



The Relationship Between Exchange Rate and Crude Oil Price in Chinese Market

Yueqi Ding*

School of Business Administration, Dongbei University Finance and Economics, Dalian, 116025, China

**Corresponding work. Email: Kiara_Delaney@163.com*

Abstract

In this paper the focus is on the use of correlation to find the relationship between exchange rates and crude oil prices in the Chinese market. And in finding a negative correlation between the two the data relating to the Euro was also collected for comparison. Ultimately, however, it was found that the impact of the exchange rate on the price of oil was more pronounced in the Chinese market. In this study, an attempt is made to explain some of the reasons for this. It also provides some suggestions to the Chinese government and Chinese investors.

Keywords: *Exchange Rate, Crude Oil Price, Chinese Market*

1. Introduction

This paper addresses this issue as the literature on exchange rates and the price of crude oil found that there was little research on the relationship between exchange rates and the price of crude oil in the Chinese market prior to this study. Crude oil has always been an important segment of the investment market and its price fluctuations are influenced by many factors, but the US dollar has always been the main currency in which crude oil is traded, so its exchange rate fluctuations are relevant to every participant in the crude oil market. And with the onset of the epidemic and the downward pressure on the world's economies that no country is immune to, it is normal for the US government's regulation of its own economy to have an impact on the US dollar exchange rate. Therefore, the volatility of the US dollar is particularly striking. Based on the above explanation, the research in this paper is somewhat current and relevant. The results of this paper find that the US dollar exchange rate and the price of crude oil are negatively correlated in the Chinese market. At the same time, the correlation between the exchange rate of the Euro and the US dollar and the price of crude oil is also investigated but found to be weak. This suggests that changes in the US dollar exchange rate have a greater impact in the Chinese market and should be taken more seriously by the Chinese government and investors.

The main research question of this paper is the correlation between the US dollar exchange rate and

crude oil prices in the Chinese market. This is supplemented by the relationship between the US dollar exchange rate and crude oil prices in the European market to demonstrate the objectivity of the results. At a time when New Coronavirus, an acute respiratory infection caused by the new 2019 coronavirus, is prevalent worldwide, its highly contagious nature has dealt a nasty blow to global economic production activities, causing a series of economic problems and a series of measures introduced by governments to preserve their own economies. The US has taken a series of measures against its own economy resulting in a weakening of the US dollar and a continued trend, while China, as a major oil importer, has a market where the price of crude oil is more sensitive to exchange rates than the European market. The dollar is weakening, and the price of oil is moving higher. It is very passive for China. At the same time, the energy crisis is intensifying worldwide, and the work attempts to explore the reasons for this negative correlation, to verify the validity of the Chinese government's initiatives and to make recommendations in this regard.

2. Literature Review

Oil is one of the branches of a diversified portfolio that is heavily considered by investors. Different exchange rates in different countries also influence investors' choices. And exchange rates change every day. This paper focuses on the Chinese market and uses correlations to try to identify the relationship between crude oil prices and exchange rates. The exchange rate in

this context is the exchange rate between the RMB and the USD. China is a major importer of oil and oil is generally quoted in US dollars. So, before we start the study, we suspect that there is a strong correlation between the two. At the same time, we question whether China's huge crude oil imports have a greater impact on crude oil price volatility than the impact of the US dollar on crude oil prices, but in one study [1], it was shown that China's net crude oil imports do not have a significant impact on crude oil prices. In contrast, the US dollar exchange rate has a significant impact on oil price prices. Chinese crude oil importers are indeed followers of international crude oil, and changes in the market and oil prices play an important role in guiding their purchases. This paper therefore argues that attention to the US dollar exchange rate is relevant to the judgement of crude oil prices by crude oil importers, crude oil investors and the Chinese government. It is also noted that in the context of an epidemic, the number of new diagnoses can also have an impact on oil prices as can negative oil price information. However [2], it was shown that when the number of new crown cases exceeded 84,479, there would be a negative impact on oil prices. However, in the case with oil price volatility as a threshold, both new crowns and negative oil prices will have an impact on oil prices. At the same time the impact of new crowns on oil prices is limited. And the study [3] also shows that the impact of the new crown epidemic, on the RMB exchange rate, is short-lived, so the study argues that the exchange rate of the US dollar will have a more dramatic impact in news related to oil prices. The study is therefore of relevance. It is also argued [4] that an increase in oil prices has a weaker correlation with a depreciation of the dollar. But the strength of this effect varies, depending on the currency, and is more substantial for oil exporters but less so for oil importers [5], the researcher selected India, another oil-importing country. The relationship between oil prices and exchange rates was found to show consistency and it was argued that oil shocks to exchange rates are permanent [6], it is shown that the correlation between exchange rates and oil prices did not start from the beginning, but only showed signs of contagion and dependence from the onset of the global financial crisis. The strong correlation exhibited by the phase is also explained in the study [7]. That is, asymmetric effects. The study concludes that the exchange rate is more responsive to an increase in oil than to a decrease in oil prices. In the study [8] it is demonstrated that the returns to oil prices and foreign exchange rates are skewed and low kurtosis and may follow extremely different marginal distributions as well as different degree freedom parameters. So, in the oil market where China is an importer. Investors need to be more astute and rational to make some risk management. At the same time research has also noted the Chinese government's investment in African markets, and in [9] it is noted that in terms of the Chinese government's aid strategy in Africa, it can be argued that the main motivation for the relationship with

