

Oil Price Rise and the Great Recession of 2008

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The financial crises of 2007-2008, caused wide-spread falling output and unemployment, in the affected countries and also globally. The severity of the recession was such that it was called the “Great Recession”. As a result of an increase in demand from China and India, at the same time, oil prices rose significantly. The empirical results from this study show that oil price changes negatively affected global growth rate in the 1970s but not in the 1990s and 2000s. These results suggest that the Great Recession in 2008 that initiated by the financial crises, was independent of a significant rise in oil prices.

Keywords: financial crises, oil price, global recession, impulse response function, demand and supply for oil, oil price shock

JEL Classification: E32, E44, F41, G01

1. Introduction

The global financial crises of 2007-2008, caused wide-spread falling output and unemployment, in the affected countries and also globally. The depth and the severity of the recession were such that some researchers have named it the “Great Recession” (GR), after the Great Depression of 1930s.

Several studies such as Paulson (2009) and Romer (2009) argued that lower interest rates in the United States caused significant expansion of mortgage demand coupled with reduction of loan standard and financial innovations led to a dramatic explosion of mortgage credit. According to Diamond and Ragharam (2009) there is a general agreement that the financial crisis was initiated by the US financial system allocation of financial resources to the real estate sector by creating new “exotic” financial instruments. These instruments ended into the balance sheets of commercial and investment banks and were financed by financial institutions issuing short term liabilities.

The high rates of unemployment caused by the Great Recession have remained persistently high in recent periods.

At the same time, oil prices rose significantly mainly as a result of the increase in demand from China and India. The price of crude reached \$US145 in July 2008. Several studies such as Hamilton (2009) argued that sharp rise in oil prices contributed to the Great Recession. However, Killian (2009) disagrees and suggests that the effect of oil price rise on the global economy that was observed in the early 1970s is no longer present. Accordingly, the GR is independent of the sharp rise in oil prices in 2008.

The purpose of this paper is to examine the extent to which oil price rise in 2008 affected the world economy. Some preliminary discussion regarding oil price changes and the global economic growth is offered

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Article History:

Received 19 January 2016 | Accepted 6 February 2017 | Available Online 16 February 2017

Cite Reference:

Monadjemi, M.S., 2017. Oil Price Rise and the Great Recession of 2008. *Expert Journal of Economics*, 5(1), pp. 14-19.

in section 2. The review of literature is presented in Section 3. The model of oil prices and the global economy is developed in Section 4. The empirical results from the study are discussed in Section 5. Summary and concluding remarks are offered in section 6.

2. Oil Prices and Global Growth Rates

The annual growth of world output, OECD total output, US output and the percentage change in oil prices since 1972 are presented in Figure 1. A broad long term view indicates that growth rates series move closely together. However, the oil price change doesn't seem to move opposite to the growth rates. In particular, the Great Recession of 2008 doesn't appear to be associated with the sharp rise in oil prices in mid 2008. On the contrary, sharp rises in oil price appear before and after the GR.

The coefficients of correlation between oil price changes and selected output growth rates are presented in Table 1.

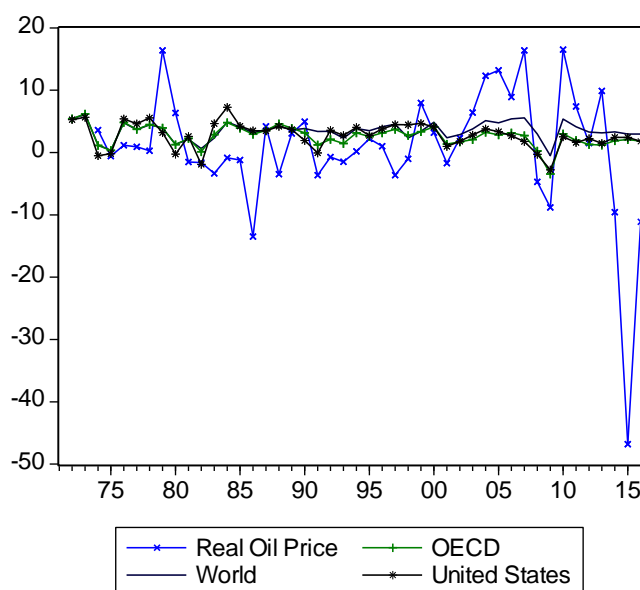


Figure 1. Oil Price and Selected Output Growth Rates

Table 1. Coefficients of Correlation Growth of Oil Price and Selected Output Growth Rates

