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# Energy commodities: A study on model selection for estimating Value-at-Risk

*Changes in commodity prices can be transmitted directly to the real economy through changes in the marginal cost of production. Therefore, it is extremely important to create some mechanism to protect against these movements in the commodities futures market. Exposure in this market comes along with tail risk, which must be measured and controlled using a risk measure. To help economic agents, this research provides a common statistical specification that can be used to reliably predict the Value-at-Risk of four important energy commodities. For this, the predictions of a range of 48 competing models, composed of four heteroskedastic specifications, six conditional distributions, and a Markov chain with up to two regimes, were compared using various statistical tests, and the model with the best average results was preferred.*

**Keywords:** commodities; Value-at-Risk; GARCH; Markov-switching; probability distributions.

**JEL classification:** C46; C53; G13; G32; P18.

## 1. Introduction

Commodities are used as basic raw materials in the production of many goods for the economy. For this reason, Garratt, Petrella (2021) and Lin et al. (2021) warn that commodity price changes can be transmitted directly to the real economy through changes in the marginal cost of production and consequently cause changes in the aggregate price level (see, also, (Chen et al., 2020)). These price changes can impact interest rates (Çepni et al., 2021; Coletti et al., 2021), exchange rates (Albulescu, Ajmi, 2021, Wang et al., 2022), and also the economic growth of countries (Boateng et al., 2022; Herrera et al., 2019; Liaqat et al., 2022; Mohaddes, Pesaran, 2017; Wang, 2022), although differently, as Liu, Serletis (2021) point out. Among all the inputs, Çepni et al. (2021) and Gong et al. (2022) reveal that oil is one of the main determinants of economic aggregates and deserves to be highlighted. This makes sense, since increases in oil prices can cause increases in the production costs of goods that use large amounts of energy or are directly derived from it (Lin et al., 2021). As a consequence, pressures in other relevant sectors of the economy can be observed (Coletti et al., 2021). For example, Chowdhury et al. (2021) point out that increases in oil prices can cause food prices to rise. Hanson et al. (1993) link this movement to the impact that the price of oil has on the prices of fertilizers, chemicals, transportation,

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