Price of Oil and the Macroeconomy:
The Case of Jordan

Prepared by:

Talib Awad*

Economic Observatory*

Faculty of Business

The University of Jordan

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- *Full Professor, Department of Business Economics, Faculty of Business, the University of Jordan.*
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Contents:

الملخص

أثارت التقلبات الحادة الأخيرة في أسعار النفط وما رافق ذلك من توجه حكـومي نحـو التحريـر التدريجي لأسعار المشتقات النفطية توقعات بالتأثير سلباً على الأداء الاقتصادي الكلي . ومن هنا أتت هـذه الدراسة لإلقاء الضوء على مدى تأثر المؤشرات الكلية الرئيسية وبالتحديد مؤشـري النمـو الاقتـصادي والتضخم بهذه التطورات. وباستخدام سلاسل زمنية تغطـي الفتـرة ١٩٧٣ -٢٠٠٧ لـبعض المتغيـرات الاقتصادية الكلية الهامة، وبعد إجراء اختبارات الاستقرار والتكامل اللازمـة تـم تقـدير نمـوذج قياسـي ديناميكي، وتوصلت الدراسة إلى النتائج الهامة التالية:

أولا: عدم وجود علاقة مستقره طويلة الأجل بين أسعار النفط الخام وكل مـن النمـو الاقتـصادي والتضخم .

ثانيا: فشل مؤشر الكلفة المحلية للنفط الخام المستورد في تفسير أي من الذبذبات قصيرة الأجل لكل من النمو والتضخم.

ثالثا: وجود دلائل على تأثر كل من التضخم والنمو الاقتصادي بالتطورات قصيرة الأجل لأسـعار النفط الخام الدولية حيث تبين أن هذه التغيرات تؤثر سلباً على معل النمو الحقيقـي للنـاتج المحلي الإجمالي و بنسبه (0.08-) في حين تؤثر طردياً على معدل التضخم المحلي وبنسبة (0.075). وقد جاء ذلك متوافقاً مع النظرية الاقتصادية وكـذلك مـع الدراسـات الدوليـة المشابهة.

رابعـا: كان للأزمة الاقتصادية النقدية التي واجهت الاقتصاد الأردني في عام ١٩٨٩ أثر سلبي حاد على النمو الاقتصادي وبنسبه -٢٣% مما يشير إلى أهميـة سياسـات أسـعار الـصرف واستقرارها. في المقابل فان المنحة النفطية العراقية ابتدءا من عام ١٩٩٢ قد أثرت إيجابـا على النمو الحقيقي وبنسبة ١٣%.

خامسا: كذلك تأثرت معدلات التضخم المحلي بشكل ملموس بالهزات الاقتـصادية المفاجئـة التـي واجهت الاقتصاد في عام ١٩٨٩ ولكن بنسبة اقل تقترب من ١٨%.

وتخلص الدراسة إلى أهميه التطورات المفاجئة وقصيرة الأجل في الأسعار الدولية للـنفط الخـام بالنسبة للأداء الاقتصادي الكلي، وعلى خلاف السعر المحلي للنفط الخام الذي يعاني من تشوهات متعـددة، الأمر الذي يحد من أهميته بالنسبة للأداء الاقتصادي الكلي.

وتوصي الدراسة باستكمال هذا البحث بإعادة التحليل على بيانات ربعيه أو شهريه في حال توفرها لقياس الآثار الأقصر أجلاً على الاقتصاد الوطني .

Abstract

The Jordanian government has been subsidizing heavily oil prices during the last three decades. Recently, some analysts and economists warned that the cut down of the oil subsidy and liberalizing oil price would push the Jordanian economy into much higher risk of falling into a stagflation through the short run adjustments in aggregate price and output. The analysis in this paper has used Hamilton's augmented model to evaluate the effects of higher oil prices on real GDP growth and inflation. However, our empirical analysis based on annual sample covering the period 1973-2007, provide little support to such expectations.

Stationarity and cointegration analysis indicates clearly to the absence of any stable long run relationship between domestic crude oil price and both economic growth and inflation. Furthermore, the estimated dynamic econometric models have failed to detect any significant short run affect of domestic crude oil price on inflation and growth. However, when the model was re-estimated using international crude oil prices instead, a significant affect with the correct expected signs are detected on both domestic inflation and the rate of economic growth. This finding of the paper, is in line Hamilton's and Kliesen's results, is that oil matters in the short run. This result also lend support to the importance of international rather than domestic price of oil development to the Jordanian macroeconomic performance.

The econometric analysis detected a sharp negative impact of the unexpected external shock of 1989 on both real activity (decreased) and inflation (increased) of the domestic economy. In contrast the Iraqi free oil deal given to Jordan affected real economic growth positively and significantly.

