The Impact of Oil Price Shocks on Amman Stock Exchange Real Return

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Abstract

The present study examined the impact of oil price shocks and short-term interest rate on Amman stock exchange real return. The study used monthly data for the period 2000:01 to 2014:06 and used unit root test, Cointegration test, VAR, impulse response function and variance decomposition function to examine the study hypotheses. In addition, Granger causality test is used to determine the direction of the relationship between variables. The impulse response and variance decompositions results show that oil price shocks and short-term interest rate have a significant and negative effect on Amman stock exchange real return. The results of Granger causality tests show that there is a unidirectional causality between oil price shocks and short-term interest rate and Amman stock exchange real return running from oil price shocks and short-term interest rate to Amman stock exchange real return.

Keywords: Oil price shocks, Amman stock exchange real return, VAR, impulse response, variance decomposition

1. Introduction

Oil occupies an important place in the economies of the countries, since it is considered as the most important source of energy in the world, not as a fuel and a source of heating but also as a raw material in the chemical industry. Therefore, petrol affects the economies of the countries as well as the global economy. Producing countries and importing countries sense the positive or the negative effects resulting from fluctuations in oil prices through balance payments and public budgets of the countries. In addition, these fluctuations affect the domestic prices of States and international prices as they affect the economic growth and unemployment rates.

An increase in oil prices has a negative effect on oil-importing countries. This negative effect depends on the degree of depending States on imported oil size and on the extent of the complexity of economic and trade relations with the petroleum exporting countries. So increasing the proportion of the oil bill to the country's GDP, increases the negative effects of oil prices fluctuations (Al-Arabiya News, 2014).

The oil prices had witnessed large fluctuations, since the big change in oil prices in 1970 and to this day, the oil prices still witnessed sharp fluctuations. The strongest was in the years 2007 and 2008 as oil prices rose from about $60 per barrel in August 2007 to $147 per barrel in July 2008. Then it soon fell by the end of 2008 to about $45. This low oil prices had continued in 2009, until it rose clearly again in July 2009 since it reached $70 per barrel. The oil prices are still ranging from $100 to $115 according to Brent prices in the year 2014(Index Mundi, 2014).

Right after the big shock to oil prices in 1970, a number of studies such as Hamilton (1983), examined the impact of fluctuations in oil prices on economic activity represented by real gross domestic product. These studies concluded that the fluctuations in oil prices have negative impacts on real economic activity.

According to Toraman et al., (2011), oil prices are considered as one of the most important economic factors that affect world economy. Since a simple change in oil price has a positive or negative impact on most economic factors. The affected size depends on the direction of the change, whether the change in oil price is rising or falling, the change is for short time or long time and the country whether it is an oil exporter or oil importer.

According to Abdelasiz et al., (2008), and Gavin (1989), the impact of fluctuations in oil prices on the importing countries is represented by the high oil prices lead to a deficit in the balance of trade, and a decrease in reserves of foreign currencies, and rising costs of production inputs such as raw materials, workers' wages, and interest rates. The result of that is represented by an increase in prices, which decline the competitiveness of companies, as a result of the reduction of goods attractiveness for importers. In addition to a decline in production, and corporate profits, which in turn lead to a decrease in the share prices of companies and thus a decrease in general price index. At the individual level, the volatility of oil prices lead to a decline in per capita disposable income and a decline in demand for goods and services.

Jordan is one of the developing countries, which completely depends on the import of crude oil and oil derivatives, where the percentage of the oil bill of Jordan to GDP was (8.31%) in 2000, increased to (18.47%) in 2005, after that decreased to (12.60%) in 2010 and increased again to million (20.81%) in 2012 (Central Bank of Jordan, 2014). This indicates that importing crude oil and oil derivatives represent a high percentage of Jordan GDP, so it is expected that the oil price fluctuations have effects on real economic activities as well as on Amman stock exchange real return.

Despite the presence of a large number of studies examined the impact of oil price fluctuations on real economic activity. There is still a small number of studies examined the impact of oil price fluctuations on the financial market returns such as Eryigit, (2012) Papapetrou (2001); Dhaoui and Khraief (2014); Tormanic et al., (2011); Issac and Ratti (2009); and Sadorsky (1999).

The purpose of the present study is to examine the impact of oil price shocks and short-term interest rate on Amman stock exchange real returns. The rest of the study is arranged as follow: section 2, literature review, section 3 data and methodology, section 4 empirical analysis and results discussion and section 5 conclusions.

