International Journal of Economics and Financial Issues

ISSN: 2146-4138

available at http: www.econjournals.com

International Journal of Economics and Financial Issues, 2017, 7(2), 118-124.

Asymmetric Oil Price Shocks and Economic Activity in Developing Oil-importing Economies: The Case of Jordan

Noura Abu Asab*

Department of Economics, Business School, University of Jordan, Amman, Jordan. *Email: n.abuasab@ju.edu.jo

ABSTRACT

The aim of this paper is to examine the asymmetric effect of oil price shocks on economic activity in Jordan, proxied by industrial production growth. Accommodating for non-linearity and employing different oil price shock measures, the findings suggest that positive oil shocks have a negative and significant effect on growth, while oil price declines have no impact on growth. This suggests that drops in oil prices are not necessarily an incentive for industrial growth in oil-importing countries. Based on symmetry specifications, oil price shocks and growth are found to be negatively correlated.

Keywords: Oil Shock, Jordan, Oil-importers, Non-linearities
JEL Classifications: O47, Q43, C50

1. INTRODUCTION

The effect of oil price changes on economic activity has received considerable attention in the literature, owning to the importance of oil as the key driver of production. Indeed, in spite of the new developments in macroeconomic policies and dramatic technology improvements in non-energy sectors, which change the microeconomic structure of industries, oil preserves its prominence as a basic input to production[1]. Therefore, oil price increases and decreases are strongly linked to economic fluctuations but the effect of these changes depends on whether the country is an oil-importer or exporter. That is, increases in oil price are only a blessing for oil-producing countries, whereas oil price declines are presumed to benefit oil-dependent economies.

The impact of wealth transfer from oil-importing economies following a positive oil shock improves the fiscal position and current account of oil-producing countries. The oil revenues enable the central government to expand its spending on social programs and investment transactions (Moshiri and Banihashem, 2012) and improve market agents' disposable income and their purchasing power. Nevertheless, this blessing might turn into a curse if the boom in oil prices is perceived to be permanent. While positive oil price shocks increase government revenues and the financial resources of investment in oil-producing countries, the external position of the economy might get worsened by the exchange rate appreciation. This bad consequence of oil price increases is explained in the literature by the Dutch disease theory, where a positive shock (boom) in a natural resource, here oil, leads to a decrease (shrinkage) in non-resource sectors. So, a permanent increase in oil price can negatively affect manufacturing output (Ismail, 2010). On the other hand, it is believed that this appreciation may help non-energy sectors to import intermediate production inputs at low prices (Berument et al., 2010).

For oil-importing countries, the increase in oil imports following a positive oil price shock increases the cost of production, which lowers real national income and increases inflation and government deficit; see Rasche and Tatom (1977), Rasche and Tatom (1981), Darby (1982), Burbidge and Harrison (1984), Hamilton (1983), Hamilton (1996), Mork (1989) and Lee et al. (1995). The magnitude of individuals' response to positive oil price shocks depends on the shape of the aggregate demand curve (Berument et al., 2010) and whether or not the shock is perceived to be permanent. If the shock is not believed to be temporary, disposable

1 The literature points out that oil has lost its attractiveness although it remains one main input of production. This comes as a result of technology improvement in non-energy sectors and the development in macroeconomic policies; i.e., monetary policy; see Blanchard and Gali (2007) and Cologni and Manera (2008).

income and so private consumption shrink, while oil is gradually replaced in production as the input cost effect dominates. Both capital and labor productivity decrease, which, consequently, lowers potential output.

The expectations about oil price changes might be associated with high uncertainty. This may also induce consumers to save more, which lowers the aggregate consumption in the short-run (Bredin et al., 2011). The effect of a positive oil price shock can be deeper as it passes to the exchange rate, owning to the inelasticity of demand for oil in the short-run. A positive oil price shock depreciates the exchange rate, as it is transmitted to domestic prices through the exchange rate pass-through which may result in higher input costs (Kamin and Rogers, 2000).

Although the effect of oil price changes depends on the degree of oil-dependence across economies, positive and negative changes in oil prices affect economies differently. Early studies on the nexus between oil prices and economic growth adopt models, e.g., Bernanke (1980) and Hamilton (1988), that did not consider the contradicting impact of oil price shocks (Bredin et al., 2011). Later, the asymmetric effect of oil price shocks has been a topic of considerable interest addressing that the symmetry specification is inappropriate. Loungani (1986), Davis (1987) and Mork (1989) were the pioneer to refer to this non-linearity[2].

