Editorial

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1 Introduction

Since the financialisation of global crude oil trading, its price movements have attracted worldwide attention from investors, policy-makers, scholars and the general public. Since oil powers production and underpins mobility in nearly all industries and sectors, global leaders are concerned about the economic burden that the era of high oil prices generates, especially in the major oil-importing, fast-growing countries, such as China and India. Different from the natural gas market, the global oil market is highly integrated, meaning that oil prices in different regions are so synchronised that a local crisis in a relevant place could send global oil prices to sky-high.

The volatile and less predictable nature of oil prices has also created the need and opportunity for hedging funds, but at the same time, many have speculated that the hedging funds have ironically been responsible for the creation of bubbles through their large capital injection and speculation. In the second decade of the 21st century, new development has taken root and invites more timely discussion.

The two parts of this special issue, therefore, seek to invite international experts to share their insights on these matters in order to shed light upon the future development of crude oil pricing and its policy implications. Overall 18 papers with 51 authors, working in 27 different universities and research institutes located in five countries (Australia, France, Singapore, India, China) share the quantitative research results about international crude oil prices.

2 Research outline

The accepted papers can be outlined on the whole from three perspectives, i.e., research contents, research methodologies and research targets.

2.1 Research contents

We can further classify two perspectives as for the research content in the special issue, i.e., the financial perspective and economic perspective.

From the financial perspective, those papers mainly shed light upon the crude oil prices in terms of oil price forming mechanism modelling, oil price volatility modelling, oil price extreme risk management, oil price or return forecasting, oil price bubble process simulation, and the interaction of different oil prices or oil prices and other related market prices. For instance, as for the oil price forecasting, Fan and Li present a systematic review of existing tools used to model the volatility and forecasting of crude oil prices, and find that the integration of time series models with artificial intelligence models has received increasing attention in oil price forecasting owing to its satisfactory prediction performance. Xu et al. provide a specific example. They propose a support vector machine-based ensemble model to forecast crude oil prices based on VECM and PMRS. Besides, the intraday oil price forecasting analysis is also incorporated. Chevallier uses the tick-by-tick data for the WTI crude oil (2001-2010) market and the recent bivariate model by Maheu and McCurdy (2011), and compares the forecast accuracy of the density of returns with the HAR-RV model (Corsi, 2009) at different horizons up to 60 days. The results provide evidence of the incremental information for density forecasting embedded in intraday data when the model is compared with the univariate EGARCH model.

The cross-market analysis is an attractive topic and receives much attention, Moosa introduces a structural time series model to examine the effect of oil prices on stock prices in three oil importing countries (USA, UK and Japan) and four oil exporting countries (Saudi Arabia, UAE, Qatar and Kuwait). The results show that some missing variables affect the secular behaviour of, and that oil prices can explain cyclical variation in, stock prices. Han et al. investigate the mean spillover effect between crude oil and gasoline prices in both spot and future markets before and after the 2008 financial crisis. Yu et al. apply the dynamic conditional correlation (DCC) model and iterative cumulative sums of squares (ICSS) model to investigate the volatility spillover effect between carbon emission market and crude oil market.

Given that the tanker shipping market has been a key extension of global oil market and its uncertainty is related to the volatility of oil market, Yang et al. develop a VAR-BEKK-GARCH model, and find that the volatility of Brent market has more significant impacts on the tanker market than WTI market in general.

From the economic perspective, the accepted papers make some in-depth analyses about the impact of oil price fluctuation on economic growth or oil company investment, as well as the influence of macro economic changes on oil market evolution. For instance, Chai et al. employ the three-way decomposition model to explore the asymmetry relationship between oil price and economic growth, and the empirical analysis not only concerns China's economy, but also includes that of the US and Japan. Wang et al. use the convergence approach to investigate the influence of oil prices on the concentration of the petroleum industry in China, and find that the petrochemical industry concentration has significant β-convergence, while the international crude oil price increases makes the trends of the convergence diminish. Yao et al. apply the panel data model to analyse the changes and impacting factors of R&D input of international oil companies, and find that oil price fluctuation is considered fully in oil companies R&D input decision-making. If oil prices rise 1%, the oil company R&D input will increase 0.19%.

2.2 Research methodologies

On the whole, the 18 accepted papers mainly employ two kinds of methodologies to investigate the related issues of crude oil prices, i.e., econometrical models and soft-computing methods. In fact, they are also the mainstream methodologies in current relevant literature.

In terms of econometrical models, Chen and Chen use the multifractal spectrum approach to study the volatility of Brent crude oil futures prices. Zhang et al. employ the STAR model to analyse the WTI crude oil price bubbles from January 2003 to July 2013, and argue that in the past decade, the bubbles always exist in the movement of WTI crude oil prices. Zhou et al. apply several econometrical models to forecast the WTI monthly crude oil price from the long-term and short-term aspects. The results show that EGARCH and TARCH models are more suitable for the short-term and long-term forecasting, respectively. Chang et al. use the impulse responses and the variance decomposition analyses to examine the price pressure transmission effect from the crude oil futures market to the spot market through a price expectation channel, and the results imply that the changes of the futures price and world output significantly predict the spot price movement.

As for the soft-computing methods, Jebaraj and Iniyan compare various methods and ultimately find that the ANN (artificial neural network) model has better performance for the oil demand forecasting in India.

It should be noted that the hybrid methods with econometrical models and soft-computing methods have been extensively recognised. For instance, Zhao et al. put forward the VAR-SVM model, which is based on VAR (vector autoregression) and SVM (support vector machine), and the GA (genetic algorithm) approach is employed to select model parameters.

2.3 Research targets

From the introduction above, we may find that most of the papers are focused on the international crude oil market, such as WTI or Brent, while there are also some papers examining the crude oil prices in China or India.

3 Future research directions

As for the future work in the field of crude oil price modelling and analysis, I also have some comments to share with our colleagues.

First, we have to consider the changes of data environment about crude oil prices. Most importantly, the concept of big data and its related technologies have spread far and wide across the globe. In crude oil market, the high-frequency, multi-dimensional and nonlinear data should be incorporated in related research and more appropriate methodologies and more far-reaching results are expected.

Second, the research topics about crude oil prices can be enriched in the future. Besides the econometrical analyses or forecasting of crude oil prices or returns, much attention can also be paid to crude oil politics, oil economics, oil finance etc., such as the complex battle among the USA, OPEC and Russia, the influence of shale gas and oil on

the US market and even the global market, the impact of panic emotion in advanced stock markets on oil market, and the investors' behaviour and risk preference analyses in oil markets. Overall, the inter-disciplinary analyses should be attached more importance.

Finally, the research methodologies about crude oil price should include larger variety according to the topics concerned, such as the combination of quantitative and qualitative methodologies, the econometrical models and soft-computing methods as mentioned above. The ultimate goal is to provide scientific and reliable results for policy makers related with oil market to make decisions and realise the sustainable development of oil market to support stable socio-economic prosperity.

Finally, I would like to sincerely thank all the reviewers for their wonderful contribution to improve and enhance the quality of the papers in both parts of this special issue, and I am also extremely grateful to all the authors for sharing their latest research.

References

Corsi, F. (2009) 'A simple approximate long memory model of realized volatility', *Journal of Financial Econometrics*, Vol. 7, pp.174–196.

Maheu, J.M. and McCurdy, T.H. (2011) 'Do high-frequency measures of volatility improve forecasts of return distributions?' *Journal of Econometrics*, Vol. 160, pp.69–76.