2. Literature Review

Despite of the fact that there is a big number of studies that examined the effects of oil price fluctuations on real economy, such as, Hamilton (1983), Jimmenez-Rodriguez and Sanchez (2005), Cologni and Manera, (2008), Kilian, (2009), Rebeca and Sanchez (2004, 2009), Nung et al., (2005), Sandrine and Mignon (2008) and Jacobs et al. (2009). They found that there is a significant relationship between oil price fluctuations and macroeconomics factors.

There are still a few number of studies examined the effect of oil price fluctuations on stock prices or returns, especially in developing countries, such as Eryigit, (2012) Papapetrou (2001); Dhaoui and Khraief (2014); Tormanic et. al., (2011); Narayan and Narayan (2010); Issac and Ratti (2009); Miller and Ratti (2009); Cong et al., (2008); Park and Ratti (2008); and Sadorsky (1999).

Dhaoui and Khraief (2014) tested the effect of oil price shocks on stock market returns for 8 international developed countries (US, Switzerland, France, Canada, UK, Japan, Singapore, and Australia) stock market. They used monthly data for the period 1991:1 to 2009:9, and used exponential generalized autoregressive conditional heteroscedasticity (EGARCH) to examine study hypotheses. They found that oil price shocks had a negative significant impact on stock market returns for all selected countries except Singapore where there is no significant impact.

Eryigit (2012) examined the dynamic relationship between oil price shocks and Istanbul stock exchange index (ISE-100), interest rate, and exchange rate for Turkey. He used daily data for the period 07.01.2005 – 31.10.2008 and used VAR. He found that there is a dynamic relationship between oil price shocks and Istanbul stock market index, exchange rate and interest rate.

Tormanic et al., (2011) investigated the effects of oil price changes on Istanbul stock exchange (ISE-100) composite index, services index, industrial index, and technology index of ISE-100. They used daily data for the period 02.01.2009–15.02.2011. and they used Vector Error Correction Model (VECM) (impulse response function and variance decomposition function) and Cointegration tests to examine their hypotheses. They found 16.40 % of the ISE 100 index explained by crude oil prices, 32.71 % of industrial index, 11.82 % of financial index, 12.60 of services index, and 5.38 % of technology index is explained by crude oil prices.

Narayan and Narayan (2010) examined the effects of oil price changes nominal interest rate on Vietnam stock exchange prices by using daily data for the period (2000-2008). They found that oil price changes have a positive significant effect on Vietnam stock exchange prices.

Issac and Ratti (2009) tested the relationship between oil price shocks and international stock exchange prices for (6) of The Organisation for Economic Co-operation and Development (OECD) countries. They used a monthly data for the period 1979:1 to 2008:3 and used VECM to examine the hypotheses of their study. They found that oil price shocks had a negative significant effect on real stock prices.

Miller and Ratti (2009) investigated the long-run relationship between world oil price of crude oil and international stock markets for six OECD countries, used monthly data for the period 1971:1 -2008:3, and used Vector Error Correction Model (VECM) to examine their study hypotheses. They found that stock market indices respond negatively to an increase in the oil price in the long run.

Eryigit (2009) investigated the impact of oil price changes on the sectorial indices of the Turkish exchange using daily data and Ordinary Least Square (OLS) method to investigate the study hypotheses. He used oil price in Turkish Lira and in USA Dollars and exchange rate (US$/LT). In addition, used a monthly data for the period 2000-2008. He found that changes in oil price in Turkish Lira has significant effects on electricity, wholesale and retail trade, insurance holding, investment, wood paper, and printing at the 5% significant level.

Cong et al., (2008) examined the relationship between oil prices shocks and Chinese stock exchange and Shenzhen stock exchange, by using monthly data and Vector Autoregressive (VAR) model. They found that oil price shocks have no significant impact on Chinese stock exchange indices.

Park and Ratti (2008) examined the effect of oil price fluctuations on real return of the stock exchange for 13 European countries, by using monthly data for the period 1996:1 and 2005:12 and they used Vector Autoregressive (VAR) model. They found that stock exchange has a negative impact on the stock real return for the study sample.

Sari and Soytas (2006) examined the relationship between changes in oil prices and the real returns of the Istanbul Stock Exchange (ISE), interest rates, and industrial production in Turkey. They used monthly data for the period 1987:01 to 2004:03. Moreover, they used variance decomposition and impulse response to examine their study hypotheses. They found that oil price shocks do not affect real stock returns significantly in Turkey.

Papapetrou (2001) examined the effect of oil price volatility on the stock exchange returns in Greece by using monthly data for the period 1989:1- 1996:6, using VECM. He found that oil price volatility has a negative impact on stock exchange returns of Greece.

