

A study of nonlinear dependence between Oil Price and Stock Returns in India

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The volatile nature of oil price and stock return (as shown in Fig. 1) have now become the emerging issues of research in the field of financial and energy economics. One plausible hypothesis is that Indian economy has been prone to oil price fluctuations over the different episodes of time with various factors mostly increased oil demand globally after 2000s. It is clearly visible from the figure that both oil price and stock return have moving together from 1999 to the earlier month of 2002, but after April 2002 their movement are very much uncorrelated. It is mainly due to the Asian financial crisis, Global economic crisis, Oil shocks and its crisis, Euro Zone crisis, and US financial crisis which have impact on both stock and oil price of the country. Historically, the Indian stock returns were affected by the 1970s oil crisis of Middle East because of heavy reliance on the Arabian economies. Consequent to this, our fuel import bill has reached 3.6% of total GDP by 2008. Owing to this, fuel import bill has been multiplying over the years putting certain companies under stress.

With the recent plummeting oil price, the impacts on the Indian stocks are mixed. Refineries, off-shore oil companies and paint have experienced downtrend, whereas, automobile and aviation sectors had the good time in the Indian market. Despite 40% reduction in crude oil price in 2014 and 15% reduction in 2015, the Indian stock market as a whole has not performed satisfactorily due to the supply glut and uncertainty over the rate hike by USA Fed Reserve. This fluctuation of oil price does have both direct and indirect impact on the economy. Directly, the fluctuation of oil price creates the inflationary pressure on economy and thereby affects consumptions, capital formation and hence affects the financial markets and economic growth. Indirectly, the oil fluctuations also affects both international trade and exchange rate of the country and hence affects the current account balance.

Reflecting the recognition of such importance in recent period, there has been plethora of research, which shows the nonlinear relationship between oil price and stock returns [1, 2, 3]. But, these studies show the unidirectional relation between them. However, it has been observed that both variables are linearly correlated to each other [4, 5].

Therefore, in order to show whether they are nonlinearly related to each other or not in both direction as well as measure the feedback effect between them, the study will

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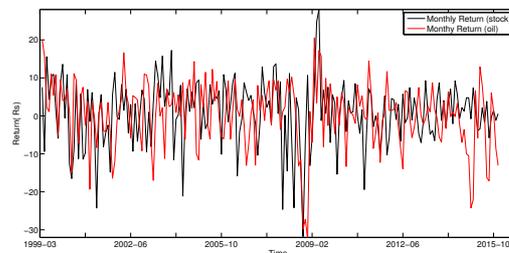


Figure 1: Monthly return of stock and oil price.

use the bivariate noisy Mackey-Glass model as well as Hiemstra and Jones causality framework[6]. In this context, this study will contribute mainly three aspects to the literature. First, we will examine the nonlinear relationship between oil price and stock returns. Second, we will use bivariate noisy Mackey-Glass process to show the feedback effect between them. The merit of this method is that it can filter more difficult dependent dynamics in time series. Finally, the study may be useful to predict the oil price and stock return for the next decade.

This study will use monthly data of the Standard and Poors (S&P 500) stock market index and Brent (BTI) spot crude oil price from 1999 to 2016. The justification is that the data of S&P 500 is available for India from 1999 onwards. The data of S&P 500 and BTI spot crude oil price are collected from Bombay Stock Exchange, India and Energy Information Administration respectively.

The preliminary results from BDS (Brock, Dechert and Scheinkman) test suggest that the oil price and stock returns are nonlinearly interdependent to each other. From the policy perspective this study is going to suggest whether the lagged information can or cannot be predicted the returns of both oil and stock price.

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