1- Introduction

In 1989, there were widespread riots after fuel prices were raised sharply as part of an economic reform program backed by the International Monetary Fund (IMF). However, the cash-strapped kingdom is being forced to balance social pressures against the increasing strain being placed on the budget, as international oil prices soar through the $ 70 a barrel mark. After 1991, Jordan had been a major beneficiary of Iraqi oil, with fuel being pumped to the kingdom either free of charge or as part of a highly favorable deal under which it would be swapped for Jordanian products. However, this resource dried up with the 2003 invasion of Iraq. Arab countries such as the UAE, Kuwait and Saudi Arabia instead first agreed to fill the gap at reduced rates, but Jordan has been faced with market prices in recent months, exactly at a time when they have skyrocketed.

In December 2001, the spot price of crude oil averaged $19.33 per barrel. Shortly thereafter, oil prices started to trend higher. After a brief decline from $74 per barrel in July 2006 to about $55 per barrel in January 2007, oil prices then resumed their upward trajectory. They surpassed $90 per barrel in October 2007. During the run-up in crude oil prices over the past few years, some economists and energy analysts correctly expected the price of crude oil to eventually rise to $100 per barrel or more, and in February 2008, spot crude oil prices closed above $100 per barrel for the first time ever, and they have since climbed even further reaching a maximum of about $147 a barrel during September 2008. However, the price of crude oil deteriorated dramatically since after reaching to $30-40 range by December2008-January 2009. This sharp fluctuation in oil price has raised a question about its potential macroeconomic impact on a small open economy that is heavy dependent on oil imports. Many analysts predicted that $100 per barrel crude oil would cause the Jordanian economy to fall into a period of stagflation. Conventional economic theory suggests that higher oil prices lead to a reduced

rate of growth in aggregate economic activity in the short run[1]. This study is the first attempt to explore and analyze quantitatively the macroeconomic impacts of crude oil price fluctuations on the Jordanian economy. Specifically, this study will investigate the impact of a permanent increase in the spot price of crude oil on real GDP growth and inflation[2].

2- Oil and macroeconomic activity: a theoretical background

Oil shocks tend to draw the attention of forecasters, macroeconomists, financial market participants, and public policymakers. An oil price shock is typically a large, unexpected increase in the relative price of energy that adversely affects the economic decisions of major economic units such as firms and households.

These effects are both direct and indirect and vary in magnitude across time. To begin with, higher crude oil prices directly raise the prices of petroleum-based products such as gasoline or diesel fuel. Because crude oil is an important energy source for most industrialized or industrializing countries, there can also be important pass-through (secondary) effects to the prices of non-energy goods and services. These include fuel surcharges implemented by those in the transportation services industry. An oil price increase may lower future GDP growth through other channels. In particular, sharp oil price changes—either increases or decreases—affect macroeconomic activity for at least two reasons. First, they raise

[1] - Using a static aggregate demand—aggregate supply model, an increase in energy prices causes the aggregate supply curve to shift up along a stationary aggregate demand curve causing both a decrease in aggregate output and an increase in price level (stagflation). Over time, though, the economy returns to its long-run level of potential output.

2 - Numbers in the introduction are taken from the oil price net at:
http://www.oil-price.net/

uncertainty about future oil prices and thus cause delays in business investment (e.g., Bernanke [1983] and Pindyck [1991]).

Most oil price fluctuations are the result of changes in supply arising from wars, embargoes, or geopolitical uncertainty tied to developments in important oil-producing regions. However, the latest rise in oil prices appears to be led by demand factors such as the fast- growing Asian countries. Most recently, the sharp decline in world crude oil price is due to recessionary pressures resulted from the ongoing international financial crises.

At the same time, the duration of these economic effects varies with its permanence and with the passage of time. In the short-run, the price elasticities of the supply and demand for oil is likely very low because firms and consumers may find it difficult to change their consumption immediately and new sources of oil or alternative sources of energy are not immediately available. Over the longer term, these price elasticities will likely be larger. Higher prices spur producers to seek out new sources of crude oil, but they also provide important incentives to increase the production of alternative energy sources, such as ethanol or bio-diesel. Higher oil prices also prompt users to conserve energy.

"The new energy regime," as in the 1970s was sometimes called, spawned a literature that sought to quantify the effects of higher energy prices on output, inflation, and employment. Rasche and Tatom (1977) and Baily (1981) were among the first to study the transmission mechanism between oil price changes and real GDP.

Hamilton (1983), among many others, documented a negative and significant relation between oil price changes and future GDP growth. But as Hooker (1996) showed, this result breaks down in the data after 1986. In 1986, recall, there was a sharp, unexpected decline in oil prices. In Hamilton's original linear specification, he implicitly assumed that oil shocks had a symmetric effect on economic activity: Increases (decreases) in oil prices reduce (raise) future GDP growth. However, the effect can be also asymmetric. To account for nonlinearities

in the data, Hamilton (2003) proposed a net oil price increase variable. In this specification, oil price increases influence economic activity, such as the growth of real GDP, but oil price decreases do not.