Sadorsky (1999) examined the dynamic interaction between oil price and real stock returns, industrial production, interest rate of a 3-month treasury bill, by using unrestricted Vector Autoregressive model (VAR) model. He used monthly data for the period 1947:1- 1996:4, in USA. He found that oil price changes have a significant negative impact on real stock return.

From the literature review, the changes in crude oil prices and short-term interest rate can negatively affect stock market returns. However, the size of this effect is different from one country to another depending on their degrees of economic openness.

3. Data and Methodology

3.1 Data

The present study examined the relationship between oil price shocks, short-term interest rate and Amman stock exchange real return. The choice of the variables based on the previous studies such as Sadorsky (1999), Park and Ratti (2008), Eryigit (2012), Cong et al (2008) and Sari and Soytas (2006). The study used monthly data for the period 2000:01 to 2014: 06, we choose this period because oil prices witnessed high fluctuations especially through the period 2007-2014. Since it increased from $25.22 in January 2000, reached $133.85 in August 2008, and decreased to $41.58 in December for the same year. After that, it started increasing noticeably. It recorded in July 2009 $68.59 per barrel, and reached after that to a highest price $123.46 in July 2011, but it was in July 2014 $106.98. The data of Amman stock price index obtained from (Amman Stock exchange, 2014), short-term interest rate and consumer price index are obtained from (Central Bank of Jordan, 2014). The data of oil price is gathered from (Index Mundi, 2014).)

3.2 Methodology

The methodology used by this study based on the studies of Sadorsky (1999), Papapetrou (2001), Eryigit (2012), Tormanic et. al., (2011) Issac and Ratti (2009), Park and Ratti (2008) and Sari and Soytas, (2006), they used Vector Error-Correction Model (VECM) and VAR (Impulse response function and Variance decomposition function). They found a strong relationship between oil price shock and stock exchange returns. This study is looking to find an evidence on the relationship between oil price shocks and short-term interest rate and Amman stock exchange real returns. The dynamical relationship among oil price shocks and interest rate and Amman stock exchange returns is examined by using Vector Autoregressive model (VAR) or Vector Error-Correction Model (VECM). Since a vector error correction model is a special form of the VAR model for I (1) variables which are cointegrated (Griffiths, Hill, and Lim, 2008). VAR model describes a system of equations in which each variable is a function of its own lag and the lag of the other variables in the system.

According to Nandha and Hammoudeh (2007), a unit root test is used to determine whether the time series are stationary at level or they are stationary at first difference or more. In addition, applied the Cointegration test to the variables of the study to see whether they are cointegrated or not. If the time series are stationary at level VAR model is used. However, if they are not stationary at level and the Cointegration equations are statistically significant VECM is used; otherwise, VAR model is used (Eryigit, 2012 and Toraman et al., 2011).

From Table (1) the unit root test shows that Amman stock exchange real return, real oil price in Jordan Dinar and short term interest rate are stationary at level and at 5% significant level. Table (3) the Johansen Cointegration Test results indicate that the variables are not cointegrated. So the VAR model is used in the current study, which studies the value of effect and the response to impulse of oil price and the impulse of short-term interest rate with respect to Amman stock exchange real returns.

3.2.1The Model

$$RSR = C(1)*RSR(-1) + C(2)*RSR(-2) + C(3)*ROPJ(-1) + C(4)*ROPJ(-2) + C(5)*IR(-1) + C(6)*IR(-2) + C(7)$$

Where RSR; real stock returns of Amman stock exchange, (-1, -2) lag 1 and lag 2, ROPJ: real oil price in Jordan Dinar, IR; interest rate, (C(1), C(2), C(3), C(4), C(5), C(6)); coefficients, C(7); intercept.
For estimation process, we used econometric software E Views 6 provided by Quantitative Micro Software.

3.2.2 Study Variables

1. Amman stock exchange real return (RSR): to avoid the impact of the inflation, we deflated Amman stock exchange price index, by using the consumer price index and then take the first difference. ($RSR = (RSPI_t - RSPI_{t-1}) * 100$), this proxy for the real stock return is already used by Park and Ratti (2008), Cunado and Gracia (2013) and Dhaoui and kraief (2014).
2. Real Oil price shocks (ROPJ): UK Brent nominal price is used as a proxy to the nominal oil price. Several authors such as Dhaoui and kraief (2014) commonly use this proxy. To avoid the impact of inflation and the difference of the currency units we measure the crude oil price in Jordan Dinar against US$ (JD/US$) then deflated this price by using Consumer price index of Jordan.
3. Short-term interest term (IR): based on Sadorsky (1999), Park and Ratti (2008) and Dhaoui and kraief (2014). We use monthly weighted average interest rates on discounted bills and bonds as a measure of short- term interest rate. The use of short-term interest rate as a variable in the study is due to the use of the central bank of Jordan, for short-term interest rate as a tool of monetary policy to react sensitively to the high oil prices and this interaction may lead to an indirect effect of oil prices on the real economy and then on the real returns of the stock market (Dhaoui and kraief, 2014).

