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Dynamic Linkages among select Financial Variables: An Analysis of Oil Importing and Exporting Countries

Abstract

Crude oil is a critical commodity traded globally, accounting for 34% of total energy consumption despite efforts toward non-fossil fuel energy sources. Oil prices are highly sensitive to supply and demand fluctuations, influencing key macroeconomic variables. As a fossil fuel derived from geological formations, crude oil is a source for various essential products such as jet fuel, diesel, and petroleum, and is predominantly found in regions far from areas of high consumption. Most reserves are located in the Middle East, North America, and South America, with OPEC (the Organization of the Petroleum Exporting Countries) controlling 40% of global oil production. Factors such as OPEC's output, U.S. oil inventories, global demand, geopolitics, refinery utilization, speculative trading, and weather conditions contribute to price volatility.

Oil price changes impact economies through both supply-side and demand-side channels. Demand-side variations, linked to increased economic activity, generally have a neutral effect on economic growth, while supply-side shocks—such as geopolitical tensions, sanctions, or production cuts—result in price volatility. Rising oil prices exacerbate fiscal and current account deficits, forcing governments to reduce excise duties on imports to mitigate inflation, thereby reducing revenue. Higher import bills and deteriorating trade balances further strain foreign reserves, especially in oil-importing countries.

The dynamic relationship between oil prices, financial markets, and macroeconomic indicators is an area of significant interest. Previous studies have primarily focused on static relationships, neglecting the dynamic interconnections between oil prices and variables like equity markets and exchange rates. This study fills the gap by exploring these dynamic linkages over a 10-year period (2013-2023) using daily data from stock markets and currencies of major oil-exporting and oil-importing nations alongside Brent crude oil prices.

The research uses advanced econometric models, including the DCC GARCH model, dynamic Johansen co-integration test, and wavelet coherency, to examine volatility spillover and co-movement among variables. The analysis reveals a low short-term volatility spillover between oil and equity markets in most oil-exporting countries, with volatility clustering persisting in several nations, including Saudi Arabia, Brazil, and Russia. Significant spillover between oil prices and exchange rates is found in countries like Russia, Nigeria, and Mexico.

The study also observes a dynamic long-term relationship between oil prices and financial markets, especially during crises such as the COVID-19 pandemic and the Ukraine-Russia conflict. Co-movement between oil prices and stock markets is stronger during the COVID-19 crisis compared to the Ukraine-Russia conflict. Similar patterns are evident between oil prices and exchange rates, with higher co-movement during the pandemic.

In oil-importing countries, short-term volatility spillover is significant for most markets, though weaker for India and South Korea. Long-term associations between oil prices and financial indicators are also more pronounced during crises.

Overall, the study concludes that the relationship between oil prices, exchange rates, and stock markets is weak under normal conditions but intensifies during crises, particularly in oil-importing countries. These findings have crucial implications for policymakers and investors seeking to mitigate the economic impact of oil price fluctuations.