Disentangling the effect of positive and negative oil shocks provides evidence that increases in real oil price have stronger effects than negative changes on real gross domestic product (GDP). Mork (1989) finds that the effect of oil price decreases is statistically insignificant. He points out that the 1985-1986 declines in oil price could not stimulate the economic growth in oil-importing countries. Hamilton (1996), Hamilton (2003) constructs the net oil price increase measure and provides evidence to the Mork's (1989) finding. Other identification to oil shock measures has been addressed in the literature; see Cunado and de Gracia (2003) and Jimenez-Rodrguez and Sanchez (2005). Kilian (2006) suggests a methodology through which the oil shocks can be disentangled into three sources: Oil supply shocks, aggregate demand, and oil-specific demand shocks. Kilian finds that most unexpected volatility in oil prices is passed from aggregate demand shock and oil specific demand shocks.

Most studies on the effect of oil shocks on output have been done for the U.S. economy; however, more have been recently reported for other oil-exporting countries, see Eltony and Al-Awadi (2001), El-Anashasy et al. (2006), Berument et al. (2010), Olomola and Adejumo (2006). Cunado and de Gracia (2003), Huang et al. (2005), Jimenez-Rodrguez and Sanchez (2005), Tazhibayeva et al. (2008), Ayadi (2005), Lescaroux and Mignon (2008), Korhonen and Mehrotra (2009), Mendoza and Vera (2010). In addition, different methodologies are used to examine the effect of oil price shocks on different macroeconomic indicators from simple ordinary least square (OLS) to structural vector autoregression (VAR) and multivariate generalized autoregressive conditional heteroskedasticity (GARCH) in mean. In this paper, we contribute to the literature on the non-linearity specifications of oil price shocks for the case of Jordan; the net oil-importing country. This small open economy, located in the Middle East region, depends heavily on energy sources imported from the neighboring Arab and international markets. The complete reliance on oil imports and being relatively prone to political disturbances, and the availability of data compared to other oil-import reliant economies in the region, make Jordan a good case study for examining the effect of oil price shocks on economic activity[3]. Furthermore, it is expected according to the International Monetary Fund (IMF's) country programme notes that the declines in energy prices will increase the economic growth and lower the burden of the energy import bill. This means that negative oil price shocks, whether anticipated or unanticipated, may induce higher industrial production (IP) growth[4].

To the best of our knowledge, the effect of oil price shocks on economic growth for Jordan is only considered in the study of Berument et al. (2010), who employ SVAR to examine the nexus between oil prices and GDP growth for a selected number of the MENA region countries. For oil importers, among which is Jordan, they find that oil shocks have no impact on growth considering their results as an evidence of the non-linearity assumption of the nexus. They differentiate between demand and supply shocks, the results are found similar for Jordan, although the effect of oil supply shock lowers the growth, for other oil-importers. In this paper, we employ different specifications of asymmetric oil price shock measures to examine the relationship between oil price shocks and IP over the monthly span from November 1995 to December 2015. Although, the period of analysis is not subject to heavy recession i.e., 1973-1975, 1980-1982 and 1990-1991; Kilian and Vigfusson (2009), the economy experienced episodes of oil fluctuations due to the tensions in the Middle East until the end of 1990s and around 2002-2003 as a result of oil production cuts and the disruptions of oil supply following the Iraq's war, which drove oil prices up.

2 Henry (1974) and Bernanke (1980) show that oil price uncertainty would postpone investment decisions.

3 To reduce dependence on fuel imports, Jordan takes paces towards replacing the fuel energy with renewable and sustainable energy sources. The Energy Master Plan (2007-2020) for the development of the energy sector includes many targets, among which is to start generating electricity from nuclear energy and promote the development of renewable energy projects. Jordan signed an agreement with Russia to set basis for establishing the first nuclear power plant and engaged in a number of wide-ranging renewable energy projects. However, although such developments are needed to eliminate the effect of oil supply shocks on the domestic economy and prevent oil import disturbances due to political unrest in the region, a number of highly capital intensive plans remain proposals as the country is financially poor and challenged environmentally and socially (Abdul Rahim, 2015).

4 The IMF's standby arrangement program provided Jordan with \$2.1 billion = SDR 1.364 million, 800 percent of quota. To meet the IMF's program targets, the central government of Jordan excreted reforms to rebuild the credibility of the energy sector by imposing high tariffs on energy consumption and removing the general fuel subsidies. The reforms also entail changes to fees and taxes imposed by the income tax law. However, according to the IMF's notes, the central government is still expected to impose more tariffs and taxes on energy consumption. Along with the reforms, the recent decline in oil prices helped lowering the public debt and improved the current account. Inflation was also dropped and international reserves accumulated which improved the credit position of the country (IMF, 2015).

