OIL DEPENDENCE AND MACROECONOMICS VARIABLES: EVIDENCE FROM OPEC AND NON-OPEC COUNTRIES

Azadeh Pazouki, Department of Accounting, Finance and Economics, Bournemouth University, Executive Business Centre, 89 Holdenhurst Road, BH8 8EB, Bournemouth, UK, Phone +44 7376371620, E-mail: apazouki@bournemouth.ac.uk

Mojtaba Karimi, Faculty of Management and Economics, The Islamic Azad University, Science and Research Branch, Phone +989128393376, E-mail: tabakarimi62@gmail.com

George Filis, Department of Accounting, Finance and Economics, Bournemouth University, Executive Business Centre, 89 Holdenhurst Road, BH8 8EB, Bournemouth, UK,

Jens Holscher, Department of Accounting, Finance and Economics, Bournemouth University, Executive Business Centre, 89 Holdenhurst Road, BH8 8EB, Bournemouth, UK,

Overview

This study examines the dynamic relationship among oil dependence volatility and key macroeconomic variables in the OPEC and non-OPEC countries over the period 1983- 2015. Previous studies focused on the effects of oil price, oil price shocks and oil revenues on oil importing economies (See, Hamilton 1983, 1996, 2001, 2003; Lee et al. 1995; Jimenez-Rodriguez and Sanchez 2005, 2008, 2012; Cashin et al. 2014, among others). Few studies have studied the effects of oil price volatility, oil rent volatility and oil revenue volatility on key macroeconomics variables for oil exporting countries. Even more, the literature is relatively silent on the effects of oil volatility on government expenditure (Rutten 2001; Selmi et al. 2012; D.E and Osaze 2013; Alley 2016). This study fills this void focusing on a group of oil-exporting countries, which is comprised by both OPEC and non-OPEC countries, and examining whether oil price volatility, oil rent volatility and oil revenue volatility exercise an impact on the fiscal side of these economies. To achieve this aim a Panel Vector Autoregressive (PVAR) framework is employed. The findings for both OPEC and non-OPEC countries indicate that oil price volatility tends to have a positive effect on exchange rate, government expenditure and inflation in the long-run, whereas the economic growth is responding negatively to the same shock. Additionally, the results suggest that exchange rate, GDP growth, government expenditure and inflation are reacting negatively to oil revenue volatility shocks in OPEC economies. By contrast, economic growth and government expenditure of non-OPEC countries respond positively to oil revenue volatility shocks. As a result, evidence from the OPEC countries show that a significant impact of the oil rent volatility shocks on exchange rate and inflation (positive) and GDP and government expenditure (negative). Furthermore, oil rent volatility shocks exercise positive effects on exchange rate, government expenditure and inflation; whereas we do not find evidence that GDP growth responds to oil rent volatility shocks in non-OPEC economies.

Methods

This research uses data from both OPEC and non-OPEC economies for the period 1983–2015.The PVAR methodology we employ, originally developed by Holtz-Eakin et al. (1988), extends the traditional VAR model introduced by Sims (1980), which treats all the variables in the system as endogenous, with the panel-data approach, which allows for unobserved individual heterogeneity. In its general form, the PVAR model can be expressed as follows:

$$Y_{it} = A_0 + A_1 Y_{it-1} + A_2 Y_{it-2} + \cdots + A_j Y_{it-j} + BX_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (1)$$

where Y_{it} is a vector of our dependent/endogenous variables, namely real per capita economic growth, exchange rate, inflation and government expenditure and oil dependence (proxied by either oil price volatility, oil rent volatility % of GDP or oil revenue volatility per capita). The autoregressive structure allows all endogenous variables to enter the model with a number of j lags. X_{it} is a vector of the exogenous variables (commonly used in endogenous growth models). μ_i accounts for the unobservable country characteristics (country fixed-effects) and λ_t accounts for any global shocks that may affect all countries in the same way (time fixed-effects). Finally, ε_{it} denotes the error term.