3.2.3 Study Hypotheses

The study has the following alternative hypotheses:

H1: There is a significant relationship between oil price shocks and Amman stock exchange real returns.
H2: There is a significant relationship between short-term interest rate and Amman stock exchange real returns.

4. Empirical Results and Analysis

4.1 Unit Root Test Results

To avoid false regression results, it must use a stationary time series data. Granger and Newbold (1974) who coined the term spurious regression to describe regression results, involving time series, that look a good regression since the t-values suggest that there is a significant relationship between the two variables while the fact that it is spurious regression. Therefore, stationary time series data is a condition to use data in regression. If the variables are not stationary, co-integration test should be applied to understand the actual behavior of the variables. Augmented Dickey-Fuller (ADF), Phillips-Perron Test Equation (PP), Kwiatkowski-Phillips-Schmidt-Shin (KPSS), Elliott-Rothenberg-Stock (ERS), Ng-Perron (NP) are the methods to test unit root of variables (Al-Qudah, 2014; and Eryigit, 2012)

The Augmented Dickey Fuller (ADF) test is applied to examine whether the variables in this study are integrated in the same order or not. The null hypotheses for the variables real stock return (RSR), interest rate (IR) and real oil price in Jordan Dinar (ROPJ) is that each variable has a unit root test. Results are reported in Table (1).

Table 1: Augmented Dickey Fuller (ADF) Unit Root Test

Variable	Calculated ADF Statistics	5% ADF Critical Value	Probability	Order of Integration	Stationary/ Not Stationary
RSR	-9.65133	-1.94268	0.0000	I(0)	Stationary
ROPJ	-9.45094	-1.94268	0.0000	I(0)	Stationary
IR	-2.05258	-1.94269	0.0388	I(0)	Stationary

Augmented Dickey Fuller t-statistics guideline is if the test absolute statistics is more than the critical value, variable is stationary (has not a unit root).

From Table (1), when we test for unit root test at level and (none, trend, trend and intercept) real stock return (RSR), real oil price in Jordan Dinars (ROPJ) and interest rate (IR) are stationary at level and at the significance level of 5%.

4.2 Lag Selected

The lag selection criteria is used to select the optimum lag because it is necessary to avoid over parameterizing model, (Al-Eitan 2012, al-qudah, 2014). The optimal lag is necessary to perform Cointegration test, Granger Causality test and VAR. To determine the appropriate number of lag length of the VAR model the likelihood ratio statistic is employed which follows the chi-squared distribution. The results of the analysis are shown in Table (2). We use Akiake Information Criteria (AIC) and Schwarz information Criterion (SC) criteria.

Table 2: Lag Order Selected Criteria

Lag+S6M46:S63	LogL	LR	FPE	AIC	SC	HQ
0	-59.5454	NA	0.000426	0.753559	0.8098	0.776388
1	804.5773	1686.601	1.43E-08	-9.54912	-9.32416	-9.45781
2	830.9331	50.48877*	1.16e08*	-9.75823*	-9.36454*	-9.59843*
3	838.7581	14.70721	1.18E-08	-9.74407	-9.18167	-9.51579
4	842.5892	7.06216	1.25E-08	-9.6818	-8.95067	-9.38503
5	847.2424	8.409421	1.32E-08	-9.62943	-8.72957	-9.26417
6	853.8234	11.65563	1.36E-08	-9.60028	-8.53171	-9.16654
7	858.6606	8.392209	1.44E-08	-9.55013	-8.31283	-9.0479
8	862.3753	6.310519	1.53E-08	-9.48645	-8.08043	-8.91574

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

According to Final Prediction Error (FPE), Akiake Information Criteria (AIC), Shwarz Information Criteria (SC) and Hannan-Quinn information criteria the optimal lag is two lags.

4.3. Johansen Cointegration Test Results

We performed Johansen Cointegration test to examine whether the variables are cointegrated or not. Variables are considered cointegrated if there is one or more Cointegration equations between variables and this imply that there is a long run relationship between variables. If the variables are cointegrated, we perform restricted vector autoregressive model, which is named Vector Error Correction Model (VECM). Nevertheless, if the variables are not cointegrated we perform unrestricted vector autoregressive model (VARM).