The expectations of recessions following the 2008 financial crisis and the recent weak aggregate demand from China and Europe also contributed to major oil fluctuations. Furthermore, the chosen period covers the time over which the fixed exchange rate system has been the framework for monetary policy in Jordan. So, plausible effects of structural change in the domestic economy that may weaken tracing the role of oil price shocks are eliminated. Unlike most studies that focus on the net increase measure of oil price changes, we accommodate the effects of positive and negative oil price shocks and do not impose the assumption that negative oil price changes should be ignored in the regression a priori.

Our results provide evidence that oil price shocks have adverse effects on the growth of IP. Negative oil shocks have insignificant impact on growth, while positive shocks affect the growth negatively. However, the unexpected oil price shock measure of oil price shock appears to have a lower impact on growth compared to the specification through which the source of volatility has been identified.

The rest of the paper is organized as follows. Section two explains the methodology. Section three presents the data and empirical results. The last section provides the concluding remarks.

2. METHODOLOGY

We follow different specifications suggested by the literature to identify the measure of oil price shock.

2.1. First: Mork (1989)

Mork identifies the measure of oil price shock as the percentage change in the nominal price of oil, $o_{t,Mork} = \log(Oil_t) - \log(Oil_{t-1})$ and distinguishes between positive rate and negative rate of change as follows.

$$o^{+}_{t,Mork} = [0 \text{ if } o_t \leq 0; o_t \text{ if } o_t > 0$$

$$o^{-}_{t,Mork} = [0 \text{ if } o_t > 0; o_t \text{ if } o_t \leq 0$$

2.2. Second: Lee et al. (1995)

What matters about oil price is not its trend but the uncertainty associated with oil price volatility, and more importantly the unexpected oil price shocks, which result in economic instability for oil-producing and oil-importing countries alike (Narayan and Narayan, 2007). Since both supply and demand sides of oil shocks are inelastic in the short-run, a large change in oil prices is required to restore the equilibrium back (Moshiri and Banihashem, 2012). We follow the identification developed by Lee et al. (1995) to construct the measure of oil price shock, where uncertainty about oil prices is measured by the conditional standard deviation for the change in oil price. Lee et al. (1995) argue that oil price shocks have a more significant impact on the economy when the oil prices are volatile than when they are stable. Asymmetric oil price uncertainty here is a measure of adjusted volatility in the increases and decreases in the real price of oil. The specification steps can be shown as follows.

We first apply GARCH(1,1) developed independently by Bollerslev (1986) and Taylor (1987) in modeling the oil price return variance based on equation 1.

$$Oil_t = \beta_0 + \sum_{i=1}^{12} \beta_i oil_{t-1} + \varepsilon_t \tag{1}$$

Oil is the real price of oil and the conditional variance equation is as follows.

$$\sigma_t^2 = \alpha_0 + \alpha_1 u_{t-1}^2 + \beta\sigma_{t-2}^2 \tag{2}$$

Where σ_t^2 is a one-period ahead estimate for the variance based on all relevant information from the past (Brooks, 2014). α_0 is long-term average value, $\alpha_1 u_{t-1}^2$ is the information about volatility from the previous period and $\beta\sigma_{t-2}^2$ is the fitted variance during the previous period. The oil price shock measure is defined by Lee et al. (1995) as:

$$o_{t,Lee} = \frac{\varepsilon_t}{\sqrt{h_t}} \tag{3}$$

Which models disturbances at each point in time divided by the conditional standard deviation at that point in time, which is also known as a standardized residual, where:

$$\varepsilon_t = \sqrt{h_t \upsilon_t \upsilon_t} \tag{4}$$

$$h_t = c_0 + \gamma_{t-1}^2 + \mu h_{t-1} \tag{5}$$

The normalized residuals, ε_t, and the conditional variance, h_t, are estimated by GARCH(1,1) on the basis of equation (1) as explained above.

