the stock market.Also, fluctuation in oil prices and asymmetric exchange rate and consumer price index and money supply are reported symmetrically.

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Introduction

Understanding the mechanism of oil pricing is important for crude oil exporting countries. On the one hand, these countries need this vital variable for industrialization, and on the other hand, given the fundamental role of these revenues in the economy of oil exporting countries, any instability in oil prices affects on macro variables, especially financial markets. Furthermore, it affects the behavior of investors in the stock market and their sentiment to invest in this market (Dutta et al., 2017).

Bastiani and Manera (2016) found that the nature of oil price volatilities affects stock market volatility in countries such as the US, and argued that oil supply volatilities have no signification impact on the stock market while demand volatilities have signification and important impact on stock market volatility. Also, the relationship between stock returns and macroeconomic variables can be studied in two ways. The first Theory refers to the stock market as an Index of economic activities and the second view refers to macroeconomic variables that influence and predict the stock market. In addition, economic activities can explain Stock Market Returns.

Since, the stock market reflects macroeconomic variables in the stock price index, the sensitivity of the stock market to important macroeconomic variables and vice versa is the most important part of the theories of investment, financing and business environment (Katha and Sahu .,2016).

Considering the fact that the economic of Iran is dependent on oil, in these circumstances and the degree of economic dependence on oil revenues, any change in international markets and the occurrence unforeseen fluctuations and expectations are related to these revenues. The sale of such products will lead and cause imbalances in other sectors of the economy.

Since the stock market of Iran is also affected by these changes, therefore, it is essential to study the impact of changes in the world oil prices on macro variables in order to prevent economic crises and develop appropriate measures to maintain economic balance and stability and adjust the country's annual budgets. Such information is useful for both domestic and foreign investors as it provides a better choice for investment. In addition, companies that are sensitive to oil price fluctuations can take appropriate precautions against oil prices fluctuations. The world of oil prices, Exchange rates, consumer price

index and money supply are exogenous variables in relation to the stock market. The Nonlinear Cointegrating Autoregressive Distributed Lag can be used to study the impact of these variables on the stock market index.

Research Literature

Relationship between asymmetric oil price shocks and stock market

The theoretical argument for the relation between crude oil and stock prices can be explained through two major channels. First, oil prices can affect stock prices directly by affecting the future cash flows by their impact on the overall economy (Hooker, 2002; Kilian.,2009). Secondly, the oil prices can impact stock prices indirectly through affecting the interest rate used to discount the future cash flows (Basher et al., 2012; Ciner .,2013). These discounted cash flows are a reflection of economic conditions (e.g., inflation, interest rates, income, production costs, economic growth, and consumer confidence) and macroeconomic events that are likely to be influenced by oil shocks (Arouri & Nguyen, 2010). The rising oil prices cause a decline in the exchange rates which increase the cost of production of goods and services in the oil-importing economy like India, hence, increasing the inflation. The higher inflation negatively affects the financial markets in general, stock markets in particular (Cong et al., 2008; Creti et al., 2014).

Numerous studies have examined the relationship between crude oil prices and stock return index. However, there is no single consensus on the relationship between these two variables, Whether positive or negative .Most studies have examined the negative impact of oil prices on Stock Returns Index , i.e., an increase or decrease in oil prices will cause a decrease or increase in stock prices (Sadorsky,1999;Papapetrou,2001; Basher and Sadorskey,2006 ;Basher et al ,2012; Driesprong et al ,2008; Park and Ratti ,2008). Proponents of a negative relationship suggest that high oil prices increase product costs, leading to lower profits and dividends. Therefore, the stock price decreased (Narayan and Narayan, 2010; Zhu and Niu, 2016), while On the other hand, there are several studies that show a positive relationship between these two variables.

The existence of a positive relationship between these two variables can be explained by the increase in oil prices as a factor to improve business performance by investors. Studies showing an increase in oil prices suggest that oil demand shocks are considered a positive factor for stock markets (Basher et al.,2012;Kollias et al ,2013; Guntner,2014; Kang and

Ratti ,2015).An unexpected and exogenous increase in oil prices can be transmitted to real economic activity. This mechanism is possible through various channels. In this context, the question is whether the existing mechanism is responsive to positive and negative shocks.