Growth Rates	1972 - 1978	1980 – 1990	1991 – 2007	2007 – 2015
United States	-0.3	-0.26	0.19	0.03
OECD	-0.11	-0.07	0.28	0.17
World	-0.1	-0.04	0.50	0.47

In the above table growth rates are averages over selected periods.

In Table 1 preliminary results show opposite movement of oil prices and growth rates during the period early 1970s to the end of 1990. However, after 1990s oil prices changes don't appear to adversely affect growth rates. In fact there seems to a strong positive correlation between oil price fluctuations and world's growth rate during 2007 – 20015 which includes the period of GR.

3. Review of Literature

Hamilton (2009) argued that “Whatever the cause, the oil price spike of 2007-2008 was by some measures the biggest in post-war, and the U.S. recession that began in December of 2007 was, likewise, the worst in post-war experience, though of course the financial crises rather than any oil-related disruptions were the leading contributing factor in that downturn contributed to the Great Recession”. Furthermore, Hamilton (2009) maintains that “had there been no increase in oil prices between 2007:Q3 and 2008:Q2, the US economy would not have been in a recession over the period 2007:Q4 through 2008:Q3”. However, Killian (2009) disagrees and argues that the effect of oil price rise on the global economy that was observed in the early 1970s is no longer present. Accordingly the Great Recession would have occurred even if oil prices remained unchanged during 2007 to 2008.

Hooker (1996) agrees with Killian (2009) and suggests that strong evidence shows that oil prices after 1973 do not Granger cause many U.S. macroeconomic variables. A number of potential explanations indicate that a linear symmetric relationship between oil price changes and macroeconomic variables no longer exists. Oil price increases have a different impact than oil price declines. Hooker (1996) maintains that “The OPEC price increases do appear to have had significant impacts, while the effects of the price declines of the 1980s are smaller and harder to characterize.” The empirical results of Monadjemi (2016) showed the significant impact of real oil price fluctuations on global output. The study argues that sharp rises in oil prices in 2008 and recent falls in price of oil are supportive of the influence of world demand on energy prices. Similar to Hooker (1996), Monadjemi (2016) concluded that since early 1970s the influence of political development in Middle East on oil prices is no longer supported by data.

4. Theoretical Model

The theoretical models of oil price changes and output (global or US) generally start with a demand and supply for oil, including output, price of oil, price of oil substitutes and real interest rate, see Monadjemi (2016), Killard (2009) and Hamilton (2009). The problem of this kind of approach is the two ways cause and effect. That is, oil price changes affect output and also global output changes influence oil prices. To avoid the causality problem, researchers have employed VAR method of estimation. In a VAR model, every variable is a function of its own lag and lagged values of other variables in the model. In this procedure, all the independent variables are exogenous. The coefficients of independent variables in the VAR are not meaningful. However, Impulse Response Functions (IRF) and Variance Decompositions (VD) derived from the model can convey useful information. To this end IRFs derived from a VAR model will be reported and analysed.

The following VAR model is proposed for investigating the effects of oil price changes on the global output during the GR.

$$P = f(y_1, y_2, r) \tag{1}$$

In equation 1, P , y_1 , y_2 and r are real oil prices, global output, OECD output and real rate of interest respectively.

5. Empirical Results

The oil price series in this study are crude oil prices: west Texas intermediate, UD dollar per barrel collected from *Economic Research*, Federal Bank of St. Louis. All the other data were collected from the OECD publications’ *Main Economic Indicators*. For growth rates quarterly data were converted into monthly series using Eview statistical software. Two IRFs derived from the VAR model in equation 1 are presented in Figures 2, 3, 4 and 5. In IRFs using Cholesky assumption, those variables that appear earlier influence other variables in the model but not vice versa. Accordingly, in the order of three variables (real oil price, a growth rate and real interest rate) real oil price preceded the other three variables. The results are for two separate periods of 1973 – 1978 and 2006 – 2014.