The volatility measure is divided into positive and negative measures on the basis of the following criteria:

$$o^{+}_{t,Lee} = [0 \text{ if } o_t^{Lee} \leq 0; o_t \text{ if } o_t^{Lee} > 0$$

$$o^{-}_{t,Lee} = [0 \text{ if } o_t^{Lee} \geq 0; o_t^{Lee} \text{ if } o_t^{Lee} < 0$$

2.3. Third: Hamilton (1996)

Hamilton proposes the net oil price increase measure for oil shocks. The oil price return of each month, or quarter if the data is quarterly, is compared with the maximum value of prices over a year. The percentage change is considered if the value is positive and if not it is set to zero. This can be represented as follows.

$$oil^{+}_{t,Hamilton} = [0; o_t - max\left(o_{t-1} \ldots o_{t-12}\right)]$$

As oil prices are determined in the international market, oil prices should be treated as strictly exogenous, provided that Jordan is small to affect world oil prices. Hence, to examine the effect of symmetric and asymmetric oil price shocks on the growth of IP, we estimate equations 6, 7 and 8, based on Mork (1989) and Lee et al. (1995) identification shock measures, by the standard regression methods since the OLS residuals are uncorrelated Equation 7 is also estimated based on Hamilton (1996) specification.

In each case, the growth in IP index is regressed on its 12th lagged values and lags of oil price shocks measure $o_{t,Mork}$ or $o_{t,Lee}$ as follows:

$$IP_t = \alpha_0 + \sum_{i=1}^{12} \alpha_i IP_{t-i} + \sum_{j=1}^{12} \beta_{t-j} o_{t-j} + \varepsilon_t \tag{6}$$

$$IP_t = \alpha_0 + \sum_{i=1}^{12} \alpha_i IP_{t-i} + \sum_{j=1}^{12} \beta_{t-j} o^{+}_{t-j} + \varepsilon_t \tag{7}$$

$$IP_t = \alpha_0 + \sum_{i=1}^{12} \alpha_i IP_{t-i} + \sum_{j=1}^{12} \beta_{t-j} o^{-}_{t-j} + \varepsilon_t \tag{8}$$

3. DATA COLLECTION AND EMPIRICAL RESULTS

Data on Jordanian IP quantity index, which measures the real production output of manufacturing, mining, and quarrying sectors, is collected from the central bank of Jordan's Statistical Database. Data on monthly Europe Brent spot oil price is imported from the U.S. Energy Information Administration. Nominal exchange rate to the U.S. dollar and consumer price index for Jordan are extracted from the IMF - International Financial Statistics. All series cover the monthly span from November 1995 to December 2015, over which the central bank of Jordan is committed to the fixed exchange rate system.

Data on nominal exchange rate to the U.S. dollar is used to convert the crude oil price into local currency. This is to eliminate the effect of exchange rate appreciation that may offset the impact of oil price increases. We aim to examine the relationship between economic activity, proxied by growth in IP and oil price shocks. Hence, the growth is defined as the first difference of the logarithm of the IP and the return on oil price is calculated as the first difference of the logarithm of crude oil price.

We first test for the stationary of the series by the mean of the augmented Dickey–Fuller (ADF) Dickey and Fuller (1979) and Phillips and Perron (1988) tests. For the ADF test, an intercept is included in the model specification and the lag length is determined by Schwarz information criterion. Both the growth of IP and the return of Brent oil price series are stationary at level, as provided in Table 1.

Based on Mork's oil price shocks measure, negative oil price shocks have a negative but insignificant impact on IP as the total parameters estimates of oil shock measure is −0.086 and the calculated-t-statistic, −1.18, is below the critical value. The estimation of equation 8 where standard errors are between brackets is as follows:

$$\widehat{IP}_t = \begin{bmatrix} 0.006 \\ (0.007) \end{bmatrix} - \begin{bmatrix} 2.747 \\ (0.070) \end{bmatrix} IP_{t-1} - \begin{bmatrix} 0.086 \\ (0.075) \end{bmatrix} o^{-}_{t-j}$$

In addition, both positive oil shocks and symmetric identification of oil shocks appear to affect the growth negatively. For both specifications, the total coefficient of all estimates of oil price shocks is significant at 1% level of confidence. According to the results, a 10% increase in oil price leads to approximately 3% decrease in IP growth. The estimation of equations 6 and 7 following Mork's specifications is as follows.

$$\widehat{IP}_t = \begin{bmatrix} 0.009 \\ (0.003) \end{bmatrix} - \begin{bmatrix} 2.684 \\ (0.077) \end{bmatrix} IP_{t-1} - \begin{bmatrix} 0.096 \\ (0.044) \end{bmatrix} o_{t-j}$$

$$\widehat{IP}_t = \begin{bmatrix} 0.008 \\ (0.018) \end{bmatrix} - \begin{bmatrix} 2.548 \\ (0.074) \end{bmatrix} IP_{t-} - \begin{bmatrix} 0.331 \\ (0.075) \end{bmatrix} o_{t-j}$$