Nonlinear Relationship between asymmetric oil price shocks and stock market

The main reason behind this nonlinear relationship is that different stokeholders have different investment horizons (Reboredo & Rivera-Castro, 2014). In the financial markets, various investors with different time horizons are gathered, therefore, all investors have different influences on the overall stock market. For example, Sadorsky (1999) provided evidence related to the asymmetric effect of oil prices on stock prices by using a vector autoregressive model. Basher & Sadorsky (2006) further concluded that an asymmetric relationship exists between oil and stock prices. Salisu & Oloko (2015) also provided evidence regarding asymmetric relationships during the slowdown period of the world economy. On the other hand, Cong et al. (2008) provided insignificant evidence for an asymmetric relationship between oil prices and the Chinese stock market. However, Park & Ratti (2008), and Nandha and Faff (2008) provided no evidence for an asymmetric effect of oil prices on the stock market. Recent literature also provides inconsistent findings. For example, Badeeb and Lean (2018) examined the asymmetric effect of oil prices on sectoral stock indices by using a nonlinear ARDL model. Their study concludes a weak linkage between oil prices and Islamic stock indices. On the contrary, Chang et al. (2020) examined the asymmetric effect of oil prices on Islamic composite and sectoral stock indices. Their findings show the presence of the asymmetric effects of oil prices on the DJ Islamic index. Moreover, their findings related to the industrial sector, utility sector, oil & gas sector, consumer services, consumer goods, healthcare sector, and financial sector are consistent with the findings of the DJ Islamic index. Finally, they note the symmetric effect of oil prices on basic material and technology and telecommunications sectors. Many studies argue that a linear specification may not be reasonable since the oil-stock interaction is characterized for its complexity and nonlinearity (e.g., see, Aloui & Jammazi,2009; Chen, 2010; Narayan and Sharma, 2011; Huang et al., 2016). Balcilar et al. (2015) also argue that stock prices respond asymmetrically to shocks in oil prices.

While the asymmetric effect of oil prices on economic activity is well-documented, the existing empirical literature is not conclusive for its relevance for the oil-stock relationship. In a sample of major oil-importing and exporting countries, Wang et al. (2013) examined the potential nonlinear linkage between oil prices and equity returns. The authors employed two kind of linearity tests and revealed that for most countries in their study no significant nonlinear dependance is found. For a panel of 18 oil-importing and oil-exporting countries, Ramos and Veiga (2013) supported the presence of asymmetric effects only in oil-importing countries. Nevertheless, using a time-varying copula approach, Fenech & Vosgha (2019) have supported the presence of asymmetric behavior across all the GCC countries where stock returns are more responsive to decreases in oil price drops than to increases. In the same vein, using nonlinear autoregressive distributed lag (NARDL) models, Siddiqui et al. (2019) found that during the oil price collapse of 2014–2016, negative oil price changes had relatively larger effects than positive oil price changes on stock indices in the oil-exporting countries, such as the GCC group. In an economy with continuous aggregate production function, the effect of an energy price increase on the share of energy costs in GDP is limited .This direct supply channel implies a symmetrical response of economic activity to positive and negative oil price shocks. Oil price shocks can also affect aggregate economic activity through demand side channels.

First, the unexpected increase in oil prices is associated with higher energy consumption. Therefore, increasing crude oil prices lead to a decrease in the purchasing power of households and consequently, a decrease their consumption. (Baumeister and Kilian, 2017; Baumeiste et.al, 2018).

Crude oil prices are usually subject to unpredictable fluctuations. Changes in oil prices can affect the prices of public goods in different ways (Adrangi et. al 2020).It is also explained the oil price shocks on the supply and demand side ultimately affect on inputs and outputs prices .It is also explained that supply and demand side ultimately affect input and output prices.Rafei and Shahrestani (2020) argued that the global oil price fluctuations had a significant impact on the financial sectors of the economy, especially the stock market. Ftiti and Hadhri (2019) also find the results of the nonlinear nonparametric causality method showed that use of economic policy uncertainty and also investor sentiment could improve the prediction of stock returns.Dutta et .al (2017) concluded that oil market uncertainty had a significant impact on market fluctuations.

Stock returns of sample markets are also sensitive to oil fluctuations and variable jumps in stock returns.

Hu et. al (2017) used NARDL and SVAR methods to analyze the asymmetric effects of oil price shocks on Chinese stock market .They found that oil price demand shocks had significant effects on Chinese stock market in short- and long- run. However, supply shocks are an exception. In other words, in terms of the nature of asymmetry, there is no evidence of asymmetric impact of supply shocks, only the overall demand shock is asymmetric. On a final note, this study offers innovations. This method which distinguished the symmetric and asymmetric shocks has not been done in Iran so far. Moreover, the study investigates the symmetric and asymmetric oil price Shocks in nonlinear state with NARDL approach and then it tries to compare the results of symmetric and asymmetric estimation of the model.

Reaserch method

As explained in the introduction, the purpose of this study is to analyze the analysis of Symmetric and Asymmetric Shocks of Oil Price on the overall Stock Market Index. Accordingly, the specification of the model is estimated in two ways, symmetric and asymmetric, and the results of these two methods are compared. In symmetric method, Autoregressive Distributed Lag is used, and in the asymmetric method, the effects of the increase and decrease in oil prices are separated and analyzed using the approach of Nonlinear Cointegrating Autoregressive Distributed Lag (NARDL), which is derived from the specification of the study model of shin et al. This research is estimated in EViews 10 that is derived from the specification of the study model of shin et al.

