

THE RELATIONSHIP BETWEEN CRUDE OIL PRICES, OIL EXPLORATION, AND CRUDE OIL SUPPLY

Xin Jin, University of Aberdeen, 00441224273318, xjin@abdn.ac.uk
Marc Gronwald, University of Aberdeen, 00441224272204, mgronwald@abdn.ac.uk
Esti Tri Widyastuti, University of Aberdeen, 00441224272204, r02et17@abdn.ac.uk

Overview

The aim of this research project is to deepen the understanding of the relationship between crude oil prices, oil exploration and crude oil supply. The project consists of two parts: The first part of the project is concerned with a detailed analysis of the relationship between oil price changes and exploration activity. It has only recently been established that exploration rather than oil production is directly impacted by oil price changes [Anderson et al, 2014; Mauritzen, 2016]. In particular the effect of oil price declines are not very well understood as historically oil price decreases occurred considerably less often than oil price increases [Baumeister and Kilian, 2016]. The second part of this project analyses the relationship between exploration activities and future crude oil production.

Methods

The key method applied in this paper is the probabialistic model for oil discovery proposed by Smith (1980). This model deals with exploratory effort and oil discovery in order to estimate remaining reserves in a petroleum play; see Smith (2017) for a recent analysis of the Bakken shale oil play. This paper uses a modification of that approach in order to forecast a sequence of oil discoveries in a certain oil producing region. Using disaggregated data as well as input from University of Aberdeen Department of Geology and Petroleum Geology as well as University of Aberdeen Petroleum and Natural Gas Engineering Research Group, the future oil production profile in that region is forecasted. Issues taken under consideration are geological features of the respective oil producing regions as well as information on lags between exploration and development activities and the start of actual production.

Results

The main outcome of this part of the research project is a forecast of future crude oil production. On a regional level this is highly relevant as future revenues can be estimated. On the aggregate level, (future) oil production is a key determinant of future crude oil prices. The innovative key assumption put forward is that crude oil demand and supply are not driven by the same set of fundamental factors. The disaggregated approach, in addition, allows the investigation as to whether regional differences exist or if the maturity of an oil- producing region plays a role.

Conclusions

This research is highly policy relevant: Enhancing the understanding between crude oil prices, oil exploration, and crude oil supply will allow for an investigation of possible feedback loops between crude oil prices and crude oil supply. In addition, the possibility of future extreme oil price episodes will be analysed see Gronwald (2016) for a discussion of the role of oil market fundamentals during recently witnessed extreme oil price episodes. Finally, the disaggregate analysis yields useful insights into how local economies in oil producing regions will be affected by declines in crude oil prices.

References

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