To construct the oil price measure based on Lee et al. (1995) specification, we model the conditional standard deviation for the changes in oil price by GARCH(1,1). Based on autoregressive moving average (12,12), we first check the Ljung-Box statistics of squared residuals as well as the ARCH-LM test developed by Engle (1982) to ensure the absence of autocorrelation and to test for conditional heteroscedasticity. The length of AR and MA components is shortened on the basis of information criteria and good fit of the parsimonious model and we end up with AR(10,11), MA(1,2,3,10,11,12)[5]. Ensuring that the errors are uncorrelated, the ARCH test suggests that ARCH effect presents as the null hypothesis of no ARCH effects is rejected, as shown in Table 2.

In addition, Jarque and Bera (1980) test suggests that the residuals of oil price return are not conditionally normally distributed. The kurtosis and skewness test statistic indicate that the return series has a fat and left tail, respectively. When we plot the Quantile-Quantile graph, presented in Figure 1, for the oil price return series, both positive and negative oil shocks explain the non-normality of the residuals. Although violation of non-normality assumption will not affect the consistency of the ARCH parameters estimates, the covariance matrix will no longer be consistent. This inconsistency will result in incorrect computation of standard errors and thus inaccurate inference of the significance of the ARCH coefficients estimates. We correct this by employing the Bollerslev and Wooldridge (1992) method to get the quasi-maximum likelihood covariances and standard errors.

The findings reported in Tables 3-5 show the estimation of equations 6-8. According to the results, positive oil price shocks have a negative effect with 0.013 magnitude and is significant at 5% level of confidence, whereas declines in oil prices have

Table 1: Unit root test and normality

Variable	ADF-t-statistics	PP test adjusted-statistics
Oil	−6.26	−12.48
IP	−42.07	−12.48
Histogram for oil price return		
Skewness	−0.728	
Kurtosis	3.951	
Jargue–Bera	30.396***	

***Indicate significant at 1% level of confidence. The null hypothesis for both tests is that the series has a unit root. The Jargue–Bera test has a null hypothesis of a normal distribution. IP: Industrial production, ADF: Augmented Dickey–Fuller, PP: Phillips and Perron

5 The presence of ARCH effect is robust to change in ARMA structure.

Table 2: ARMA model

Variable	Coefficient
C	0.0002
AR(10)	0.54***
AR(11)	0.34***
MA(1)	0.25***
MA(2)	0.15***
MA(3)	0.12***
MA(10)	−0.49***
MA(11)	0.48***
MA(12)	0.21***
Akaike info criterion	−2.022
Schwarz criterion	−1.888
Durbin–Watson statistics	2.009
ARCH effect Lag (1/6)	F-statistic=20.01***/4.95***
ARCH effect Lag (12,12) Lag (1/6)	F-statistic=15.55***/4.22***

***indicate significant at 1% level of confidence. ARCH: Autoregressive conditional heteroskedasticity, AR: Autoregressive, ARMA: Autoregressive moving average

Table 3: The effect of oil price shock Lee et al. (1995)

Variable	Coefficient	SE
C	0.0135	0.01
IP_{t-1}	−0.528***	0.068
IP_{t-2}	−0.315***	0.078
IP_{t-3}	−0.246***	0.078
IP_{t-4}	−0.285***	0.079
IP_{t-5}	−0.262***	0.081
IP_{t-6}	−0.282***	0.08
IP_{t-7}	−0.276***	0.079
IP_{t-8}	−0.18***	0.079
IP_{t-9}	−0.132*	0.077
IP_{t-10}	−0.294***	0.075
IP_{t-11}	−0.104	0.076
IP_{t-12}	0.306***	0.066
O_{t-1}	−0.011	0.007
O_{t-2}	0.002	0.007
O_{t-3}	−0.001	0.007
O_{t-4}	0.001	0.007
O_{t-5}	−0.001	0.007
O_{t-6}	−0.008	0.007
O_{t-7}	0.001	0.007
O_{t-8}	0.001	0.007
O_{t-9}	−0.001	0.007
O_{t-10}	−0.0005	0.007
O_{t-11}	−0.0007	0.007
O_{t-12}	0.01	0.007
R^2	0.505	
Adjusted R^2	0.443	
Durbin–Watson statistics	1.996	
Breuch–Pagen LM	F-statistic=0.876	P.F(2,190)=0.417
Harvey	F-statistic=01.10	P.F(24,192)=0.346

***,**,*denote significance at 1%, 5% and 10%, respectively. The null hypothesis of Breuch and Pagen and Harvey tests is that the errors are uncorrelated and homoscedastic. Both tests confirm that the residuals are lack of autocorrelation and heteroscedasticity problems. SE: Standard error, IP: Industrial production

insignificant impact of a total magnitude of 0.006. Symmetric oil prices shocks affect the growth negatively and significantly. A 10% oil shock lowers IP growth by 0.1%.