For some economic issues, the impact of several economic policies on a particular component is accompanied by lags. This is generally the case for fiscal policies. In the case of government financial measures to decrease inflation or increase investment, it takes a long time to observe the effects of these measures. This problem is explained in econometrics by the fact that present changes in dependent variable are due to past and present changes in the explanatory variable. In these models, the effects of change in explanatory variables are not fully visible in the present. Some of it is in the present and some in the future. The lags in the effects of the explanatory variables on dependent variable are called lag effects. The

models that are developed to explain the lag effects are also called distributed lags.so, a distributed lag model can be represented as follows:

$$Y_t = \alpha_0 + \beta_0 X_t + \beta_1 X_{t-1} + \beta_2 X_{t-2} + \cdots + \beta_k X_{t-k} + u_t \quad (1)$$

On the other hand, the changes in the dependent variable are due to changes in adjusted explanatory variables in each period of lags. In the present, the total changes in the dependent variable appear. These adjustments over time are called minor adjustments. Therefore, the lagged dependent variable is also included in the system as an explanatory variable because it has auto explanatory power. By combining broad lags of explanatory variables and self- explanatory variables, the general shape of ARDL models (p, q) is described as follows:

$$Y_t = \alpha + \sum_{j=1}^{p} \gamma_j \, Y_{t-j} + \sum_{i=0}^{q} \beta_j \, X_{t-i} + u_t \quad (2)$$

Considering the impact of the stock market on the exchange rate, inflation and liquidity, and the relationship between these variables and oil price fluctuations in Iran, these variables were used as independent variables. The overall stock index is also used as a dependent variable. In this study, due to the heteroskedasticity, the model used for the symmetric method in this study is defined as log –linear. Existence of negative data in data analysis (positive and negative).It was not possible to obtain a logarithm from the right hand side of the equation and it is according to Equation 3:

(3)

$$ltsr_t = \beta_0 + \sum_{j=1}^{p} \gamma_j \, ltsr_{t-j} + \sum_{i=0}^{q} \beta_1 \, oilp_{t-i} + \sum_{i=0}^{r} \beta_1 M_{t-i} + \sum_{i=0}^{s} \beta_1 \, cpi_{t-i} + \sum_{i=0}^{v} \beta_1 \, ex_{t-i} + \varepsilon_t$$

Where:

: Logarithm of total stock market index at time t $Ltsr_t$

: World symmetric oil prices at time t $oilp_t$

: Money supply in Iran at time t M_t

: Consumer price index in Iran at time t cpi_t

: Exchange rate in Iran at time t ex_t

: Error component of model ε_t

t: Time on a monthly basis from April 2012 to March 2017

Also, the model used for asymmetric approach with shin and Greenwood training approach includes the analysis of oil price fluctuations, consumer price index and money supply to the positive and negative fluctuations and

the fit of each of them to the total stock market index, which can be analyzed as Equation4:

$$ltsr_t = \theta^+ oilp_t^+ + \theta^- oilp_t^- + \varepsilon_T \quad (4)$$

$$\begin{cases} oilP_t^+ = \sum_{j=1}^{t} \Delta oilP_J^+ = \sum_{j=1}^{t} Max(\Delta oilp_j . 0) \\ oilP_t^- = \sum_{j=1}^{t} \Delta oilP_J^- = \sum_{j=1}^{t} Min(\Delta oilp_j . 0) \end{cases}$$

Based on the above relationship, the short-run asymmetric model is designed as follows:

$$ltsr_t = \sum_{j=1}^{p} \rho_j ltsr_{t-j} + \sum_{j=0}^{q} \theta_j^+ oilp_{t-j}^+ + \sum_{j=0}^{r} \theta_j^- oilp_{t-j}^- + \varepsilon_T$$

Where:

: Logarithm of total stock market index at time t$ltsr_t$

$oilp_t^+$: Positive fluctuations in world of oil prices at time t

$oilp_t^{-}$: Negative fluctuations in world of oil prices at time t

ρ: Autocorrelation coefficient

θ: Asymmetric coefficient of oil price lags

Equations for the analysis of other explanatory variables on the dependent variable have also been designed such as Equation 4, which have been omitted here so as not to increase the paper length.

Equation 4 is used to examine short -run relationships between variables. The present of asymmetry in the long run is examined using the Wald test.Equation 5 is used to conduct the Wald test.

$$\beta^+ = \beta^- \rightarrow -{}^{\theta_j^+}\!/_{\rho_j} = {}^{\theta_j^-}\!/_{\rho_j} \quad (5)$$

Based on the above patterns, the asymmetric effect of oil price, exchang rate, consumer price index and money supply can be tested in short- and long- run.