Guo and Kliesen (2005) found that increased oil volatility over the period from 1984 to 2004 had a significant and adverse effect on key measures of U.S. macroeconomic activity, such as business capital spending. Second, oil price changes induce resource reallocation from more adversely affected sectors to less adversely affected sectors, and such reallocation is costly (e.g., Davis and Haltiwanger [2001], and Lee and Ni [2002]).

The link between oil price changes and economic activity is complicated by other factors, such as the physical demand for the product, which to some degree is influenced by economic growth, and the influence of domestic monetary policymakers. According to Barsky and Kilian (2004), the linkage between higher oil prices and weaker economic growth is complicated by the endogeneity of oil prices. This view holds that demand shocks, rather than supply shocks have been the dominant factors explaining higher oil prices. In a subsequent paper, Kilian (2007) asserts that precautionary demand shocks, which he defines as expectations about future oil supplies, have also been important.

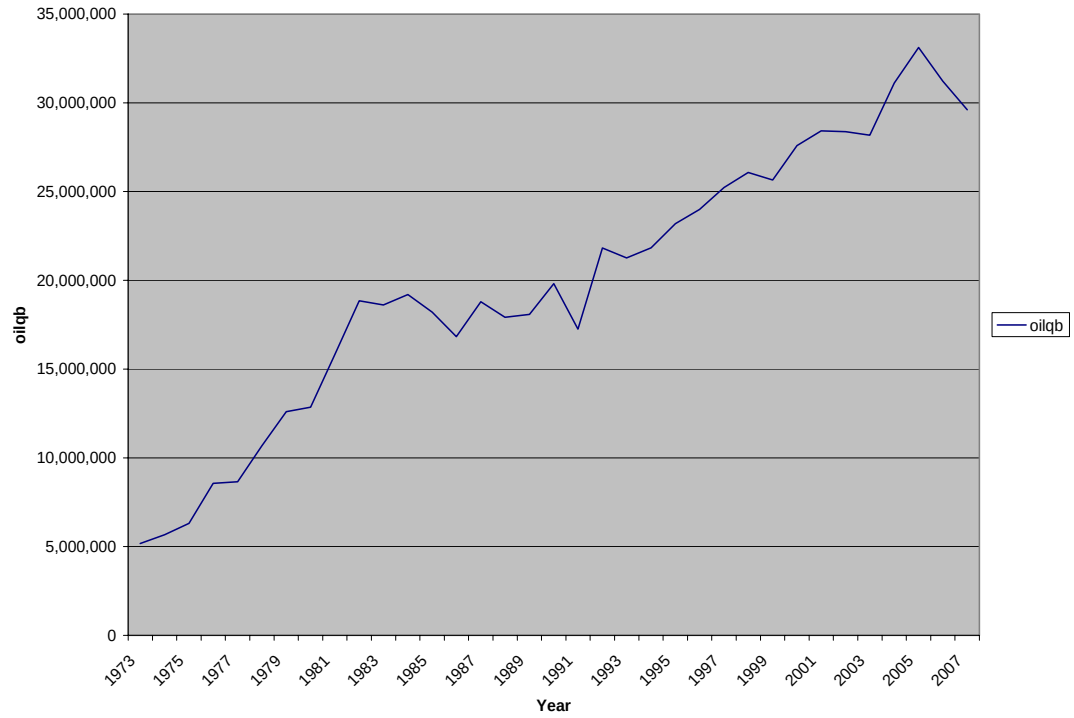
Another view, expressed by Bernanke, Gertler, and Watson (1997), holds that the dominant cause of recessions was not due to the sharp rise in oil prices but rather to the endogenous response of monetary policymakers. Other studies examining the interaction between monetary policy and oil price shocks include Leduc and Sill (2004) and Hamilton and Herrera (2004).

3- Preliminary descriptive analysis

3.1 - Development of crude oil imports to the Kingdome

Figure (1) shows the development of crude oil imports during the period 1973-2007. Imports of crude oil increased steadily during the period, rising from 5176042 barrels in 1973 to 29617734 barrels in 2007[3]. The average annual rate of growth was high at about 13.5% during the whole period. The highest increase in imports occurred in 1981-1982. However, imports decreased significantly in 1991 following the first Gulf war. Crude oil imports reached its peak in the year 2005 (33116999 barrels) and dropped slightly since after.

Figure (1) Annual import of crude oil, 1973-2007, Barrels.