Table 3: Johansen Cointegration Test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.086333	21.56825	29.79707	0.3231
At most 1	0.029136	6.128719	15.49471	0.6803
At most 2	0.006251	1.072361	3.841466	0.3004

Trace test indicates no Cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

From Table 3, the Johansen Cointegration Test results indicate that the variables are not cointegrated. So the VAR model is used in the current study.

VAR model describes a system of equations in which each variable is a function of its own lag and the lag of the other variables in the system. The model as we find it from VAR output:

RSR = C(1)*RSR(-1) + C(2)*RSR(-2) + C(3)*ROPJ(-1) + C(4)*ROPJ(-2) +
C(5)*IR(-1) + C(6)*IR(-2) + C(7)

Where RSR; real stock returns of Amman stock exchange, (-1, -2) lag 1 and lag 2, ROPJ: real oil price in Jordan Dinar, IR; interest rate, (C(1), C(2), C(3), C(4), C(5), C(6)); coefficients, C(7); intercept.

4.4 Vector Autoregressive (VAR) Model Results

Vector autoregressive (VAR) analysis allows the analyzer to test for the endogeneity of all variables and the responses of Amman stock exchange real returns, oil price changes and short-term interest rates, to oil price, short-term interest rate, and Amman stock exchange real returns shocks in order to capture the short-run dynamics of the variables.

4.5 Granger Causality Test

According to Subhash and Mathur (1989) and Al-Qudah (2014), causality in the Granger is an appropriate methodology for examining whether oil price shocks causes real stock returns, or vice versa. Therefore, we use Granger Causality test to examine the causality direction between the study variables, whether oil price shocks cause real stock return or real stock return causes oil price shocks. Interest rate causes real stock returns, or real stock returns cause interest rate, and oil price shocks cause interest rate or interest rate causes oil price shocks, since this causality may be bidirectional or unidirectional between variables.

H0: Oil price shocks does not Granger cause real stock return and vice versa.
H1: Oil price shocks does Granger cause real stock return and vice versa.
H0: Interest rate does not Granger cause real stock return and vice versa.
H1: Interest rate does Granger cause real stock and vice versa.
H0: Oil price shocks does not Granger cause Interest rate and vice versa.
H1: Oil price shocks does Granger cause interest rate and vice versa.

The results of the Granger causality test are reported in Table (4).

In order to test null hypotheses (F-statistics) is used. Our guideline if the P value is more than 5%, we cannot reject null hypothesis. If the P value is less than 5%, we reject null hypothesis and accept alternative hypothesis.

From Table 4, we can see that oil price shocks does Granger cause real stock return, since P value is (0.008) which is less than 5% so we can reject H0 and accept H1. Interest rate also granger causes real stock return since; P value is (0.005) which is less than 5% so we can reject H0 and accept H1. However, real stock return does not granger cause market capitalization and interest rate since P value for both is more than 5% so we accept H0 so the causality is unidirectional. There is a unidirectional causality running from oil price shocks and interest rate to real stock return.

Table 4: Pairwise Granger Causality Test

Null Hypothesis:	**Obs**	**F-Statistic**	**Prob.**
ROPJ does not Granger Cause RSR	172	4.97095	0.008
RSR does not Granger Cause ROPJ		0.49268	0.6119
IR does not Granger Cause RSR	172	5.47269	0.005
RSR does not Granger Cause IR		1.27418	0.2824
IR does not Granger Cause ROPJ	172	2.13186	0.1218
ROPJ does not Granger Cause IR		0.55481	0.5752

4.6 Impulse Response Function

In a vector autoregressive (VAR) model, Sims (1980) proposed the use of impulse response and variance decomposition to help in expressing the VAR system response to shocks that represent positive residuals of standard deviation unit in each equation in the system. A one random shock in the VAR system produces a series of reactions over time in all variables in the VAR system. Impulse response functions calculate these reactions.
We employ the Impulse Response Function based on VAR model to find real stock return responds to own shocks, oil price shocks and interest rate shocks. Plotting the response to Cholesky one standard deviation functions is a practical way to explore the response of each variable to a shock immediately or with various lags (Eryigit, 2012). Figure (1) shows the impulse-responses results for a positive shock of one standard deviation of oil price, real stock return and interest rate to oil price, real stock return and interest rate disturbances.