Estimation of Research Model in Linear and Nonlinear States

In this section, after examining the stationary status of research variables, first according to the conventional method in explaining the effect of oil prices on stock market index, the Nonlinear Cointegrating Autoregressive Distributed Lag model (symmetric model) is estimated.

Then, for asymmetric analysis of the effect of oil prices, exchange rate, consumer price index and money supply on the total stock index, Nonlinear Cointegrating Autoregressive Distributed Lag model (asymmetric model) is estimated.

According to Granger (1987), in order to estimate cointegrated coefficients, all variables must have the same degree of integration and be greater than zero. The presence of this condition is also necessary for the studied asymmetric model in this research (shin et all 2014).In order to investigate the stationary in this research, Augmented Dickey –fuller unit root test and Philips –Perron unit root test are used and the results are reported in table 1.

Table 1: Results of stationary tests at level and first difference of model

Phillips-Perron test				Augmented Dickey –fuller unit root test				Variable
At first difference		At level		At first difference		At level		
Prob	t-Statistic	Prob	t-Statistic	Prob	t-Statistic	Prob	t-Statistic	
0.000	-5.884	0.997	1.174	0.000	-5.958	0.995	0.918	ltsr
0.000	-6.607	0.445	-1.664	0.000	-6.845	0.359	-1.839	oilp
0.000	-10.82	0.919	-0.300	0.000	-10.33	0.915	-0.327	$oilp^{+}$
0.000	-5.882	0.660	-1.227	0.000	-6.079	0.746	-1.012	$oilp^{-}$
0.000	-11.24	0.830	-0.740	0.000	-11.19	0.768	-0.950	ex
0.000	-5.626	0.999	1.546	0.000	-5.596	0.998	1.213	ex^{+}
0.000	-7.701	0.502	-1.571	0.000	-11.29	0.544	-1.324	ex^{-}
0.000	-4.516	0.999	2.092	0.064	-2.780	0.994	0.822	cpi
0.000	-4.410	0.999	2.168	0.072	-2.731	0.995	0959	cpi^{+}
0.000	-9.214	0.961	0.070	0.000	-9.218	0.963	0.085	cpi^{-}
0.000	-15.56	1.000	3.174	0.000	-9.935	1.000	3.252	M
0.000	-9.062	0.999	2.091	0.000	-9.059	0.999	2.083	M^{+}
0.000	-11.16	0.836	-7.715	0.000	-11.15	0.816	-0793	M^{-}

Source: Research Findings.

4-1-Results of Estimation of the Linear Model

In order to study the research model using Autoregressive Distributed Lag, it is important to determine the optimal lag. This model is estimated based on the optimal lag according to Akaike Information.

According to the lowest amount for the Akaike statistic optimal lag is 6 and the selected model is ARDL(2,6,0,0,2).Table 2 shows the results of dynamic model using Autoregressive and linear extensive lag method.

Table 2: Short-Run Results with the ARDL Model

Variable	Coefficient	Standard deviation	T-statistic and prob
LTSR(-1)	1/198528	0.094040	12.74490 [0.0000]
LTSR(-2)	-0/320101	0.094254	-3.396137 [0.0011]
OIL	-0/000106	-0.001109	-0.095678 [0.9240]
OIL(-1)	0/001249	0.001810	0.689822 [0.4924]
OIL(-2)	-0/000285	0.001791	-0.158921 [0.8742]
OIL(-3)	-0/001580	0.001736	-0.910141 [0.3657]
OIL(-4)	0/005976	0.001754	3.408101 [0.0011]
OIL(-5)	-0/008450	0.001734	-4.873337 [0.0000]
OIL(-6)	0/004026	0.001069	3.764691 [0.0003]
M	0/00000513	0.00000247	4.078660 [0.0411]
CPI	·0/001671	0.001170	1.427530 [0.1576]
EX	0/0000718	0.0000459	1.563263 [0.1222]
EX(-1)	0/0000322	0.0000551	0.584916 [0.5604]
EX(-2)	-0/000159	0.0000494	-3.212097 [0.0019]
C	1/111752	0.326301	3.407137 [0.0011]
R-Squared : 0.994239		DW-statistic: 2.065088	

Source: Research Findings.

The results of the dynamic equation show that the effect of oil price fluctuation on the total stock market index is not significant in three periods (one month) and has a significiant effect from the fourth period. As it be seen, the effect of the fourth and sixth periods on the total stock market index is positive and in the fifth period it had a negative effect. The positive and negative fluctuations of the oil price in these confrontations are not far from the mind. Also, the effect of money supply on total stock market index is positive and significiant.An increase in one unit of money supply leads to a 0/00000513 increase in total stock index .The effect of consumer price index in the short -run is positive but not significiant.Exchange rate with a lag of two periods has a negative effect on total stock index. A one –unit increase in the informal exchange rate leads to a 0.000159 decrease in the overall stock market index. A high coefficient of determination indicates a high explanatory power of the independent variables. Durbin Watson (DW) statistic is also in the range that there is noautocorrelation. The small coefficients of the model depend on the monthly data used in this research and also the logarithm of dependent variable.