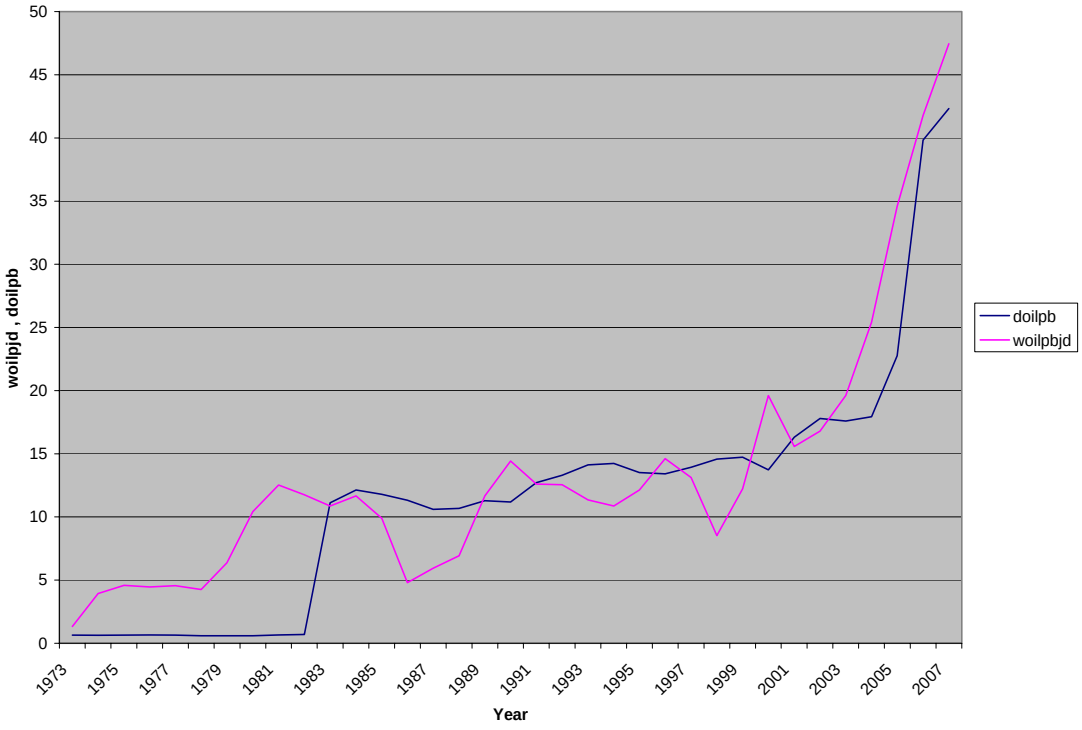


[3] - Originally the quantity of imported oil is measured by metric ton, then converted barrels using the following conversion: One barrel equals 42 US gallons or 35 UK (imperial) gallons, or approximately 159 liters or 9,702 cubic inches (5.6 cubic feet); 6.29 barrels equal one cubic meter and (on average) 7.33 barrels weigh one metric ton (1000 kilograms).

3.2- Domestic versus international cost of crude oil

Figure (2) shows that world oil price of crude oil was higher substantially than domestic oil price during the period 1973-1982. The gap between the two variables is due to the subsidized crude oil prices resulted from the preferential treatment granted to Jordan by neighboring Arab oil exporting countries. However, the relationship between the two prices was reversed during most of the 1984-2002, where domestic imported oil prices surpassed international oil price. The gap between the two prices decreased in the last few years due to the end of special bargain price of imported oil. Another fact which reflected in Figure (2) is that although variations in international oil price are stronger than variation in domestic oil price during the period, the tow prices are moving closely together especially after 2003. Following the second Gulf war, Jordan was forced to import crude oil from other Arab countries at prices closer to world prices. The simple correlation coefficient between the two prices was high at about 0.8 during the whole period.

