

Rafiq, Shuddhasattwa (2009) *Oil consumption, pollutant emission, oil price volatility and economic activities in selected Asian developing economies*. [Thesis (PhD/Research), Curtin University of Technology] (Unpublished)

Abstract

It is now well established in the literature that oil consumption, oil price shocks, and oil price volatility may impact the economic activities negatively. Studies identifying the relationship between energy and/or oil consumption and output primarily take two different approaches. One approach includes energy or oil consumption in addition to output, labour, and capital and the other approach takes energy and/or oil, output and prices. Based on any of these two models most of the previous studies devised energy conservation policies for different economies. However, none of the previous studies considered both of these models jointly to make policy implications and there are not much studies investigating oil consumption-output relationship in a multivariate model in the context of developing economies. Furthermore, one of the important variables in making any conservation policies, carbon emission, kept out of their models.

Similarly, there has been a large body of literature investigating the impact of oil price shocks in different economies. Nevertheless, studies analysing the impact of oil price volatility on economic activities are very limited. More importantly, studies analysing the impact of oil price volatility in developing economies are almost non-existent. In the light of increasing demand for oil from the developing nations, comprehensive studies on identifying the impact of oil consumption, oil prices, and oil price volatility on developing economies is warranted.

Hence, in this thesis, the contribution of oil in economic development is investigated with the help of two different models. The first model, termed as *production-side approach*, analyses the contribution of oil consumption in economic activities within the traditional production function framework. The second model, termed as *demand-side approach*, analyses the contribution of energy consumption in economic activities in two stages. In the first stage, oil consumption demand is analysed by a tri-variate model having oil prices as the third variable in addition to oil consumption and GDP. In the second stage, carbon emission output is determined in a tri-variate model with carbon emission as the third variable along with oil

consumption and output. Furthermore, this thesis performs a unique task of analysing the impact of volatility on world crude oil prices on the economic activities of six Asian developing economies. The countries selected for this purpose are, China, India, Indonesia, Malaysia, Philippines and Thailand.

With respect to the oil consumption-output relationship, despite dissimilarities in results for causality relationships between oil consumption and output in three different models for different countries, one common premise has emerged. Except for the Philippines, all other countries are found to be oil dependent either from *supply-side* or from *demand-side* or from both of the sides. Which implies that for all the considered developing economies, except for the Philippines, oil conservation policies seems to be harder to implement as that may retard their economic growth. In addition to that, one very important findings of the empirical analysis based on the equation regarding pollutant emission output is that for all the countries, except for Malaysia, output Granger causes pollutant emission (CO₂) both in the short run and long run.

With respect to the impact of oil price volatility on economies, this study finds that oil price volatility seems to impact all the economies in the short run. According to the results, oil price volatility affect GDP growth in China and Malaysia, GDP growth and inflation in India and Indonesia, while in the Philippines volatility in oil prices impact inflation. However, in Thailand the impact channels are different for pre- and post-Asian financial crisis period. For Thailand, it can be inferred that oil price volatility impacts output growth for the whole period; however, after the Asian financial crisis the impact seems to disappear.

Based on a comprehensive study within three different theoretical frameworks the policy implications regarding oil consumption-output relationship can be devised as follows. For the Philippines, where unidirectional causality from income to oil consumption is found, she may contribute to the fight against global warming directly implementing energy conservation measures. The direction of causality indicates that the oil conservation policies can be initiated with little or no effects on economic growth. For rest of the oil dependent countries where either bi-directional causality or unidirectional causality from oil consumption to output is found in any of the models, since oil is a critical determinant of economic growth in these

countries, its shortage may retard economic growth. Nevertheless, all of these countries may initiate environmental policies aimed at decreasing energy intensity, increasing energy efficiency, and developing a market for emission trading. These countries can invest in research and development to innovate technology that makes alternative energy sources more feasible, thus mitigating pressure in environment.

According to the impact analysis of oil price volatility on economic activities, the policy implications are as follows. In Thailand, the results after the financial crisis show that adverse effect of oil price volatility has been mitigated to some extent. It seems that oil subsidization of the Thai government by introduction of the oil fund and the flexible exchange rate regime plays a significant role in improving economic performance by lessening the adverse effect of oil price volatility on macroeconomic indicators. For all other countries, the impact of oil price volatility is also of short term. Hence, the short-term impact of oil price volatility on the concerned economies may be excreted though the uncertainty born by the fluctuations in the crude oil price in the world market. As far as the impact on GDP growth is concerned, the short-run impact may also be transmitted through the investment uncertainties resulted from increased volatility in oil prices. However, from the Thai experience it can be inferred that flexible exchange rate regime insulate the economy in the short run from any adverse impact from oil price volatility on growth. Hence, it can be suggested that good subsidization policy with considerable knowledge on international currency market, both spot and future, may shield the economies from adverse consequences due to the fluctuation in oil prices in the short run. Nevertheless, this may affect other sectors of the economy like, inflation, interest rate, government budget deficit, etc.

Key Words: Developing countries, oil conservation, oil price volatility, pollutant emission, cointegration, error correction model, Granger causality, generalized impulse response analysis, generalized forecast error variance decomposition.

JEL Classification: O13; C22; C32; Q43; Q48