Table 3 shows the results of the long- run estimation using the Autoregressive and linear extensive lags method

Table 3: Estimation of long run coefficients with Akaike Information Criterion

Variable	Coefficient	t-statistic
OIL	0.006826	2.284638 (0.0252)
M	0.0000422	1.601394 (0.1135)
CPI	0.013744	1.981134 (0.0512)
EX	-0.000450	-1.355273 (0.1794)
C	9.144772	19.81382 (0.0000)

Source: Research Findings

Long- run results of the model show a positive effect of symmetric oil price on the overall stock index. A one- unit increase in the oil prices leads to a 0/0068% increase in total stock index. The effects of money supply and consumer price index are positive, but the effect of exchange rate is still negative. Money supply and exchange rate are not significant at the 90 % and 95 % confidence intervals. Consumer price index is significant at the 90% confidence intervals.Bound's Test and Specification Tests and also Error Correction Test (ECM) are reported in Table 4.

Table 4: Results of Bound's Test to confirm the long -run relationship

Test	F-Statistic	Critical value at level 5%
Bound's Test	5.085442	3.49-2.56
-	Jarque-Bera/ Chi-square	F statistic
Serial correlation	1.605546 [0.4481]	F (73.2) 0.662965 [0.5184]
Error function form	Not applicable	F (1.74) 0.644362 [0.5213]
Normality	2.897859 [0.234822]	Not applicable
Hemoskedasticity	] 11.10580 [0.6777]	F (14.75) 1.75411 [0.7136]
-	Coefficient	P-value
Error Correction	-0.121572	-5.704983 (0.0000)

Source: Research Findings

Critical values of Bound's Test confirm the existence of long run relationship at the 95% confidence interval. According to the Error Correction Test (ECM), when the dependent variable goes out of equilibrium, it returns to equilibrium within eight periods. The coefficient of the error correction variable is less than unity, indicating the convergence of the model in returning to the original or new equilibrium.

Resuts of non-linear estimation

In order to analyze the effects of the case study variables, .The results of the data analysis are shown in the positive and negative series such as $oilP_t^+$ and $oilP_t^-$.Results of data analysis are shown in the following charts.

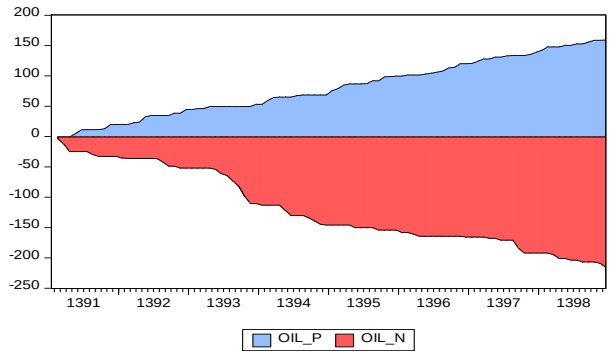


Figure 1: Analysis of oil prices in terms of positive and negative fluctuations

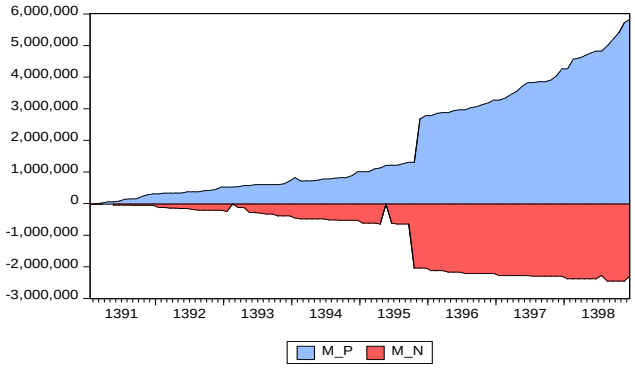


Figure2: Analysis of money supply in terms of positive and negative fluctuations

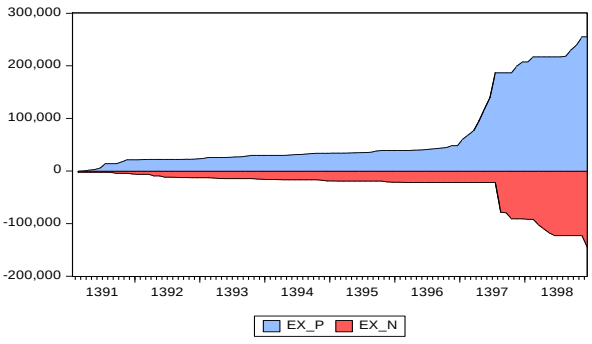


Figure 3: Analysis of exchange rate in terms of positive and negative fluctuations