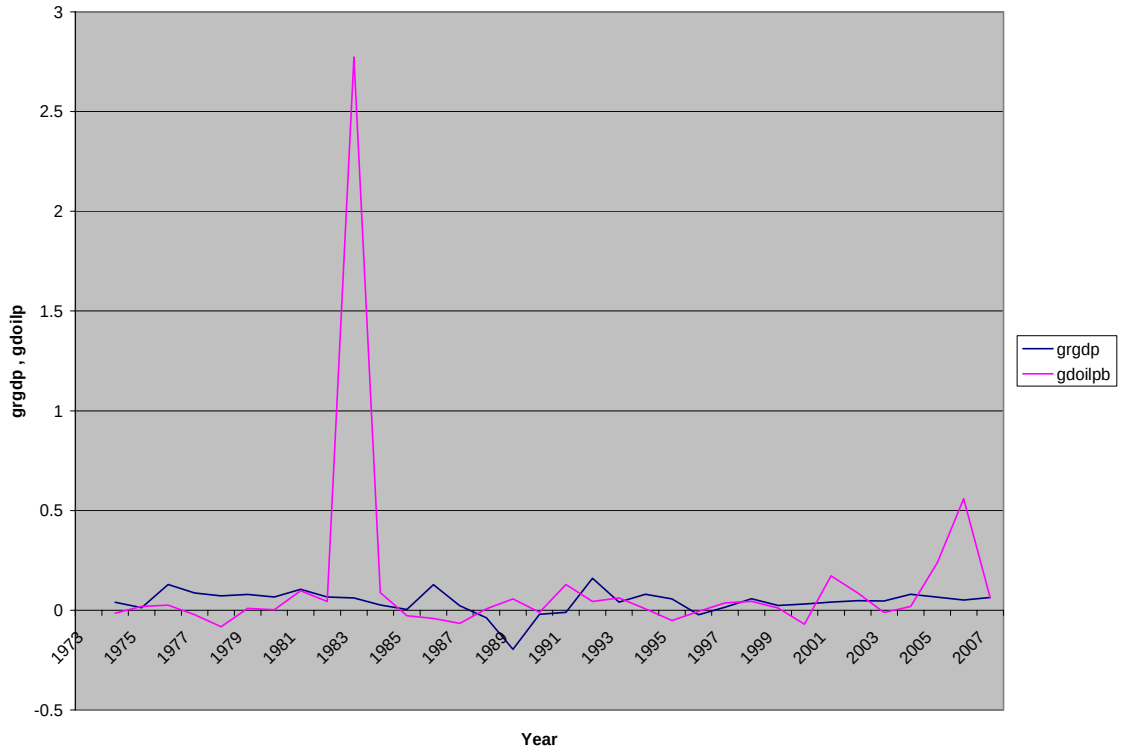
Figure (2) Domestic crude oil price versus international oil price, 1973-2007, in domestic currency.



3.3 The relationship between oil price and real GDP

Figure (3) shows that domestic oil price behavior was more volatile compared to real GDP. Most notably the domestic price of imported crude oil increased substantially in 1983, due to the end of the special preferential treatment that was given to Jordan by neighboring Arab oil exporting countries. Real GDP recorded the sharpest decreases in 1989 following the collapse of the Jordanian Dinar exchange rate. Another large jump in domestic oil price occurred in 2006 due to the gradual elimination of domestic oil price support and the same time the sharp increases in world oil price. There is no clear systematic relationship between the two variables that can be deduced from Figure (3), however this need to be confirmed empirically.

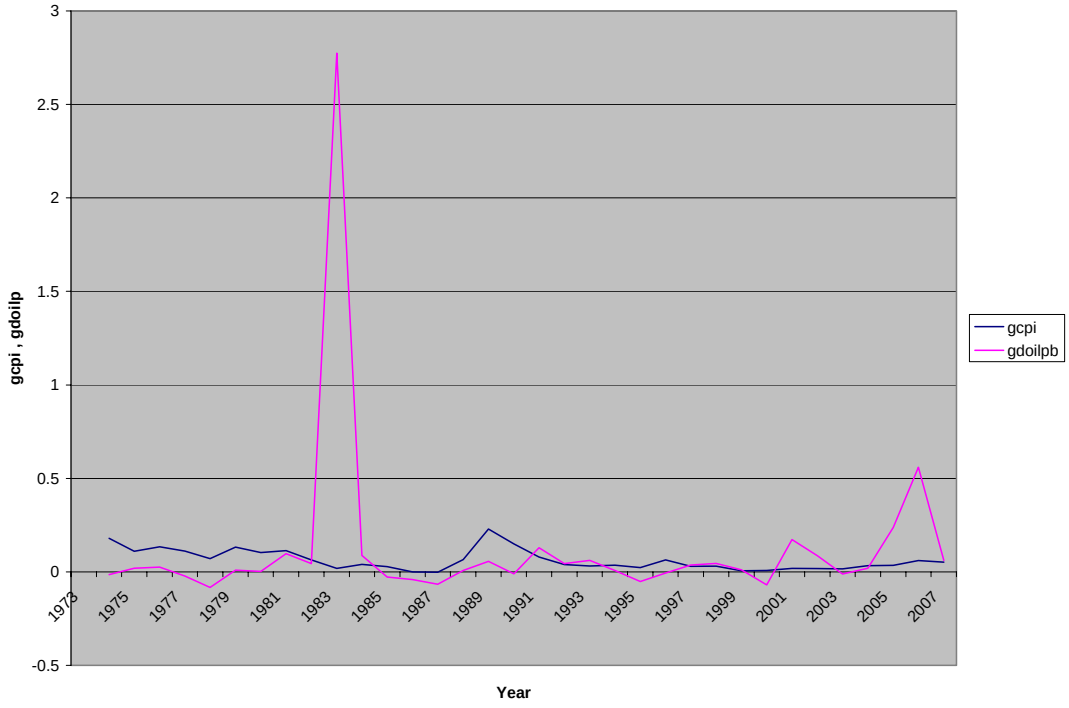
Figure (3) Real GDP versus domestic oil price, 1973-2007 .



