Interaction Dynamics of Arbitrage, Hedging and Speculation with Spot Volatility: Evidence from Crude Oil Market

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EXTENDED SUMMARY

Introduction and Research Gap

This paper investigates the impact of trading activity on spot market volatility and examines the dynamics among the types of trading in the crude oil futures market. We analyze the interlinkages between speculation, hedging and arbitrage across prominent exchanges across the globe. This study is built on the premise put forward by Working (1960) who theorized that different trading activities in the market such as speculation, hedging and arbitrage are not isolated events but are interlinked to each other. The study enhances the existing literature by contributing to the subject crude oil futures market dynamics and by shedding light on whether the fluctuations in spot market volatility are explained by the varying levels of trading activity(Watugala, 2019).

Trading activity in the Crude Oil futures markets are broadly classified into hedging, speculation and arbitrage. Several studies in literature examine trading and its impact of market volatility as isolated activities. However, scarcely in literature do researchers examine the combined effect of all three types of trading activities on market volatility and their interlinkages. Hence, we examine the interlinkage among speculation, hedging and arbitrage and their impact on spot price volatility in five prominent commodity exchanges across five countries in the context of crude-oil futures. Crude Oil futures are one of the most widely traded non-agricultural commodity futures popularly used to hedge against the erratic oil price movements. We examine whether hedging, speculation and arbitrage exert an influence on the spot market volatility as it determines the price of raw materials which is of major concern for several industries in the economy.

Several reasons make this study pertinent, firstly volatility dynamics is one of the key components in crude oil futures markets, as it contributes to efficient fund allocation and strategic derivatives trading strategies. Understanding whether levels of trading contribute to volatility can help both the producers and consumers of the futures markets to gauge optimal trading strategies. Secondly, several regulators gain from a better understanding of spot volatility dynamics and trading activity. Hence, for the sake of objectivity, we examine volatility dynamics and trading activity; enabling policymakers to consider other regulatory possibilities. Finally, the commodity futures markets are primarily meant for price discovery risk mitigation and our findings can provide insights into the price discovery process and risk management for practicing investors.

Data and Methodology

Our sample focuses on the crude oil futures traded at the top exchanges (by volume) across five countries, namely, the United States of America, Europe, United Arab Emirates, Japan and India for the period spanning from 2010-2017. The data series for all crude oil futures contracts were sourced from Bloomberg, U.S Energy Information Administration (EIA) and US Department of Energy. Vector auto regression (VAR) (Sims, 1980) was used to examine the interlinkage between the different trading activities as well as spot volatility. GARCH(1,1) model has been used to measure spot volatility.

Results

Our results capture the impact of the different trading activities in the crude oil futures market on time-varying crude oil spot volatility. In India, spot volatility is influenced by all the three activities – hedging, speculation and arbitrage. Speculation is affected by both lagged volatility and hedging. Additionally, speculation (5%) and arbitrage (3%) contribute to variance in spot price volatility as well. In USA, all the three activities impact volatility. Hedging interacts negatively with speculation and positively with lagged volatility. In the USA, 4% of the variance in spot price volatility is explained by speculation. There is bidirectional relationship of all the activities with volatility. European market volatility is influenced by lagged speculation and hedging but not arbitrage. Hedging is negatively influenced by lagged speculation and volatility and arbitrage has the least influence on all the trading activities. In Europe, speculation and arbitrage account for 9% and 4% of spot price variance. In Japan, volatility is influenced by lagged hedging and speculation, but Arbitrage (1.4%) and speculation (1.23%) have low impact on spot volatility. However, there is no bidirectional causality among the market activities. In UAE, lagged hedging negatively influences volatility. Hedging is unaffected by other trading activities and market volatility. In the UAE, the variation in spot price volatility is predominantly explained by its own innovations rather than trading activity. While USA, Europe and India, have liberal markets, UAE and Japan are more stringent which results in reducing trading activity interaction. Therefore, the level of interlinkages of trading activities is dependent on market-level factors as well. We also capture the impact of shocks on the various trading activity on spot-market volatility to support

our findings. Our results confirm that different trading activities - arbitrage, speculation and hedging are interlinked and its extent varies across different markets and the results are in line with the views of Working (1960). It is observed that lagged volatility and speculation have a positive impact on spot market volatility supporting Master's hypothesis, while the impact of hedging and arbitrage is lower except for Europe where arbitrage also increases volatility. Overall, spot Market volatility is explained by speculation and arbitrage, while the role of hedging is diminished.