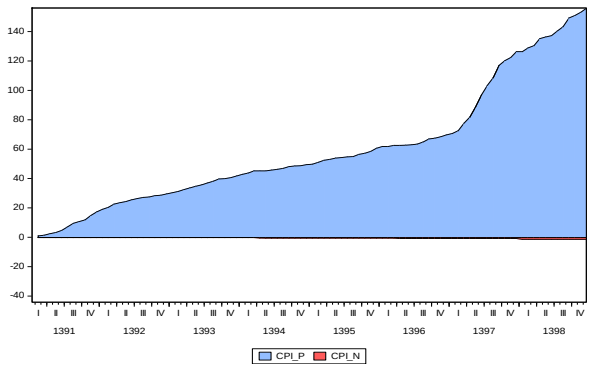


Figure 4: Analysis of consumer price index in terms of positive and negative fluctuations

Results of the analysis show that in the case study period, negative fluctuations of oil prices were more and more severe than positive fluctuations. Results of decomposition show that in case study period negative fluctuations of oil prices are more and more severe than positive fluctuations. Positive fluctuations of money supply are more than negative fluctuations and until 1395, it was reasonable and stable, but since, fluctuations of money supply have witnessed sharp fluctuations. Negative fluctuations of exchange rate are less than positive fluctuations and had appropriate conditions until 1396 but since 1396, the exchange rate has gotten out of control. Positive fluctuations of consumer price index are more and more severe than negative fluctuations .In other words, in this period consumer price index didn't have negative fluctuations and general level of prices has always been increasing. Also, fluctuations of consumer price index have had unreasonable and unstable behaviors since 1391.

Table 5 is reported the results of decomposition and analyzing with the method of Autoregressive and non-linear extensive lags of model' s variables on total stock index.

Table 5: Estimation of nonlinear ARDL coefficients with Akaike (NARDL Approach) information criterion

Variable	Coefficient	T statistic
LTSR(-1)	1/003278	671/0309(٠/0000)
OIL_P(-1)	0/001333	2/671806(٠/0090)
OIL_N(-1)	٠/000874	2/346504(٠/0211)
Variable	**Coefficient**	**T statistic**
LTSR(-1)	1/000440	1313/788(٠/0000)
EX_P(-1)	0/0000195	1/987983(٠/٠499)
EX_N(-1)	-٠/0000152	-2/832907(٠/0057)
Variable	**Coefficient**	**T statistic**
C	0/951200	3/068444(٠/0029)
LTSR(-1)	0/913049	31/66143(٠/0000)
M_P(-1)	0/00000635	2/337977(٠/٠218)
M_N(-1)	-٠/00000643	1/947111(٠/0549)
Variable	**Coefficient**	**T statistic**
LTSR(-1)	0/996087	674/8215(٠/0000)
CPI_P(-1)	0/001348	2/296065(٠/0250)
CPI_N(-1)	٠/018785	1/446550(٠/6567)

Source: Research Findings.

Results of analyzing asymmetric effects of oil prices show that positive and negative fluctuations of oil prices in both of the manners have had positive and significant effect on total stock index .A similar result was obtained in examining the symmetric effect of oil prices. Effect of positive fluctuations of oil prices are greater than negative fluctuations. Changing in one unit of oil prices lead to increase 0/0013% in total stock index. While, decreasing in one unit of oil prices, growth of total stock index increases by 0/0008% .Positive fluctuations of exchange rate have positive and significant on total stock index and negative fluctuations of exchange rate have negative and significant on total stock index. In examining the symmetric effect of exchange rate, results were negative but the results of asymmetric exchange rate show that the effects of positive and negative manners are different on total stock index. Increasing in one unit of exchange rate will lead to grow 0/0000195 in total stock index but a decrease in one unit of exchange rate lead to decrease 0/0000152 in total stock index. Positive fluctuations of money supply have positive and significant effect on total stock index and negative fluctuations of money supply have negative and non-significant effect on total stock index (significant at the confidence interval of 90%).The results of examining symmetric effect of money supply are positive and non- significant effect

but the results of asymmetric money supply show that the effects of positive and negative manners are different on total stock index. An increase in one unit of money supply will lead to grow 0/00000635 but a decrease in one unit of money supply will lead to decrease 0/00000643 in total stock index.Significiant level of negative manner is at the confidence interval of 90%.Positive fluctuations of consumer price index have positive and significant effect on stock price index and negative fluctuations have positive and non-significant effect on total stock index. The results of examining symmetric effect of consumer price index are positive and non- significant effect but the results of asymmetric consumer price index show that the effect of positive and negative manners are the same on the total stock index. An increase in one unit of consumer price index will lead to grow 0.001348 in stock index and a decrease in one unit of consumer price index will lead to grow 0.01875 in total stock index.Significiant level of negative state is confirmed.
Wald test is used to investigate the existence of significant difference between these two coefficients.

