

Oil Dependence Volatility and Disaggregated Government Expenditure

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Overview

This study examines the the direct and indirect effect of the oil dependence volatility to the disaggregated government spending. In this study, we analyse the dynamic effects of oil price volatility, oil rent volatility and oil revenue volatility on different categories of the OPEC and non-OPEC governments expenditures from 1983 to 2015, using panel Vector Auto-Regressive model along with panel impulse response functions. To capture the full dynamics of the aforementioned relationship in a PVAR setting, we also consider core macro-economic variables, namely the GDP per capita growth rate, inflation rate and exchange rates. It is worth retiring that very little work has been done with respect to the effects of oil uncertainty on disaggregated government spending consists of education spending, military spending, and health spending via inflation, exchange rates, economic growth per capita channels for oil exporting countries. To date, there is only one study that examines the effect of oil revenue shocks on the different categories of the Iranian government expenditures (Farzanegan 2011). To our knowledge, this is the first research that adopts a panel VAR approach and panel impulse response analysis to study the dynamic impact of oil price volatility, rent volatility and revenue volatility on disaggregated government spending by taking into account the endogeneity of these variables.

The results suggest that OPEC and non-OPEC economies are price setters to the effect of oil price volatility on the education spending since the high skill level needed by oil-rich countries in their leading sector can be bought or imported, their governments do not face the same urgent educational imperatives and may underrate the need for strong educational policies. Moreover, there is only direct effect of the oil price volatility on military spending at OPEC countries, whereas there is a direct and indirect effect of oil price volatility on military spending at non-OPEC countries. In fact, cutting military budgets and possibly cutting aid indicates how low and volatile oil prices are affecting the foreign and security policies of the OPEC countries. However, oil price volatility exercises a direct effect to health spending in OPEC countries, whereas there is only an indirect evidence of the effect of oil price volatility on health spending via exchange rate, inflation and economic growth in non-OPEC countries. This may be due to the fact that OPEC countries are dependent on oil, the less they spend on health as a percentage of GDP.

The policy implications of these results are straightforward. A policy implication of our findings suggest that while OPEC governments plan their spending, they mostly try to take the fields that will contribute to the development of countries into consideration. However due to the unrest faced in countries close to Mediterranean region, importance of country security increases. OPEC governments separate big shares to military spending from their budgets. This will force them to separate less resource to investments in education, health and infrastructure fields which will contribute to country development. This will slow down economic growth. In production of military products more R&D activities and resources are required. Also, attention must be given to the real sector of the economy in order to broaden the revenue base of the government and enhance education spending. The study therefore suggested that government should increase spending on capital projects as well as intensify efforts at increasing output in the oil sub-sector in order to boost economic growth in OPEC economies.

Methods

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:

$$Y_{it} = A_0 + A_1Y_{it-1} + A_2Y_{it-2} + \dots + A_jY_{it-j} + BX_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (1)$$

where Y_{it} is a 1×5 vector of our key dependent/endogenous variables, namely, oil dependence volatility proxies (OilV, OilrevenueV and OilrentV), real GDP per capita (in 2010 US\$) (R_GDP), nominal exchange rate (LCU) per US\$ (R_EXCH), inflation consumer prices (INF) and general government spending and also the sub-categories of government spending comprises of education spending, military spending, and health spending (SPEND). The autoregressive structure allows all endogenous variables to enter the model with a number of j lags. The optimal lag-length is determined by the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC). 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). For example, time fixed effects capture common factors such as key global risk factors. To deal with the time fixed effects we time difference all the variables prior to inclusion in the model, which is equivalent to putting time dummies in the system. Finally, ε_{it} denotes the error term (Antonakakis et al. 2017a; Antonakakis et al. 2017b; Antonakakis et al. 2017c).

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.

Results

The results of our empirical analysis reveal the following regularities. First, based on the full sample estimation, we find that oil price volatility do not exert any significant direct or indirect effect on education spending of the OPEC countries. However, the findings suggest that oil price volatility effects on military and health spending in the OPEC countries, directly. Second, the main results show that oil revenue volatility do not impact any significant direct or indirect effect on education and health spending in OPEC countries. Conversely, a positive shock of oil revenue volatility effects on military spending of the OPEC countries, directly. Third, the empirical findings of this study suggest that oil rent volatility does not show significant reaction to education spending in OPEC countries, whereas a positive shock to oil rent volatility effects on military and health spending directly and indirectly, respectively. The empirical findings of non-OPEC countries based on the full sample estimation. First, we find that oil price volatility do not exert any significant direct or indirect effect on education spending of the non-OPEC countries. Nevertheless, there is a direct and indirect effect of oil price volatility on military spending via economic growth channel in non-OPEC countries. We also suggest significant evidence that there is an indirect effect of oil price volatility on health spending via economic growth, exchange rate and inflation in non-OPEC countries. Second, there is a direct effect of oil revenue volatility on education spending indirect evidence of oil revenue volatility on education spending in non-OPEC countries. Moreover, we cannot report any statistically significant direct or indirect evidence of oil revenue volatility on military spending in non-OPEC countries. Besides, there is only an indirect effect of oil revenue volatility on health spending via economic growth in non-OPEC countries. Third, there is a direct and indirect effect of oil rent volatility on education and health spending in non- OPEC countries. Though, the indirect findings indicate that a positive shock of oil rent volatility effects on military spending via economic growth. The results of robustness tests show that there is some evidence of asymmetric effects of oil price, oil revenue and oil rent volatility on disaggregated government spending in OPEC and non-OPEC countries.

Conclusions

In this study we investigated the direct and indirect impacts of oil dependence volatility on disaggregated government spending in OPEC and non-OPEC countries. The sample period runs from 1983 to 2015 and a panel Vector Auto-Regressive (PVAR) model along with panel impulse response functions are used in this research.

The results of our empirical analysis reveal that oil price volatility do not exert any significant effect on education spending of the OPEC and non-OPEC countries. However, oil price volatility effects on military and health spending in the OPEC and non-OPEC countries. The results show that oil revenue volatility do not impact any significant effect on education and health spending in OPEC countries. Whereas, there is an effect of oil revenue volatility on education spending in non-OPEC countries. Conversely, a positive shock of oil revenue volatility effects on military spending of the OPEC countries while, we cannot report any statistically significant direct or indirect evidence of oil revenue volatility on military spending in non-OPEC countries. The empirical findings of

this study suggest that oil rent volatility does not show significant reaction to education spending in OPEC countries, whereas a positive shock to oil rent volatility effects on military and health spending. There is an effect of oil rent volatility on education, health, and military spending in non- OPEC countries.

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