First column of Figure (1) shows the responsiveness of variables to a positive shock of one standard deviation to real stock return. Whereas, the second column shows the responsiveness of variables to a positive shock of one standard deviation to oil price shocks, and the third column shows the responsiveness of variables to a positive shock of one standard deviation to interest rate.

From first column of Figure (1), the response of real stock return to own shocks. We can see from the graph that real stock return reacts positively to own shocks for the first 5 months then it becomes negative but small for the next five months. This may be due to the worse performance especially in the last 5 years. However, the real stock return shock has a positive effect on oil price, and the real stock return shock has a negative effect on interest rate since the relationship between stock prices and interest rate is negative, an increase in interest rate encourage investors to move from investing in stocks to invest in money market.

In the second column of Figure (1), oil price shock has a negative effect on real stock return and this effect is going between zero in the first month to (-0.46994) in the 10^{th} month. This is due to an increase in oil prices will lead to an increase in inflation and this will lead to increase interest rate and increase risk and uncertainty for future investment for both firms and investors in the stock market, which is reflected negatively on stock prices. Basher and Sadorsky (2006), Bernanke (1983), Pindyck (1991) and Dhaoui and Khraief (2014), refer the negative impact of oil price shocks on stock exchange index for an increase in oil prices lead to an increase in inflation. The inflation will lead to an increase in risk and uncertainty; in addition, firms postpone irreversible investment decisions, in reaction to the profit expectations all of that will affect negatively the stock prices. The result consistency with the results of Papapetrou (2001), Sadorsky (1999), Issac and Ratti (2009), Dhaoui and Khraief (2014) and Park and Ratti (2008), Millar and Ratti (2009), Tormanic et al., (2011) and Eryigit (2012).

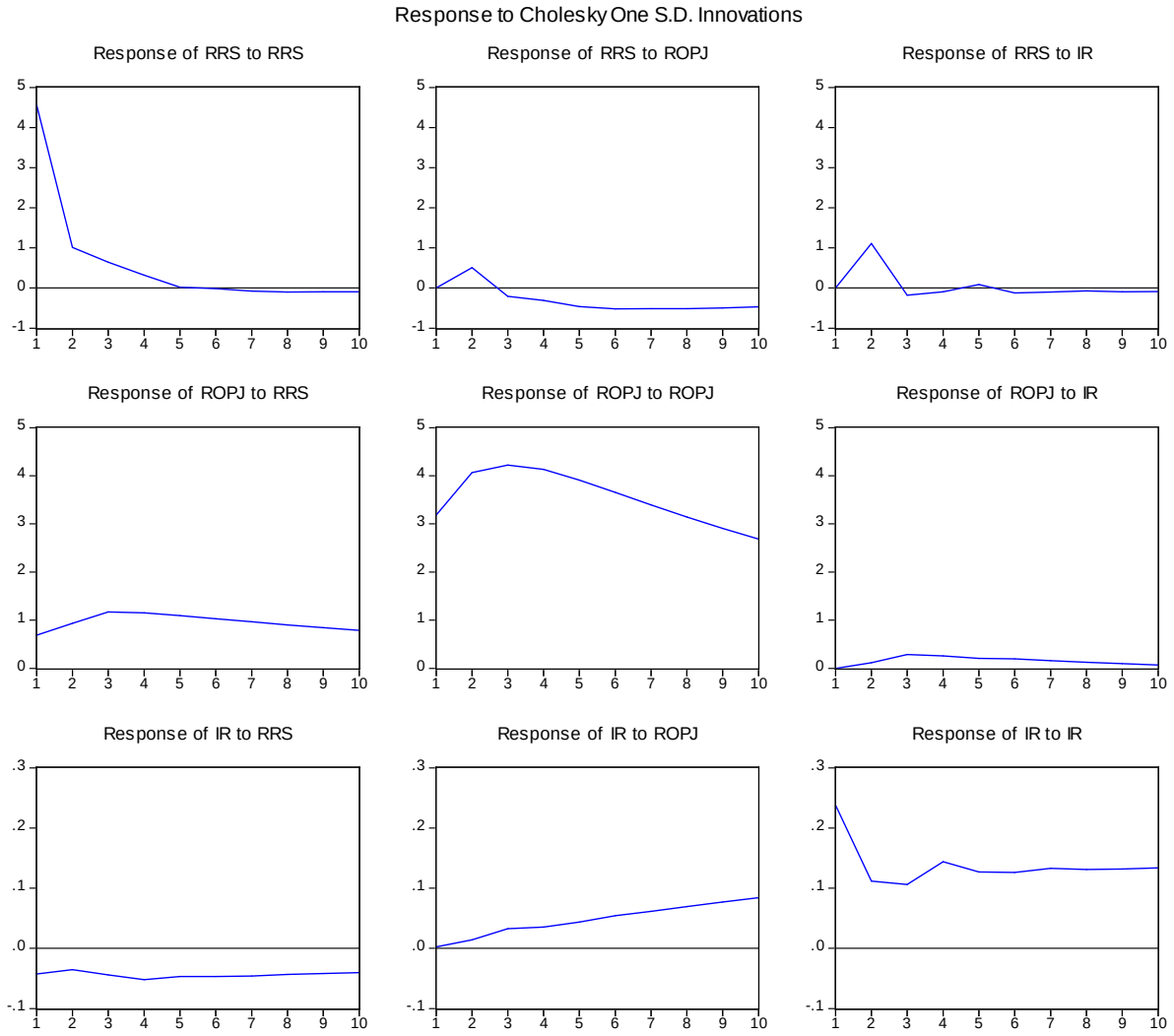
While it has a negative effect on interest rate and this effect is going between (0 in the first month to 0.07 in the 10^{th} month. Moreover, the oil price reacts positively to own shocks this response is high.