Table 6: Results of examining the significant differences between negative and positive coefficients of variables by using Wald test

Wald test for oil prices	coefficient	Prob
t -Statistic	2.454687	0.0160
f -Statistic	6.025490	0.0160
Wald test for exchange rate	coefficient	Prob
t- statistic	3.448737	0.0009
f- statistic	12.89379	0.0009
Wald test for money supply	coefficient	Prob
t-Statistic	-0.070221	0.9442
f-Statistic	0.004931	0.9442
Wald test for Consumer price index	coefficient	Prob
t-Statistic	-0.419582	0.6762
f-Statistic	0.176049	0.6762

Source: Research Findings.

The results of the table indicate that both positive and negative estimated coefficients of the oil price and exchange rate variables are significantly different from each other. Therefore, it can be concluded that oil prices and exchange rate have asymmetric effects on the overall stock index in the long -run. In other words, the asymmetry of the effects of oil prices and exchange rate on total stock index is confirmed in long -run. On the

other hand, the two estimated positive and negative coefficients for the money supply and consumer price index variables are not significantly different from each other. Therefore, it can be concluded that money supply and consumer price index don't have asymmetric effects on total stock index in the long- run. In the other words, asymmetry of the effects of money supply and consumer price index on total stock index is confirmed in long -run.

The classical hypothesis test and the stability of the model related to asymmetric results of variables are presented on total stock index.

Table 7: Results of specification tests of asymmetric variables

Oil price test	Chi-square test /Jarque-Bera	F Version
Serial correlation	16.51414[0.0569]	F(81.9) 1.918121[0.0607]
Error Function Form	Not applicable	F(1.89) 0.003109[0.9557]
Normality	4.751899[0.092926]	Not applicable
Hemoskedasticity	4.174220[0.3829]	F(4.89) 1.033962[0.3943]
Exchange rate test	Jarque-Bera /Chi-square test	F Version
Serial correlation	7.350199[0.1959]	F(84.5) 1.425085[0.2237]
Error Function Form	Not applicable	F(1.88) 4.065879[0.0568]
Normality	3.252474[0.1966]	Not applicable
Hemoskedasticity	6.363835[0.2724]	F(5.88) 1.278051[0.2806]
Money supply test	Jarque-Bera /Chi-square test	F Version
Serial correlation	5.482076[0.0645]	F(82.2) 2.597902[0.0805]
Error Function Form	Not applicable	F(1.83) 4.238525[0.6266]
Normality	5.315419[0.070109]	Not applicable
Hemoskedasticity	4.908756[0.6711]	F(84.7) 1.676361[0.6915]
Consumer price index test	Jarque-Bera /Chi-square test	F Version
Serial correlation	1.996410[0.3685]	F(62.2) 0.836294[0.4381]
Error Function Form	Not applicable	F(1.63) 0.477729[0.4920]
Normality	1.937558[0.379546]	Not applicable
Hemoskedasticity	12.17361[0.4318]	F(63.12) 1.001333[0.4584]

Source: Research Findings .

Comparing Results of Symmetric and Asymmetric Estimation of the model

Table 8 contains a comparison of the model results in symmetric and asymmetric states.

Table 8: Comparing results of symmetric and asymmetric estimation of the model

Asymmetric			symmetric		variable
Long run asymmetry	Negative fluctuation	Positive fluctuation	Long- run	Short- run	
It is exist	+	+	+	+	Oil Price
It is exist	-	+	+	-	Exchange rate
It isn't exist	NonSignificant	+	Nonsignificiant	+	Money supply
It isn't exist	Nonsignificant	+	+	+	Consumer Price Index

Source: Research Findings

Conclusion

Investigation of the symmetric oil price on the overall stock market index shows that the effects of symmetric oil prices are positive and significiant.The reasons for this effect are: Increasing in oil prices will lead to increase in government revenues. This issue will lead to implement the government economic plans and infrastructure projects for the development of the country. Implementation of development plans will boost the business of economic firms and increase their profitability. On the other hand, due to the monopoly of Iran's economic, the increase in oil prices inject a positive psychological burden on public opinion and improve expectations for economic conditions in the future.