The results of the oil net increase developed by Hamilton (1996) suggest that a 10% positive oil shock lowers the growth by around 1%. The overall positive oil shocks coefficients of 12 lags are negative and significant at 1% level of confidence with calculated

Table 4: The effect of positive oil price shock Lee et al. (1995)

Variable	Coefficient	SE
C	0.0135	0.01
IP_{t-1}	−0.528***	0.068
IP_{t-2}	−0.315***	0.078
IP_{t-3}	−0.246***	0.078
IP_{t-4}	−0.285***	0.079
IP_{t-5}	−0.262***	0.081
IP_{t-6}	−0.282***	0.08
IP_{t-7}	−0.276***	0.079
IP_{t-8}	−0.18**	0.079
IP_{t-9}	−0.132*	0.077
IP_{t-10}	−0.294	0.075
IP_{t-11}	−0.104	0.076
IP_{t-12}	0.306***	0.066
O_{t-1}	−0.011	0.007
O_{t-2}	0.002	0.007
O_{t-3}	−0.001	0.007
O_{t-4}	0.001	0.007
O_{t-5}	−0.001	0.007
O_{t-6}	−0.008	0.007
O_{t-7}	0.001	0.007
O_{t-8}	0.001	0.007
O_{t-9}	−0.001	0.007
O_{t-10}	−0.0005	0.007
O_{t-11}	−0.0007	0.007
O_{t-12}	0.01	0.007
R^2	0.502	
Adjusted R^2	0.439	
Durbin–Watson statistics	1.996	
Breuch–Pagen LM	F-statistic=0.876	P.F(2,190)=0.417
Harvey	F-statistic=01.10	P.F(24,192)=0.346

***,**,*Denote significance at 1%, 5% and 10%, respectively. The null hypothesis of Breuch and Pagen and Harvey tests is that the errors are uncorrelated and homoscedastic. Both tests confirm that the residuals are lack of autocorrelation and heteroscedasticity problems. SE: Standard error, IP: Industrial production

t-statistic of 2.432. The results can be summarized as follows. All models are lack of autocorrelation and heteroscedasticity problems.

$$\widehat{IP}_t = \begin{bmatrix} 0.009 \\ (0.004) \end{bmatrix} - \begin{bmatrix} 3.339 \\ (0.077) \end{bmatrix} IP_{t-1} - \begin{bmatrix} 0.097 \\ (0.044) \end{bmatrix} o^{+}_{t-j}$$

4. CONCLUSIONS

This paper examines the effect of asymmetric oil price shocks on the growth of the Jordanian IP over the monthly span from 1995:11 to 2015:12. Employing different specifications of oil price shock measures, suggested by Mork (1989), Lee et al. (1995) and Hamilton (1996), we establish the link between oil prices shocks and economic growth.

The results from different specifications of oil price shock measures reveal that positive oil shocks have a significant negative effect on the IP growth. On the other hand, while it is hoped that declines in oil prices could benefit the economic growth in Jordan, the findings suggest that anticipated and unanticipated negative oil price shocks have a negative and insignificant impact on the growth. This entails that the blessing of oil price decreases might not be an incentive for economic growth in Jordan, which might

Figure 1: Quantile-quantile. *GRBRENT is the oil price return

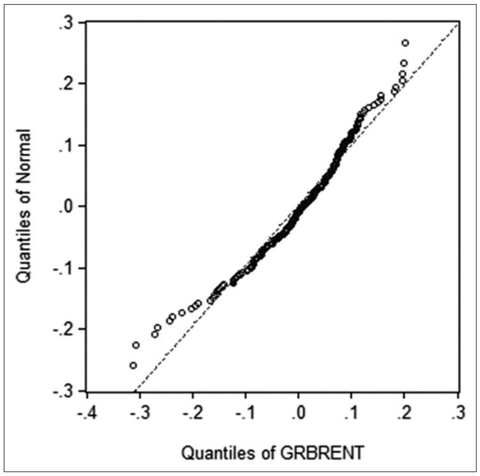

Table 5: The effect of negative oil price shock Lee et al. (1995)

