

# ***THE IMPACT OF FLUCTUATION OF US DOLLAR INDEX ON CRUDE OIL PRICES: FAST FOURIER TRANSFORM APPROACH***

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## **Overview**

The fluctuation of international crude oil prices (WTI) is a concentrated reflection of global or regional factors, such as supply and demand of crude oil, economic and political situations, alternative of renewable energy, etc. These factors may result to the rise and fall of WTI in different ways under changable international political and economic environment. WTI is priced in US Dollars, which is generally considered to be decided by the fluctuation of US Dollar Index (USD<sub>X</sub>). When the USD<sub>X</sub> rose, on the contrary the oil price fell. But at the end of 2016, the increase of USD<sub>X</sub> didn't give the same impact to WTI as it did in the past. While the USD<sub>X</sub> increased to 100 point, WTI also rose. That is to say, we can initially believe that the negative relationship between USD<sub>X</sub> and WTI found before has changed.

The main purpose of this paper is to calculate the contribution of USD<sub>X</sub> to WTI, which may not be only affected by USD<sub>X</sub>, but also by other socio-economic factors. Therefore, It is useful to reveal how the impact on the fluctuation of USD<sub>X</sub> to WTI changes and why the relationship varies. That can help to select the measures to withstand the shock of the fluctuation of WTI on economy and to guarantee the oil security of China.

The paper is organized as follows: After the introduction, the second section gives a brief overview about the literatures of the relationship between USD<sub>X</sub> and WTI. The third section describes the calculation of Fast Fourier Transform and model of piecewise linear regression. In section four we illustrate the result of calculation and regression, and analyzed the causes and reasons behind the results. Finally, we make a conclusion and put forward to policy implications in section five.

## **Methods**

Fast Fourier Transform (FFT) and piecewise linear regression.

## **Results**

First, the USD<sub>X</sub> time-series can be divided into five cycle-times by using Fast Fourier Transform. Thus the scientific method contributes to the piecewise regression followed.

Second, we found the differences on the influence degree of USD<sub>X</sub> to WTI in five cycle-times. It is convinced that the negative relationship between USD<sub>X</sub> and WTI turns to be positive in the most recent cycle-time. And the impact degree of other factors which the model formulas contain also changes.

Third, the economic development of America is the main cause of the fluctuation of USD<sub>X</sub>. But the fluctuation of WTI mainly owe to global crude oil supply and demand, which are affected by economic development of oil-consumption countries and the strategic decision of oil-product countries or organizations.

What's more, it is negligible to describe the impact of renewable energy development on oil prices, due to its inconsiderable proportion in international energy market.

## **Conclusions**

Although USD<sub>X</sub> is not the main reason to fluctuate WTI, it is the most direct factor when the supply and demand of international crude oil are balanced, especially in the period of recovery of the world economy after financial crisis in 2008. Therefore, considered the change of WTI and those effect factors, the measures adopted by China should be flexible, and also take into account differences in the global socio-economic situation.

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