Also.the results of analysis show that the effect of asymmetric oil prices have positive effect on total stock index.The reasons for this effect are: many industries in the country depend on crude oil derivatives as raw materials for production.Decrease in oil prices reduce the cost of raw materials for oil dependent manufacturing firms and raise their profitability. The export capacity of such firms can also increase. Increasing in profitability also increases the total stock index. The results of data analysis show that in the study period, the effect of money supply symmetrically in long run and short run are positive. Of course, the result of short term study is significant and the result of long term study is nonsignificiant.This result is due to "Effect of Liquidity Creation". The growth of liquidity increases lending power of banks and on the other hand, it makes inflation and increases the prices. Therefore, it also causes the growth of total stock index.

The effect of positive fluctuations of money supply asymmetrically is significant and positive and the effect of negative fluctuations of money supply on the total stock index is negative and significiant.The reason for this is also related to the effect of liquidity creation. Declining in oil revenues will decrease the process of liquidity creation by the central bank. Slowing the growth of money supply and liquidity will also have anti-inflationary effects. It will have a negative effect on the stock market. One of the effect of decreasing in market liquidity will be a drop in the total stock index. The expansionary monetary policy and increasing the money supply in economy of Iran have psychological effects on the formation of expectation to invest in stock market. Therefore, it can increase the stock price index that are consistent with economic theories because increasing in money supply will lead to higher demand of assets and as a result increase the price of assets.

The results of analysis data show that the effect of consumer price index symmetrically on stock market index is positive and significiant.This effect is significant in long run and it is nonsignificiant in short run. Therefore , the inflation will lead to increase in total stock index due to the adherence of total stock index to inflation.

In examining the behavior of the consumer price index asymmetrically, the results show that in positive and negative fluctuations, the total stock index has increased. In the other hand, the effect of positive and negative fluctuations of consumer price index on total stock index is positive. Of course, the significance of positive form was confirmed but the effect of negative fluctuations is nonsignificiant.

The effect of exchange rate symmetrically on total stock index is nonsignificiant in long run and it is negative and significant in short run. One of the most important reasons for this is the emotional behaviors of the effective factors in stock market in short run. Increasing in exchange rate as a bad news have negative impact on the stock index and it has been negative the total stock index in short run.

The results of study the asymmetric effect of the exchange rate confirm the results of the symmetric exchange rate. The effect of positive and negative fluctuations of exchange rate have different effects.Positive fluctuations of exchange rate increase the overall stock index and negative fluctuations of exchange rate has decreased the stock index.Positive shocks of exchange rate increase the consumption of imported commodities. This issue provides an opportunity for domestic industries to

cover domestic demand and increase the amount of sale and their profitability.Also, the results of wald test indicate that both positive and negative estimated coefficients of the exchange rate and oil prices are significantly different from each other.Therefore, the exchange rate and oil prices have asymmetric effect on total stock index in the long-run.

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تحلیل شوک‌های متقارن و نامتقارن قیمت نفت بر بازده سهام بازار: رهیافتARDL غیرخطی

چکیده:

در دنیای پیشرفته از بازارهای سرمایه به عنوان یکی از ارکان رشد اقتصادی و توزیع عادلانه ثروت و افزایش درآمد سرانه یاد می‌شود. این بازار از طریق جذب سرمایه‌های خرد جامعه و همچنین جذب سرمایه‌های خرد در تولید درآمدی را نیز عاید سهامداران حقیقی و حقوقی می‌نماید. از دیگر اثرات مثبت این بازار جذب نقدینگی بازار است که از جمله دلایل اصلی بروز تورم در کشورهاست. از جمله مولفه‌هائی که همواره بازار سهام را دچار افت و خیز می‌کند، قیمت نفت است. در کشورهایی که وابستگی شدید به درآمدهای نفتی دارند، نوسانات قیمت نفت و بازار سهام بیشتر در معرض مداخلات دولت است. لذا برای رسیدن به شکوفائی و ثبات در تولید و توسعه پایدار، مطالعه بازارهای سرمایه و شناسائی عوامل موثر در آن ضروری می‌باشد. بر این اساس در پژوهش حاضر تلاش شده است تا با استفاده از داده‌های ماهانه سال‌های ۱۳۹۱ تا ۱۳۹۸ و رهیافت خود توضیحی با وقفه‌های توزیعی غیرخطی، عدم تقارن در اثرگذاری متغیرها مورد آزمون قرار گیرد. یافته‌های تحقیق نشان می‌دهد که نوسانات قیمت نفت، نرخ ارز، حجم پول و شاخص بهای مصرف کننده می‌تواند از جمله کانال‌های اثرگذار در بازار سهام باشند. همچنین نوسانات قیمت نفت و نرخ ارز نامتقارن و شاخص بهای مصرفی و حجم پول، متقارن گزارش می شود.

کلمات کلیدی: نوسانات مثبت و منفی قیمت نفت، شاخص کل سهام، رهیافت خود توضیحی با وقفه‌های توزیعی غیرخطی NARDL و خطی ARDL.