Development of DSGE Model of Oil Prices and Analysis of Economic Effects of Oil Price Fluctuations

Chee, Chung Gu,* Bae, Byoung Ho**

Amid the continuing low oil prices, much research has been done into the factors behind the declines in oil prices and their economic effects. This paper establishes a small open−economy model that allows users to identify shocks that cause oil price fluctuations and to conduct analyses of their spillover effects in order to examine the effects of oil price fluctuations on the Korean economy. The model developed in this paper is one that has strengthened the oil price component of the basic small open−economy new Keynesian model. Crude oil providers and investors are included in the overseas component, which enables users to identify shocks causing oil price fluctuations more specifically based on macroeconomics. Furthermore, oil inventory optimization is introduced to identify speculative and precautionary demand shocks, and export demand is set up to respond to crude oil sales by oil−producing countries, so that economic changes in crude oil−related industries can affect Korean exports both directly and indirectly.

According to the results of the analysis conducted through the model, a substantial part of the oil price fluctuations since 2000 are explained by speculative and precautionary demand shocks over short− and medium−term horizons, and industrial demand shocks and crude oil supply shocks are found to have contributed to the underlying fluctuations of oil prices. In addition, while the declines in oil prices since the financial crisis until recently are substantially explained by the fall in speculative and precautionary demand for crude oil, industrial demand shocks explain an increasing part of the declines in oil prices due to the decrease in crude oil demand in line with the global economic slump. Moreover, oil price declines resulting from oil supply shocks and speculative and precautionary demand shocks are found to have had positive impacts on Korean economic activities, while oil price declines due to industrial demand shocks, combined with export declines in line with overseas economic recessions at the early stage of these shocks, are found to have had somewhat negative impacts on the Korean economy.

Taking these results into consideration, in conducting policy analyses it is necessary to identify the various shocks causing oil price fluctuations, examine their spillover effects, and seek appropriate policy measures, rather than considering oil prices simply as an exogenous variable. In particular, future analyses of the effects of oil price fluctuations should fully consider the fact that financial factors have stronger influence in the crude oil markets amid the current ample global liquidity, and also the fact that industrial demand-side factors have growing influence in accordance with weak global demand.

* Economist, Model-Based Analysis Team, Macroeconomic Modeling Division, Research Department (Tel: +82-2-759-4431, e-mail: chunggu.chee@bok.or.kr)

** Senior Economist, Model-Based Analysis Team, Macroeconomic Modeling Division, Research Department (Tel: +82-2-759-4177, e-mail: byoungho.bae@bok.or.kr)