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## **Co-movement and volatility analysis of precious and industrial metals: COVID 19**

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### **ABSTRACT**

This paper does a comprehensive empirical analysis of a selection of metal commodities (aluminium, copper, gold, palladium, platinum, and zinc). Aluminium, copper, gold, palladium, platinum, and zinc were chosen to be included in the study as the commodities are commonly traded commodities in the world. Aluminium, copper and zinc form part of industrial metals whereas gold, palladium and platinum form part of precious metals. It models and forecasts the co-movement and volatility of the commodities included in the paper. The models will be based on daily data from 1 January 2000 to 30 June 2020, with a comparison before, during and after the 2007-2009 financial crisis, as well as before and during COVID 19.

The data will be evaluated by means of number of financial econometric models. The financial econometric models that will be used done in two parts. The first part includes correlation, vector autoregression, the Johansen cointegration test, Vector Error Correction Model and pairwise Granger Causality Tests. Correlation will be used to explore any indication of statistically significant relationships as part of the initial investigation process. Once the initial investigation process is completed a VAR study will be undertaken to validate the linear interdependencies among multiple time series, followed by the Johansen Cointegration test, if a cointegrating relationship exists among the variables included, a Vector Error Correction Model will be used to model the long and short run dynamics. Finally a pairwise Granger Causality Tests will be performed to determine the direction of causality.

The second part includes the autoregressive integrated moving-average (ARIMA) model, the autoregressive conditional heteroscedastic (ARCH) model, the generalised autoregressive conditional heteroscedastic (GARCH) model, Threshold GARCH (TGARCH) model also known as the Glosten-Jagannathan-Runkle generalised autoregressive conditional heteroscedastic (GJR-GARCH) model, and the exponential GARCH (EGARCH) model. The results suggest that volatility is present in the data and therefore the models mentioned will be compared in order to identify which model is the best fitting model for the selected metal commodities.

### **KEYWORDS**

causality, co-movement, COVID 19, GARCH, industrial metals, precious metals, VECM

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