China is access to the abundant raw materials that Africa provides. Therefore, the Chinese government is also actively making some efforts to gain maximum benefits for its own crude oil market, to maintain the strategic security of its resources and to make the Chinese oil market more stable. This paper predicts that the correlation between crude oil prices and the US dollar is likely to show some persistent influence. It is hoped that this will have some constructive implications for investors and the Chinese government in terms of risk management and diversification.

3. Research Methods

The work first found monthly data on crude oil prices from March 2017 to January 2022 on the Federal Reserve Economics Data (FRED) website. Then this work found daily data for the US dollar to Chinese yuan exchange rate and the US dollar to euro exchange rate from March 1, 2017, to January 31, 2022. As the two were adjusted at different times, the study first simply calculated the monthly average of the two exchange rates. In processing the data, the work first fitted the trend for each of the three data separately in preparation for post-processing. The trend formula for the crude oil price was obtained separately as:

$$Y=0.0907*X+56.442 \quad (1)$$

The trend formula for the RMB/USD exchange rate is

$$Y = -0.0027*X+6.7875 \quad (2)$$

The trend formula for the EUR/USD exchange rate is

$$Y=0.0003*X+1.1461 \quad (3)$$

Using the real data and the fitted data as a difference, the difference on the trend ratio can be used as the original data for the trended image, and the detrended curve of the crude oil price can be observed in a chart with the detrended curve of the two exchange rates respectively. The standard deviation of each of the three data sets was then further calculated during the study, yielding a standard deviation of 0.1958 for the crude oil price, 0.0357 for the RMB/USD exchange rate and 0.0368 for the EUR/USD, which indicates a low level of dispersion in several data sets. The study then also compares the degree of volatility of crude oil prices and the two sets of exchange rates. When dividing the standard deviation of the two sets of data, the study found that the standard deviation obtained when comparing the crude oil price with the RMB exchange rate was 0.1826, while the standard deviation obtained when comparing it with the Euro exchange rate was 0.1880, indicating that both exchange rates are more volatile than the crude oil price.

In this study, the correlation between the US dollar exchange rate and the crude oil price in the Chinese market is mainly used to investigate the relationship

between the US dollar exchange rate and the crude oil price in the Chinese market, and the work finally obtains a correlation coefficient of -0.56 between the US dollar exchange rate and the crude oil price in the Chinese market, while the correlation between the euro exchange rate against the US dollar and the crude oil price is also used to ensure the objectivity of the findings. The correlation of -0.56 for the Chinese market is stronger and negative compared to the 0.28 obtained for the European market. The negative correlation in Figure 1 is evident in the segments from 2021 onwards, while the correlation in Figure 2 is not as evident as in Figure 1. The study suggests that there are three reasons for this result. Firstly, the US dollar, as the main currency of settlement, is affected by the state of the US economy, which has been severely affected by the pneumonia epidemic, and to preserve its economy, the exchange rate will be greatly affected to the extent that it will weaken or even continue to weaken. Secondly, the worldwide energy crisis has led to crude oil supply not meeting demand, and the impact of supply, demand and speculation on oil prices has increased, while the impact of the US dollar exchange rate has become smaller, so the result is a negative correlation, but not as strong. Thirdly, localized conflicts

have led to greater tensions in the overall global energy supply chain, thus exacerbating the rise in crude oil prices. But the impact of fluctuations in the US dollar exchange rate in China, a major oil importer, is still not negligible. But the study also notes that the Chinese government's proactive approach to the epidemic and the global energy crisis has been fruitful. The Chinese government has directed its investments towards Africa, providing early warning of the energy shortage. At the same time the Chinese government is using proactive policies or investment tools to increase the purchasing power of its currency. In terms of the performance of crude oil prices, the results have certainly been fruitful. However, the paper also suffers from several shortcomings. Firstly, there is no further discussion of the profound impact of increasing inflation on oil prices. Secondly, the paper focuses on the Chinese market, and the works are not sure whether the findings are generalizable to countries in the Asia Pacific region, given the different development conditions in Europe and the US. Or whether the impact of exchange rates on crude oil prices in developing countries is something that needs to be discussed further.