In the third column of Figure (1), we can see that a positive shock of 1 standard deviation to interest rate has a zero effect on real stock return in the first month then it becomes positive in the second month, after that for the whole period the effect is negative, which is going between (0 to -.089). This result confirms the result of (Eryigit, 2012).

This refers to a negative relationship between interest rate and stock prices, an increase in interest rate encourage investors to move from investment in stock exchange to investment in money market. Maysami et al., (2004) wrote that there is a negative relationship between interest rate and stock prices and they referred that: interest rate has effects on firms' profit, which in turn affects the investors' prices they are willing to pay for stocks in the light of expected future firms' dividends. In addition, for a big amount of stocks purchased by loans, so an increase in interest rate would make stocks transaction costly. In the same context, Sadorsky (1999) wrote that the negative relationship between interest rate and stock prices could be for three reasons. First, an increase in the interest rate will lead to an increase in the cost of credit and this will negatively affect firms' profit. Second, changes in interest rate will change the competitive relationship between financial assets. Third, some stocks are purchased by margin so an increase in interest rate will decrease stock returns. While Park and Ratti, (2007) said that the interest rate seen to be one of the most important variables that can explain the changes in stock markets. Since short term, interest rate is an influential monetary policy because interest rate is argued as a significant channel of oil price shocks to the economy, since monetary policy tightens presumably in response to the inflationary pressures from oil price shocks. The result confirms the results found by Dhaoui and Khraief (2014), Sadorsky (1999), Eryigit (2012) and Maysami et al., (2004).

While it has a positive but no high effect on oil price. Interest rate reacts positively to own shocks.

Figure 1: Response to Cholesky one Standard Deviation Innovations



4.7 Variance Decomposition of Real Stock Return

Vector Autoregressive (VAR) system is characterized by its ability of forecasting especially the short-term one. Variance decomposition shows how much a random shock to one innovation is responsible for predicting the other innovation subsequent fluctuation that is not accounted by its own prior fluctuation (Sims, 1980).

Therefore, the study used the variance decomposition function as the second method to estimate the dynamic response of each variable to an unexpected change in another variable. The study developed variance decomposition under VAR environment to examine how real stock returns, respond to own and other variables shocks, over a period of 10 months. Table (5) shows the variance decomposition of real stock return. From Table (5) the variance decomposition results are consistent with the findings of impulse-response functions. In the first month, 100% of the variability in Amman stock exchange index changes is explained by its own shocks, 0.00% of the variability is explained by oil price shock and interest rate. In the second month, 93.6% of the variability in Amman stock exchange index changes is explained by its own shocks, 1.11% and 5.26% of the variability are explained by oil price shock and interest rate respectively. It can be seen that in month (10) 87.43% of the variability in Amman stock exchange index changes is explained by its own shocks, 7.39% and 5.17% of the variability are explained by oil price shock and interest rate respectively. Therefore, oil price shocks and interest rate have an impact on real stock returns of Amman stock exchange. This result confirms the result of impulse response and granger causality test.