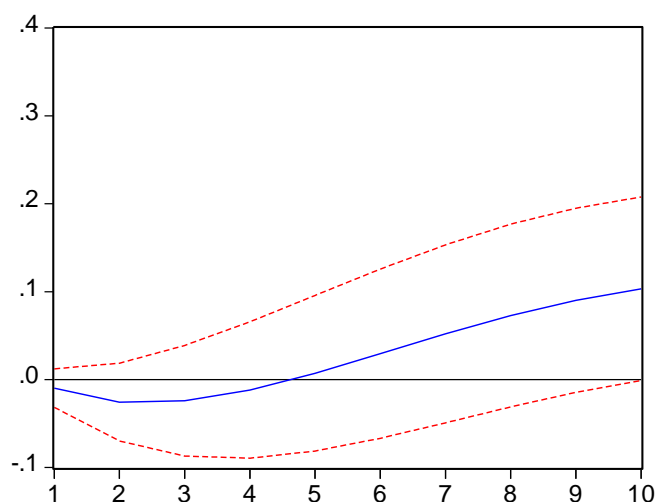


Figure 2. Response of World Growth to Oil Price Changes 1972-1978

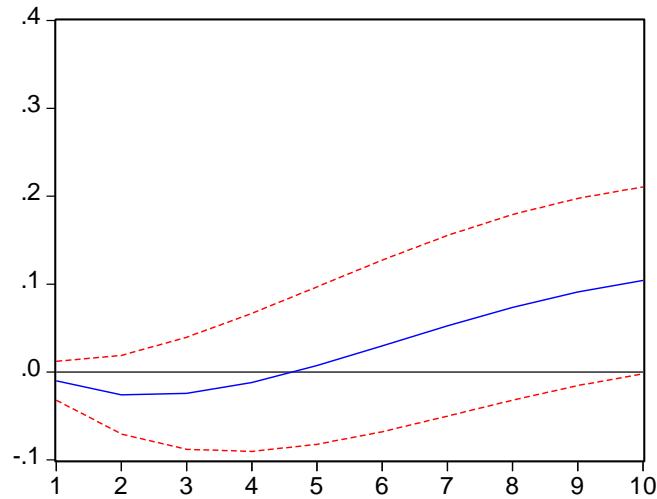


Figure 3. Response of OECD Growth to Oil Price Changes 1972-1978

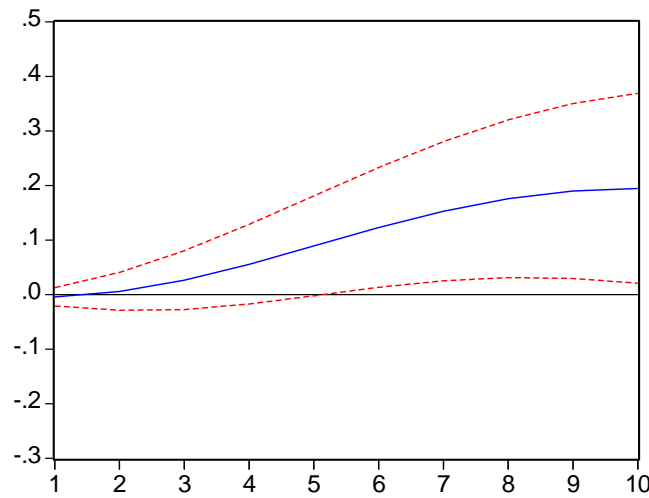


Figure 4. Response of World Growth to Oil Price Changes 2006-2014

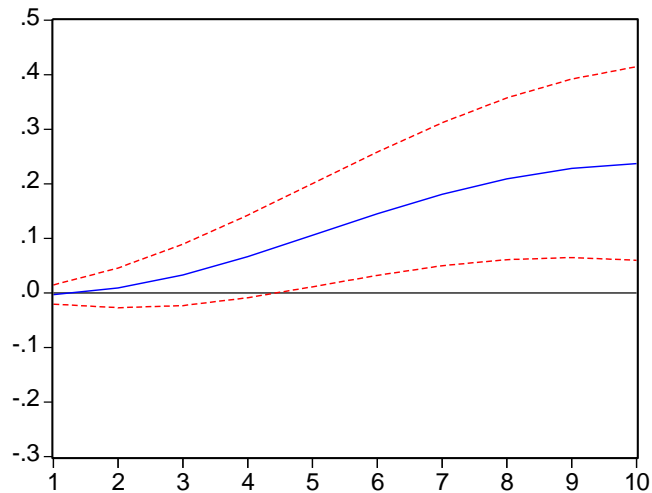


Figure 5. Response of OECD Growth to Oil Price Changes 2006-2014

In Figures 3 and 4 during the earlier period, the effects of changes in oil prices on global and OECD outputs are negative. In the latter period the effects of oil price changes are positive. These results are consistent with the proposition that changes in oil prices in recent periods, contrary to their effects in the 1970s, no longer influence global output adversely. The results of IRFs are supportive of the earlier results presented by the coefficients of correlation in Table 1.

Further evidence on changed relationship between output growth and oil price changes are reported by the following two stage least square regression (TSLS) results.

The regression results reported in equations Tables 2 and 3 are based on equation 1.

Table 2. Regression Results 1972 - 1980

Dependent Variable	Constant	Real interest rate	% change in real oil price
World growth rate	6.05	1.3 (2.62)	-0.49 (-3.36)
OECD growth rate	6.02	1.34 (0.52)	-0.51 (-3.36)
US growth rate	9.07	-0.01 (-1.17)	-0.12 (-2.12)

In TSLS lagged values of dependent variables were used as instrumental variables. In the above regression real interest rate is based on US 3 months treasury interest rate. Values in brackets are “t” statistics.

Table 3. Regression Results 2006 - 2014

Dependent Variable	Constant	Real interest rate	% change in real oil price
World growth rate	-5.69	0.84 (3.08)	0.18 (0.64)
OECD growth rate	-7.07	0.80 (1.15)	0.23 (0.32)
US growth rate	8.84	-0.02 (-1.82)	0.23 (4.07)

In TSLS lagged values of dependent variables were used as instrumental variables. In the above regression real interest rate is based on US 3 months treasury interest rate. Values in brackets are “t” statistics.

