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ASSESSMENT OF CONDITIONAL DEPENDENCE STRUCTURE IN COMMODITY FUTURES MARKETS USING COPULA-GARCH MODELS AND FUZZY CLUSTERING METHODS

Abstract:

The dynamic development of commodity derivatives markets has been observed since the mid 2000s. The main reasons for these changes include the development of e-commerce, the inflow of financial investors' capital, the emergence of passively managed index funds focused on commodities and ETFs. This development is accompanied by changes in the dependence structure in the markets. The aim of this study was to assess the conditional dependence structure in various commodity futures markets (energy, metals, grains and oilseeds, soft commodities, agricultural commodities) in the period from the beginning of 2000 to the end of 2018. Particular aim was to identify the moments of change (transitions from one market state to another state) in the dependence structure. The copula-based multivariate GARCH models were used to describe the dynamics of dependencies between the returns from commodity futures contracts and the dynamic Kendall's tau correlation coefficients were applied to measure the strength of dependencies. The daily changes in the conditional dependence structure in the markets (changes of market states) were identified with the fuzzy c-means method. In the period 2000–2018, the conditional dependence structure in commodity futures markets was not stable, as evidenced by the identified different states of the markets (two in the metals market, the grains and oilseeds market, the softs market and the agricultural market and three in the energy market).

Keywords:

commodity futures, copula, GARCH, dynamic dependencies, Kendall's tau coefficient, market states, fuzzy clustering methods

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