Variable	Coefficient	SE
C	0.006	0.007
IP_{t-1}	−0.539***	0.069
IP_{t-2}	−0.296***	0.08
IP_{t-3}	−0.253***	0.079
IP_{t-4}	−0.307***	0.079
IP_{t-5}	−0.261***	0.082
IP_{t-6}	−0.300***	0.081
IP_{t-7}	−0.269***	0.079
IP_{t-8}	−0.200**	0.081
IP_{t-9}	−0.148*	0.078
IP_{t-10}	−0.274***	0.076
IP_{t-11}	−0.11	0.076
IP_{t-12}	0.309***	0.066
O_{t-1}	−0.003	0.006
O_{t-2}	−1.70E-05	0.006
O_{t-3}	−0.001	0.006
O_{t-4}	0.006	0.006
O_{t-5}	0.001	0.006
O_{t-6}	−0.002	0.006
O_{t-7}	−0.005	0.006
O_{t-8}	0.008	0.006
O_{t-9}	−0.011*	0.006
O_{t-10}	−0.004	0.006
O_{t-11}	0.002	0.006
O_{t-12}	−0.001	0.006
R^2	0.505	
Adjusted R^2	0.443	
Durbin–Watson statistics	1.996	
Breuch–Pagen LM	F-statistic=0.876	P.F(2,190)=0.417
Harvey	F-statistic=01.10	P.F(24,192)=0.346

***,**,*denote significance at 1%, 5% and 10%, respectively. The null hypothesis of Breuch and Pagen and Harvey tests is that the errors are uncorrelated and homoscedastic. Both tests confirm that the residuals are lack of autocorrelation and heteroscedasticity problems. SE: Standard error

be attributed to the inelasticity of supply in the short-run and the market structure of industries.

REFERENCES

Abdul Rahim, N. (2015), The energy sector in Jordan. Brussels, Belgium: Invest-Export, Brussels. Embassy of Belgium, Beirut-Lebanon.

Ayadi, O.F. (2005), Oil price fluctuations and the Nigerian economy. OPEC Review, 29(3), 199-217.

Bernanke, B.S. (1983), Irreversibility, uncertainty, and cyclical investment. The Quarterly Journal of Economics, 98(1), pp.85-106.

Berument, M.H., Ceylan, N.B., Dogan, N. (2010), The impact of oil price shocks on the economic growth of selected MENA countries. The Energy Journal, 30, 149-176.

Blanchard, O.J., Gali, J. (2007), The macroeconomic effects of oil shocks: Why are the 2000s so different from the 1970s? (No. w13368). National Bureau of Economic Research.

Bollerslev, T. (1986), Generalized autoregressive conditional heteroskedasticity. Journal of Econometrics, 31(3), 307-327.

Bollerslev, T., Wooldridge, J.M. (1992), Quasi-maximum likelihood estimation and inference in dynamic models with time-varying covariances. Econometric Reviews, 11(2), 143-172.

Bredin, D., Elder, J., Fountas, S. (2011), Oil volatility and the option value of waiting: An analysis of the G-7. Journal of Futures Markets, 31(7), 679-702.

Brooks, C. (2014), Introductory Econometrics for Finance. Cambridge: Cambridge University Press.

Burbidge, J., Harrison, A. (1984), Testing for the effects of oil-price rises using vector auto regressions. International Economic Review, 25, 459-484.

Cologni, A., Manera, M. (2008), Oil prices, inflation and interest rates in a structural cointegrated VAR model for the G-7 countries. Energy Economics, 30(3), 856-888.

Cunado, J., de Gracia, P. (2003), Do oil price shocks matter? Evidence for some European countries. Energy Economics, 25(2), 137-154.

Darby, M.R. (1982), The price of oil and world inflation and recession. The American Economic Review, 72(4), 738-751.

Davis, S.J. (1987), Allocative disturbances and specific capital in real business cycle theories. The American Economic Review, 77(2), 326-332.

Dickey, D.A., Fuller, W.A. (1979), Distribution of the estimators for autoregressive time series with a unit root. Journal of the American Statistical Association, 74(366a), 427-431.

El-Anashasy, A. (2006), Oil prices, fiscal policy, and Venezuela's economic growth. In: Working Paper, University of Washington.

Eltony, M.N., Al-Awadi, M. (2001), Oil price fluctuations and their impact on the macroeconomic variables of Kuwait: A case study using a VAR model. International Journal of Energy Research, 25(11), 939-959.