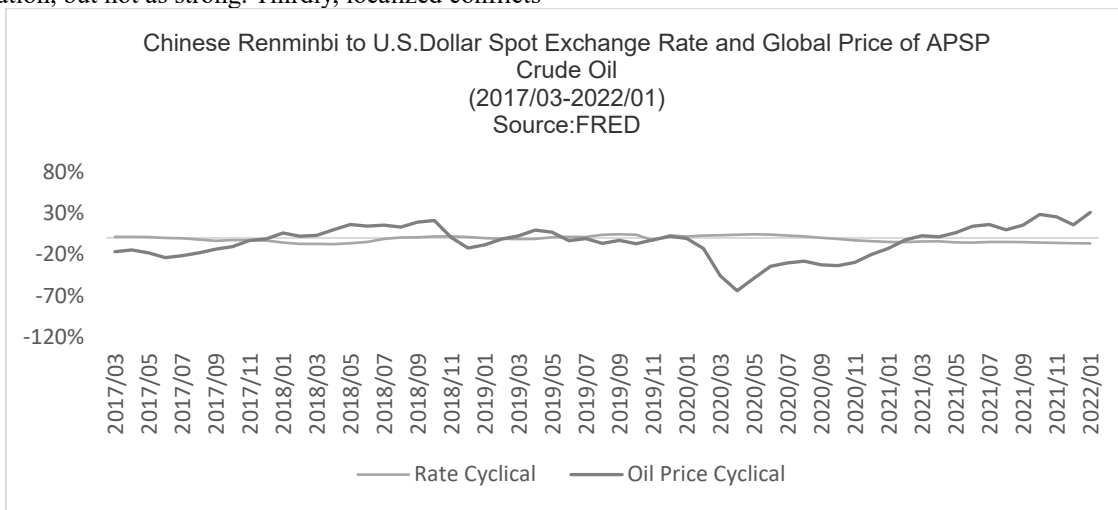


Figure 1 Chinese Renminbi to U.S. Dollar Spot Exchange Rate and Global Price of APSP Crude Oil

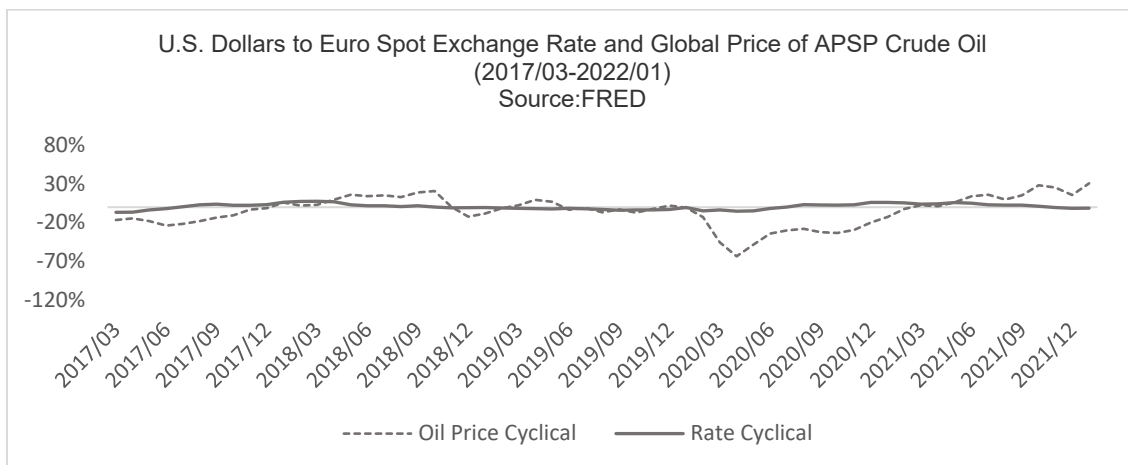


Figure 2 U.S. Dollar to Euro Spot Exchange Rate and Global Price of APSP Crude Oil

4. Conclusion

As a result of the study, the works found that exchange rates and crude oil prices show a significant negative correlation in the Chinese market. Therefore, in investment portfolios, both the Chinese government and Chinese investors should pay attention to the relationship between the two and re-optimize their portfolios to manage risk. The US dollar itself, as well as crude oil, is an investment and the works believe that the impact of the US dollar on the price of crude oil and the inversibility that the dollar itself has, is detrimental to the market, especially against the backdrop of a weakening dollar and the probability that it will continue to do so. The weakening of the dollar will affect investors' investment expectations and the global energy crisis will lead to an increase in investor investment in bulk goods, which will stimulate the influence of speculative factors affecting the price of crude oil. In the end, this will have a negative impact on crude oil itself, with an increased oversupply and a deepening of the global energy crisis. So, this work believes that China's investment in Africa has been effective, but at the same time, China, as a country with a strong macro-control influence, should, in addition to its own investment, also guide investors in an appropriate way and establish a good interaction between investors and the government, so as not to lead to market disruption and exacerbate the crisis. In turn, investors should consider the relevant factors affecting their investment in commodities and reject the herding behavior of irrational investment. Admittedly anti herding behavior requires sharper insight and more flexible information. But to maximize the benefits of your investments, it is reasonable to consider them carefully. Optimizing your portfolio, managing risk, and taking a more multifaceted view of the factors that influence prices are necessary for the Chinese government and for investors to make relevant investment decisions.

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