3.4 The relationship between oil price and inflation

Figure (4) also indicates to a weak relationship between the inflation rate and growth of domestic oil price. It shows that inflation fluctuations were weaker than variations in domestic oil price. While the highest increase in domestic cost of imported crude oil was recorded in 1983 (277%), the highest increase in domestic inflation was recorded in 1989 (22.8%). However, the exact relationship between the two variables can only be judged empirically.

Figure (4) Domestic inflation rates versus growth in domestic oil price, during the period, 1973-2007.



4. Empirical analysis

4.1 The data

Annual data are available on key macroeconomic variables, Gross Domestic Product (GDP) at current prices, consumer price index (CPI), and the international price of imported crude oil (woilp). However, the international price of imported crude oil was not fully reflected and simulated into the Jordanian economy. This is because, for most of the period the price was set according to special arrangements between the Government of Jordan and the governments of oil exporting Arab countries. During the seventies and most of the eighties crude oil was mainly imported from Iraq through special barter and /or price subsidy arrangements. After the first and second Gulf wars, Iraqi supply of crude oil was severely interrupted. Therefore, the Jordanian government looked for new and different import arrangements with Saudi Arabia and Kuwait to compensate for the loss of Iraqi oil supply. Hence the domestic crude oil price that reflects the real cost to the Jordanian economy (doilp) is expected to be significantly different from the international price of crude oil (woilp). However, data on the domestic cost of imported crude oil is not published and proved to be very difficult to obtain for the whole period of the study. Luckily enough, the University of Jordan contact with both the Ministry of Energy and the Jordanian Oil Refinery at the highest level, has succeeded to provide annual series on this variable covering the period 1973-2007.

As noted earlier, the graphical and simple correlation analysis shows that both prices were moving together closely, especially during the last few years, when the government liberalized gradually the price of oil and its products.

To measure the impact of oil price development on economic growth and inflation, real GDP (rgdp) is calculated by deflating nominal GDP by domestic

consumer price index, and the growth rate of the variables is calculated using the following formula:

$$g(x) = \ln(x) - \ln(lag\ (x)) \qquad \ldots\ldots\ (1)$$

Where the symbol (ln) refers to the natural logarithm, and (x) is the variable under consideration. The new calculated variables using this formula are the growth rate of real GDP (grgdp) and the annual inflation rate (gcpi).

4.2 The econometric model

A two equations dynamic model is used to measure the impact of oil price development on both economic growth and inflation. The model takes the following form:

$$grgdp = b_0 + \sum_{i=1}^{k} b_{1i}(grgdp)_{i-1} + \sum_{i=1}^{k} b_{2i}(gdoilp)_{i-1} + \in_{1i} \qquad \ldots\ldots\ (2)$$

$$gcpi = \alpha_{\underset{o}{0}} + \sum_{i=1}^{k} \alpha_{1i}(gcpi)_{i-1} + \sum_{i=1}^{k} \alpha_{2i}(doilp)_{i-1} + \in_{2i} \qquad \ldots\ldots\ldots\ (3)$$

Where all variables are as defined earlier, $\in_{1i}$ and $\in_{2i}$ are the error terms which are assumed to be of white noise nature. β's α's are unknown parameters, and k refers to lag length.

The model was used by many researchers including Lee et al., 1995, Hamilton 2005, Davis and Halliwanger 2001, and Kliesen 2008. The model is flexible and allows for the possibility of asymmetric relationship between oil price development and various macroeconomic variables. To allow for the possibility of asymmetric oil price effects two separate variables can be calculated from the oil price variable as follows:

$$doilpp = \max(0, doilp) \qquad \ldots\ldots\ (4)$$

And:

$$doilpn = \min(0, doilp) \quad \ldots\ldots\ldots \quad (5)$$

Where the first price variable (doilpp) measures the positive changes of oil price, while the second price variable (doilpn) measures the negative changes in oil price.

4.3 Stationarity and coitegration analysis

Before estimating the model, the variable stationary has to be checked out to avoid the problem of spurious regression. The Augmented Dicky – Fuller (ADF) test was applied to the level of the study variables cpi, rgdp, and doilp. The result of applying ADF test indicated to the none-stationarity of all model variables. Hence, the cointegration test is conducted to see whether a stable long-run relationship between the model variables does exist. The result of cointegration test is shown on Table (1):

Table (1): Cointegration test for the level of model variables.

Model	Test Statistic	P – value
rgdp	-2.842	0.3382
cpi	-2.704	0.409

Both intercept and linear time trend is used in the cointegration test.

The test results indicate to the absence of cointegration between the two models variables. The evident conclusion from this analysis is that there is no stable long-run relationship exist between oil price and both economic growth and inflation. However, since the economic model is specified in terms of growth form (Annual growth rates of real GDP and CPI), the next logical step in our empirical analysis is to apply stationarity test to the growth from of the variables. The result of applying ADF to the new variables is shown in Table (2).