Engle, R.F. (1982), Autoregressive conditional heteroscedasticity with estimates of the variance of United Kingdom inflation. Econometrica: Journal of the Econometric Society, 50(4), 987-1007.

Hamilton, J.D. (1983), Oil and the macro economy since World War II. The Journal of Political Economy, 13, 228-248.

Hamilton, J.D. (1988), Are the macroeconomic effects of oil-price changes symmetric? A comment. In: Carnegie-Rochester Conference Series on Public Policy. Vol. 28. North-Holland. p369-378.

Hamilton, J.D. (1996), This is what happened to the oil price-macroeconomy relationship. Journal of Monetary Economics, 38(2), 215-220.

Hamilton, J.D. (2003), What is an oil shock? Journal of Econometrics, 113(2), 363-398.

Henry, C. (1974), Investment decisions under uncertainty: The "irreversibility effect". The American Economic Review, 64(6), 1006-1012.

Huang, B.N., Hwang, M., Peng, H.P. (2005), The asymmetry of the impact of oil price shocks on economic activities: An application of the multivariate threshold model. Energy Economics, 27(3), 455-476.

Ismail, K. (2010), The structural manifestation of the Dutch disease: The case of oil exporting countries. IMF Working Papers, 1-36.

Jarque, C.M., Bera, A.K. (1980), Efficient tests for normality, homoscedasticity and serial independence of regression residuals. Economics Letters, 6(3), 255-259.

Jimenez-Rodrguez, R., Sanchez, M. (2005), Oil price shocks and real GDP growth: Empirical evidence for some OECD countries. Applied Economics, 37(2), 201-228.

Kamin, S.B., Rogers, J.H. (2000), Output and the real exchange rate in developing countries: An application to Mexico. Journal of Development Economics, 61(1), 85-109.

Kilian, L. (2006), Not all oil price shocks are alike: Disentangling demand and supply shocks in the crude oil market. CEPR Discussion Paper No. 5994.

Kilian, L., Vigfusson, R. (2009), Pitfalls in estimating asymmetric effect of energy price shocks. FRB International Finance Discussion Paper, (970).

Korhonen, I., Mehrotra, A.N. (2009), Real exchange rate, output and oil: Case of four large energy producers. BOFIT Discussion Paper No. 6/2009, Bank of Finland.

Lee, K., Ni, S., Ratti, R.A. (1995), Oil shocks and the macroeconomy: The role of price variability. The Energy Journal, 15, 39-56.

Lescaroux, F., Mignon, V. (2008), On the influence of oil prices on economic activity and other macroeconomic and financial variables. OPEC Energy Review, 32(4), 343-380.

Loungani, P. (1986), Oil price shocks and the dispersion hypothesis. The Review of Economics and Statistics, 68(3), 536-539.

Mendoza, O., Vera, D. (2010), The asymmetric effects of oil shocks on an oil-exporting economy. Cuadernos de Economia, 47(135), 3-13.

Mork, K.A. (1989), Oil and the macroeconomy when prices go up and down: An extension of Hamilton's results. Journal of Political Economy, 97(3), 740-744.

Moshiri, S., Banihashem, A. (2012), Asymmetric effects of oil price shocks on economic growth of oil-exporting countries. Available from: http://www.ssrn.2006763.

Narayan, P.K., Narayan, S. (2007), Modelling oil price volatility. Energy Policy, 35(12), 6549-6553.

Olomola, P.A., Adejumo, A.V. (2006), Oil price shock and macroeconomic activities in Nigeria. International Research Journal of Finance and Economics, 3(1), 28-34.

Phillips, P.C., Perron, P. (1988), Testing for a unit root in time series regression. Biometrika, 75(2), 335-346.

Rasche, R.H., Tatom, J.A. (1977), Energy Resources and Potential GNP. St. Louis: Review of the Federal Reserve Bank.

Rasche, R.H., Tatom, J.A. (1981), Energy price shocks, aggregate supply and monetary policy: The theory and the international evidence. In: Carnegie-Rochester Conference Series on Public Policy. Vol. 14. Elsevier. p9-93.

Taylor, S.J. (1987), Forecasting the volatility of currency exchange rates. International Journal of Forecasting, 3(1), 159-170.

Tazhibayeva, K., Ter-Martirosyan, A., Husain, A. (2008), Fiscal policy and economic cycles in oil-exporting countries. IMF Working Papers, 1-21.