

# **[HOW DOES ECONOMIC AND POLICY UNCERTAINTY AFFECT THE CRUDE OIL MARKET?]**

[Hongjie Zhao, University of Aberdeen Business School, +44 07849798763, h.zhao.19@abdn.ac.uk]  
[Marc Gronwald, University of Aberdeen Business School,+44 01224272204, mgronwald@abdn.ac.uk]  
[Alexander Kemp, University of Aberdeen Business School, a.g.kemp@abdn.ac.uk]

## **Overview**

Uncertainty is a huge concern for many investors, firms and governments. It will increase the operational risks and deter the investment and the hiring of new employees. These will give the pressure on the macroeconomy, like GDP growth, unemployment rate etc. Recently, considerable uncertainty has been caused by political events such as armed conflict, the 9/11 attacks, the failure of Lehman Brothers, the European debt crisis, Brexit, the presidential election in US, the Middle East chaos etc. These events can have dramatic impact on the whole economy. What is more, they will weaken the confidence and incur more serious consequences.

Baker et al. (2016) use news paper articles to construct an uncertainty index. Including human readings of 12,000 newspaper articles, they demonstrate that their index proxied for movements in policy-related economic uncertainty. Jurado et al. (2015) exploit a data rich environment to provide direct econometric estimates of time-varying macroeconomic uncertainty.

As the Crude oil market as both an important commodity market and financial market, it is very sensitive to uncertainty. According to the efficient market hypothesis, all the public information is reflected in the price. Thus, in this study, we analyse the relationship between various economic policy uncertainty measures and oil market variables.

## **Methods**

In this study, we use a standard VAR model to analyse the relationship between ten uncertainty indexes, the oil price, the number of US crude oil rotary rigs in operation (oil rig for short) and US ending stocks excluding SPR of crude oil and petroleum products (oil inventory).

The data of crude oil market variables are from US Energy Information Administration (EIA). Seven uncertainty indexes are from Baker et al. (2016). They are financial stress indicator (FSI), geopolitical risk index (GPR), US news-based uncertainty index, US three-component

uncertainty index, global economic policy uncertainty (GEPU) at PPP-level and current price level respectively and China economic policy uncertainty index. The researchers in Northwestern University, Stanford University and University of Chicago work collectively to publish these datas on their website regularly. The other three indexes, financial uncertainty index, macro uncertainty index and real uncertainty index at one month forecast ahead, are from Jurado et al. (2015).

Firstly a standard VAR model with oil price, oil rig and oil inventory are estimated and then one of the ten uncertainty indexes is added separately to the basic model. Finally, Granger causality test, impulse response analysis and forecast error variance decomposition method are also used to facilitate the understanding of relationships among variables. Diebold and Yilmaz spill-over index method (Diebold and Yilmaz, 2012) is used to indicate the overall connection level in this model with 13 variables.

## **Results**

In all eleven VAR models, oil price granger causes oil rig and oil inventory significantly. Oil price has relatively big impact on the crude oil rotary rigs in operation and the oil inventory. Except from FSI, oil rig granger causes oil price in the other 10 models. Thus, they show a significant bi-directional relationship between oil price and oil rig.

The main finding is that oil price granger causes uncertainty indexes and oil inventory has impact on oil price and uncertainty indexes. However it is important to note that not for all uncertainty measures this result holds.

Oil price granger causes US news-based, US three-components, GEPU current, GEPU PPP, financial uncertainty, and macro uncertainty significantly which indicates oil price is one source of uncertainty. In the VAR models with FSI, GPR, macro uncertainty, financial uncertainty, US three components and real uncertainty, uncertainty indexes granger cause oil price. In the models with GEPU PPP, GEPU current, US three component and US news based, oil inventory granger causes uncertainty indexes. And China uncertainty, macro uncertainty, real uncertainty, GEPU PPP, US three-components and US news-based granger cause oil inventory.

The impulse response analysis shows oil price is a negative shock for oil inventory significantly. With the increasing of oil price, oil inventory will decrease, vice versa. Response of oil rig to oil inventory is negative in the short term and becomes positive in the long term significantly. Response of oil price to all the uncertainty indexes are negative in the short term significantly,

except for China uncertainty index which is positive. With respect to the long term, the response becomes insignificant and fluctuates around zero line.

In the forecast error variance decomposition graphs, oil price has big power to explain the variance in oil rig and oil inventory. Oil price can explain oil rig and oil inventory roughly 40% and 20% respectively. It shows the importance of oil price in the oil market.

The overall connection is 76.4% from connectedness table. The biggest contributors to others are GPR, USA news-based and oil price. The biggest receivers from others are GEPU current, GEPU PPP and China economic and policy uncertainty.

## Conclusions

Oil is still an important fuel for the society in the near future, even in the background of energy transition. Previously researchers analysed the relationship among uncertainty index, oil production and oil prices (Kang and Ratti, 2013; Kang et al. 2017). In this study, the innovation is to include oil rig and oil inventory data in the model which can reflect closely the impact of uncertainty on oil market.

It is evident that economic policy uncertainty and oil market have tight connections. Especially for the oil price and oil inventory, they both affect and are affected by uncertainty indexes significantly. Oil is an important political resource, industrial input and financial product, economic policy uncertainty indexes can be good indicators and aspects to analyse variations in the oil market. The relationships should be analysed deeply and thoroughly in the future.

## References

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