

The Effect of Recycling on Price Volatility of Critical Metals in the EU (2010-2019): An Application of Multivariate GARCH Family Models

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Abstract : Electrical and electronic applications, as well as rechargeable batteries, are common in any economy. They also contain a number of important and valuable metals. It is critical to investigate the impact of these new materials or volume sources on the metal market dynamics. This paper investigates the impact of responsible recycling within the European region on metal price volatility. As far as we know, no empirical studies have been conducted to assess the role of metal recycling in metal market price volatility. The goal of this paper is to test the claim that metal recycling helps to cushion price volatility. A set of circular economy indicators/variables, namely, 1) annual total trade values of recycled metals, 2) annual volume of scrap traded and 3) circular material use rate, and 4) information about recycling, are used to estimate the volatility of monthly spot prices of regular metals. A combination of the GARCH-MIDAS model for mixed frequency data sampling and a simple GARCH (1,1) model for the same frequency variables was adopted to examine the potential links between each variable and price volatility. We discovered that from 2010 to 2019, except for Nickel, scrap consumption (Millions of tons), Scrap Trade Values, and Recycled Material use rate had no significant impact on the price volatility of standard metals (Aluminum, Lead) and precious metals (Gold and Platinum). Worldwide interest in recycling has no impact on returns or volatility. Specific interest in metal recycling did have a link to the mean return equation for Aluminum, Gold and to the volatility equation for lead and Nickel.

Keywords : recycling, circular economy, price volatility, GARCH, mixed data sampling

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