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Has China's oil-import portfolio been optimized from 2005 to 2014? A perspective of cost–risk tradeoff

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Abstract

Optimizing the oil-import portfolio has become extremely effective for enhancing energy security. The focus of this paper is on whether China's oil-import portfolio has been continuously optimized since 2005. Firstly, a multi-objective programming problem was constructed based on cost–risk tradeoff, and the optimal results were obtained. The oil-import portfolio of China since 2005 was then analyzed by comparing the optimal import strategy with the actual strategy. Next, the cost fluctuation was decomposed to demand, structure, and price effects with LMDI index decomposition. Finally, the driving force behind China's actual oil-import strategy was further explored by setting up different scenarios that consider the trade relations as well as risk exposure of exporting countries and import diversification. The optimization results and discussion show that a non-linear negative correlation exists between oil-import risk and cost, and that a Pareto curve offers an alternative decision set of oil-import portfolio optimization. Although the oil-import portfolio seems to have been optimized gradually since 2005, the deviation between the actual and optimal import decisions has grown since 2009. For China, the actual optimization space is limited due to the constraints of trade relationships and diversification, which makes the risk-optimization space larger than the cost-optimization space.

Key words: oil imports; portfolio optimization; diversification; risk exposure

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