Table (2): Augmented Dickey – Fuller test applied to the model variables in the growth form*.

Model	Test statistic	P - value
grgdp	-3.1029	0.026
gcpi	-2.9525	0.03957
goilp	-2.8945	0.04697

* The test was applied with constant and without time trend.

The ADF test shows clearly that all model variables are now stationary in the growth form, so that OLS can be applied to the new variables without any fear of spurious regression problem.

4.4 Analysis of the Regression Results

To make the model estimatable, the lag length of the model variable must be specified first. Both Akaike (AIC) and Hannan –Quinn (HQC) criterias are used to determine the optimal lad length, the results of optimal lag length analysis is as shown in the Table (3) :

Table (3) : Lag length selection by AIC and HQC

Lags	log likely	P (L R)	AIC	BIC	HQC
1	-138.28636	10.836027	11.219978	10.950196	10.950196
2	-126.31180	0.00008	10.245319 *	10.821246 *	10.416572*
3	-124.20233	0.37719	10.385358	11.153261	10.613696
4	-123.02436	0.67060	10.594397	11.55476	10.879819
5	-120.63930	0.31171	10.714022	11.865877	11.056529
6	-119.75781	0.77925	10.945023	12.288854	11.344614
7	-115.77893	0.09314	10.946587	12.482394	11.406263
8	-109.58153	0.01464	10.783817	12.511600	11.297577

* Refers to optimal lag length.

According to both AIC and HQC criterias the optimal lag length is found to be two.

The dynamic model expressed earlier in equation (3) and (4) is estimated by (OLS) with two lags structure. First the model is estimated using domestic price of imported oil which reflects the cost of crude oil as set by the government. Second, the model is re-estimated using international price of imported oil which reflects the free market price. The results of estimating the model using the domestic price of imported crude oil is shown in Table (4):

Table (4): OLS estimates of the effects of domestic crude oil price on real growth and inflation.

Real Economic Growth				Inflation Rate			
Variable	Coefficient	S. E	P-Value	Variable	oefficient	S. E	P - Value
Constant	0.031	0.015	0.05	Constant	0.027	.013	0.04
gdoilp	0.002	0.02	0.93	gdoilp	-0.011	0.016	0.5
gdoilp-1	-0.004	0.02	0.85	gdoilp-1	0.001	0.015	0.93
gdoilp-2	-0.010	0.02	0.67	gdoilp-2	-0.012	0.016	0.44
grgdp-1	0.301	0.19	0.13	gcpi-1	0.716	0.193	0.001
grgdp-2	0.039	0 .20	0.84	gcpi-2	-0.149	0.180	0.42
R^2 =11%		D – W = 1.8		R^2 = 44%		D- W = 1.94	

As shown in Table (4), development in the domestic price of imported crude oil has failed to explain significantly neither the real growth rate nor the inflation rate. This result may suggest that domestic price of imported oil is highly distorted and therefore does not reflect indeed the real opportunity cost of oil usage to the domestic economy during most of the study period.

To further investigate the impact of oil price on the macroeconomy, the model was re-estimated using the same specification, but replacing domestic price of imported crude oil by the international price of crude oil that may be a better indicators for the real opportunity cost of crude oil usage to the domestic economy. The result of estimating the model is shown in Table (5).

Table (5): OLS estimates of the effects of international oil price on real growth and inflation

Real Economic Growth				Inflation Rate			
Variable	Coefficient	S. E	P- Value	Variable	Coefficient	S. E	P -Value
Constant	0.023	0. 01	0.13	Constant	0.02	0.01	0.08
gwoilp	-0.08	0.01	0.06*	gwoilp	0 .075	0.027	0.01**
gwoilp-1	-0.003	0.04	0.95	gwoilp-1	0 .022	0.029	0.45
gwoilp-2	-0.058	0.04	0.11	gwoilp-2	0.034	0.026	0.19
grgdp-1	0.314	0 .19	0.10	gcpi-1	0.515	0.19	0.01
grgdp-2	0.183	0.18	0.32	gcpi-2	-0.062	0.17	0.72
R^2 =0.32		D – W = 2.08		R^2 = 0.57		D- W = 1.65	

Significant at better than 10% level.

****Significant at better than 5% level.***

Surprisingly, international price of imported oil has affected significantly both real economic activity and inflation in Jordan. The coefficient of the current international oil price in the growth equation is statistically significant at about 6% significant level as indicate by the P – value (0.065). However, the size of the coefficient is small (-0.08), and the negative sign means that doubling (increasing by 100%) international crude oil price reduces the rate of growth in the real GDP by only 8% during the first year. This result is very close to Kliesen's findings on the effect of oil price on the real growth of U.S. economy. In his paper the coefficient of the cumulative effect of oil price on the growth of real GDP was estimated to be -0.09% [4].