Table 5: Variance Decomposition of Real Stock Return

Period	S.E.	RSR	ROPJ	IR
1	4.5588	100	0	0
2	4.826428	93.62092	1.113711	5.265373
3	4.87721	93.43522	1.268777	5.295999
4	4.898473	93.04862	1.663482	5.287902
5	4.92142	92.18476	2.545566	5.269676
6	4.95045	91.10775	3.623871	5.26838
7	4.978994	90.08909	4.661766	5.249141
8	5.00724	89.11371	5.677033	5.209253
9	5.03358	88.21921	6.589601	5.191188
10	5.057186	87.43397	7.391726	5.174301

Cholesky Ordering: RSR

From Table (6) the variance decomposition results for oil price shocks, most of the oil price variability comes from itself and real stock return. At the first month, 95.53% of the variability in oil price is explained by itself, while 4.46% is explained by real stock return and 0.00% by interest rate. After ten months, 92.92% is explained by itself, while 6.83% by real stock return and 0.218% by interest rate. In the long term, the impact of the real stock return and interest rate on oil price increased.

Table 6:Variance Decomposition of Oil Price

Period	S.E.	RRS	ROPJ	IR
1	3.261208	4.469499	95.5305	0
2	5.297809	4.813272	95.13903	0.047696
3	6.881335	5.750439	94.04638	0.203181
4	8.113165	6.145544	93.60738	0.247074
5	9.075677	6.373164	93.37723	0.249603
6	9.839238	6.520726	93.22762	0.251658
7	10.45335	6.629752	93.1238	0.246444
8	10.95341	6.717088	93.04548	0.237432
9	11.36405	6.790288	92.98164	0.22807
10	11.70358	6.855302	92.92602	0.218673

Cholesky Ordering: ROPJ

From Table (7) the variance decomposition results for interest rate, at the first month, 96.87% of the variability in interest rate is explained by itself, while 0.0085% is explained by oil price and 2.3% by real stock return. After ten months, 80.76% is explained by itself, while 11.48% by oil price and 7.75% by real stock return. In the long term, the impact of real stock return and oil price on interest increased.

Table 7: Variance Decomposition of Interest Rate

Period	S.E.	RSR	ROPJ	IR
1	0.241658	3.115153	0.008562	96.87629
2	0.26899	4.2584	0.280184	95.46142
3	0.294292	5.811436	1.46188	92.72668
4	0.333647	6.946904	2.26518	90.78792
5	0.362574	7.54011	3.364209	89.09568
6	0.390511	7.928156	4.814465	87.25738
7	0.419551	8.072185	6.310793	85.61702
8	0.447128	8.054097	7.954083	83.99182
9	0.474345	7.938692	9.705946	82.35536
10	0.501519	7.750987	11.48705	80.76196

Cholesky Ordering: IR

5. Conclusions

This study examined the relationship between oil price shocks, short-term interest rate and Amman Stock Exchange real return. By using monthly time series data for the period (2000:01 to 2014:06). The study used unit root test, Cointegration test, VAR, impulse response function and variance decomposition function to examine the study hypotheses. In addition, Granger causality test is used to determine the direction of the relationship between variables.

The impulse response shows that a shock to oil price has a significant and negative effect on Amman stock exchange real return almost after two months. This refers to an increase in oil prices, which leads to an increase in production cost, increase prices of goods and services produced, and decrease demand. All of that will decrease firms' production, profits and reflect negatively on stock prices.

The impulse response shows that a shock to short-term interest rate has a significant and negative effect on Amman stock exchange real return almost after two months. This is due to the increase in interest rate that encourage investors to move from investing in stock market to investing in money market. In addition, an increase in interest rate increases the cost of financing firms and then the cost of production, which in turn affects negatively firms profits and stock dividends and then reflects negatively on stock prices.

The response of the Amman stock exchange real return to its own shocks is positive and significant for the first five months, and then lost effect in 6^{th} and 7^{th} months and the effect becomes negative in the last three months. The positive and negative effect refers to the fluctuation upward and downward in Amman stock exchange performance especially in the last 5 years.

The variance decomposition results show that Amman stock exchange real return is significantly affected by oil price and short-term interest rate shocks since its value in month (10) is 7.39% and 5.17% respectively. While Amman stock exchange real return is highly affected by its own shocks since, it was 100% in the first year and 87.43% in month (10).

The results of Granger causality tests show that there is a unidirectional causality between Amman stock exchange real return and oil price and short-term interest rate running from oil price and short-term interest rate to Amman stock exchange real return. The implications of the study results recommend that Jordan be required to look for cheap energy resources to decrease the negative impact of oil prices shocks on Amman stock exchange performance as well as the whole economy performance. The implications of the study results recommend that the results of the study are important for investors in stocks, which requires them to find out the impact of oil prices fluctuations on stock prices change, and in turn is reflected in the returns of their investments. These results are also important for corporate managers as well as decision-makers to take into account the effects of oil price fluctuations on the cost of production and then on corporate profits and stock returns.

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