Significant and negative coefficients of oil price changes in Table 2 indicate that oil price changes adversely affected global output in the 1970s. However, In Table 3 coefficients of oil price changes are positive and insignificant suggesting that in recent period oil prices do not affect world output significantly. These results are consistent with Killard (2009) and are in contrast with Hamilton (2009). Hamilton (2009) argued that significant rise in oil prices in 2008 contributed to the GR of 2008 – 2009. However, the empirical results of this study show that oil price change in 2008 had no adverse effect of global output during the period 2006 to 2014.

Monadjemi and Lodewijks (2012) also found that, aside from the early 1970s OPEC pushed oil price rise, little support for the prolonged effect of political developments on oil prices. This study also maintained that the 2008 rise in oil prices had no effect on the US economy. The empirical results of this article showed that the growth of global output is the most important determinant of oil prices.

6. Summary and Concluding Remarks

Several studies argued that significant rise in oil price in 2008 contributed to the great recession that occurred in 2008 – 2009. However, other studies provided evidence that the adverse effects of oil price change on global output that occurred in the 1970s is no longer present. The empirical results of this study based on Impulse response function and two stage-least square shows that oil price changes negatively affected global growth rate in the 1970s but not in the 1990s and 2000s. These results suggest that the Great Recession in 2008 that initiated by the financial crises, was independent of a significant rise in oil prices.

The future research in this area should be directed towards the extent to which future oil price shocks may contribute to global instability.

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