[4] - Kevin L. Kliesen (2008). Oil and the U.S. Macroeconomy: An Update and a Simple Forecasting Exercise. A working paper, Federal Reserve Bank of St. Louis. , p. 14.

The effect on inflation is even more significant at (1% significant level) but almost with the same magnitude (0.075) in absolute term. The positive sign means that doubling the price of international crude oil increases the domestic rate of inflation by only 7.5% at the first year. These results imply that even the short run effects of oil price on economic growth and inflation are of modest size.

However, a close investigation of the two key macroeconomic variables, real growth and inflation, indicates to the existence of some up- normal jumps in their behavior. Specifically, real GDP growth has decreased sharply by 19.6% in 1989. This can be explained by the economic crises that stormed the economy in (1988-1989) and the resulting sharp depreciation of Jordanian |Dinar (the Dinar lost about half of its value against U.S Dollar). Another large but positive jump in the growth of real GDP occurred in 1992 (16% increase) which may be the result of almost free crude oil deal granted to Jordan from Iraq starting 1992 after the set out of the first Gulf war. As domestic inflation concerned, the highest jump occurred in 1989 (22.8%) following the economic and financial crises indicated above. To account for the impact of such shocks on the real growth and inflation, the models were re-estimated using additional indicator (dummy) variables D89 and D92 accounting for the two shocks (taking the value of 1 in the jump year and zero otherwise). The result of estimation is shown in the Table (6).

Table (6): OLS estimates of the effects domestic oil price on the growth of real GDP and inflation.

Real economic growth				Inflation rate			
Variable	coefficient	S.E	P-value	Variable	coefficient	S.E	P-value
Constant	0.038	0.11	0.001	Constant	0.01	0.008	0.07
gdoilp	0.0009	0.015	0.95	gdoilp	-0.01	0.01	0.23
gdoilp-1	-0.008	0.015	0.59	gdoilp-1	0.002	0.01	0.82
gdoilp-2	-0.01	0.015	0.34	gdoilp-2	-0.006	0.01	0.56
d89	-0.23	0.034	0.00	d89	0.176	0.03	0.000
d 92	0.13	0.04	0.006	gcpi-1	0.56	0.13	0.000
grgdp-1	0.18	0.13	0.17	gcpi-2	0.07	0.07	0.58
grgdp-2	0.11	0.127	0.4				
R2 =0.67		Durbins'h= 0.83		R2 =0.77		Durbins'h= -0.1	

As before development in domestic oil price has failed to explain significantly, neither domestic growth rate nor the inflation rate. However, the introduction of the dummy variables in the two equations has increased the explanatory power of the two models significantly as indicated by the values of R-square, (0.67 and 0.77) for the growth and inflation rates, respectively. As expected, both dummy variables turned out to be highly significant (at better than 1% significant level), and carry the correct expected sign. The negative sign of the dummy in the growth equation indicates to the sharp negative impact of the financial crises on the growth of real GDP (decreased by 23%). In contrast, the free crude oil deal from Iraq increased significantly the real growth rate by about 13%. The effect of 1989 crises on domestic inflation was also substantial (increased by about 18%).

4.5 Asymmetry of oil price effect

As noted earlier in this paper many researchers found the effects of oil price increases on economic activity and inflation different than the effects of oil price decreases (asymmetric). To investigate this possibility the model was re-estimated using the derived oil prices illustrated earlier in equations (5) and (6). However, the result of estimation has failed to produce any sensible and significant effect using both domestic and international oil prices.

5. Conclusion

The analysis in this paper has used Hamilton's augmented model to evaluate the effects of higher oil prices on real GDP growth and inflation. The recent fluctuations in international crude oil price combined with the policy of gradually eliminating domestic oil price support, raised the expectations of a possible harmful affect on the domestic macroeconomy. However, our empirical analysis based on annual sample covering the period 1973-2007, provide very little support to such expectations. Stationarity and cointegration analysis indicates clearly to the absence of any stable long run relationship between domestic crude oil price and both economic growth and inflation. Furthermore, the estimated dynamic econometric models have failed to detect any significant short run affect of domestic crude oil price on inflation and growth. However, when the model re-estimated using international crude oil prices instead, a significant affect with the correct expected signs are detected on both domestic inflation and the rate of real economic growth. This finding of the paper, is in line Hamilton's and Kliesen 's result; that is oil matters in the short run. This result also lends support to the importance of international rather than domestic price of oil development to the Jordanian macroeconomic performance.

The econometric analysis detected a sharp impact of the unexpected external shocks of 1989 and 1992 on both real activity and inflation of the domestic economy.

The asymmetric price effect analysis when applied to the case of Jordan did not produce any plausible and significant results. This may be due to the failure to capture a shorter time fluctuations built into shorter period data that was not available for this study. Repeating the analysis using quarterly data would be a real addition in this front of research.

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