In order to get a more complete picture of the dynamic interactions between oil dependence and macroeconomics variables, we perform a panel generalised impulse-response function (PGIRF) analysis, in order to evaluate the speed of adjustments to shocks originating in our aforementioned variables. The panel

generalised impulse response function analysis applied, which is based on Koop et al. (1996) and Pesaran and Shin (1998), provides a natural solution when theory does not provide a clear cut guidance on the ordering of the aforementioned endogenous variables, as in our case. Besides, the PGIRFs are also decomposed into the responses of shocks to specific variables by taking out from the PGIRFs the effects of shocks to all other variables (Koop et al., 1996), which gives us further insights into the mechanisms at work.

Results

The findings of this study reveal the following empirical regularities. First, oil price volatility shocks have a major impact on the exchange rate, government expenditure and inflation in the long-run although the economic growth is responding negatively to the same shock in OPEC countries. The latter finding is also in line with Selmi et al. (2012). Additionally, the generalised impulse-response for non-OPEC countries confirms that there is a significant positive effect of exchange rate, government expenditure and inflation to oil price volatility shock and it has negative effect on GDP growth as well. Such findings are in line with those by Chemingui and Hajeeh (2011) and Rutten (2001) in oil exporting countries. However, since the impact of oil volatilities on inflation rate is very large, one can conclude that oil still has a very direct impact on these both OPEC and non-OPEC economies. In fact, oil price volatility has a negative impact on economic growth at oil-exporting OPEC countries and non-OPEC economies. These findings corroborate those by El-Anshasy et al. (2015) and D.E and Osaze (2013), among others.

Based on a panel VAR model along with PGIRFs, evidence from the OPEC countries show that a significant impact of the oil rent volatility shocks on exchange rate and inflation (positive) and GDP and government expenditure (negative). Furthermore, oil rent volatility shocks exercise positive effects on exchange rate, government expenditure and inflation; whereas we do not find evidence that GDP growth responds to oil rent volatility shocks in non-OPEC economies.

Overall, we find evidence that exchange rate, GDP growth, government expenditure and inflation are reacting negatively to oil revenue volatility shocks in OPEC economies. As far as a non-OPEC country is concerned, oil revenue volatility shocks have a positive effect on both economic growth and government expenditure. However, exchange rate and inflation react negatively to the shock of oil revenue volatility.

Conclusions

In this study we shed more light to the contested literature on the effects of oil price volatility, oil rent volatility and oil revenue volatility on key macroeconomics indicators for oil exporting countries, by estimating a PVAR approach along with PGIRFs to data on oil dependence volatility, economic growth, exchange rate, inflation and government expenditure variables in the OPEC and non-OPEC countries, from 1983 to 2015.

The results of our emprical analysis reveal that oil price volatility has a direct effect on macroeconomic variables in OPEC countries and the volatility of oil price affects economic activity indirectly on non-OPEC countries. Moreover, our results distinguish between responses of macroeconomic variables of OPEC and non-OPEC economies. In particular, it is evident that the magnitude of key macroeconomic responses to their variables in OPEC economies although there is not vital effect of macroeconomic changes on non-OPEC economies.

According to our Pannel VAR model, oil price volatility tends to have a positive effect on exchange rate, government expenditure and inflation in the long-run, whereas the economic growth reacts negatively to the same shock in both OPEC and non-OPEC countries. Consequently, the outcomes recommend that exchange rate, GDP growth, government expenditure and inflation are responding negatively to oil revenue volatility shocks in OPEC economies. By contrast, economic growth and government expenditure of non-OPEC countries respond positively to oil revenue volatility shocks. Therefore, evidence from OPEC economies suggest that an important impact of the oil rent volatility shocks on exchange rate and inflation (positive) and GDP and government expenditure (negative). Also, oil rent volatility shocks exercise positive effects on exchange rate, government expenditure and inflation; whereas we do not find evidence that GDP growth responds to oil rent volatility shocks in non-OPEC economies.

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