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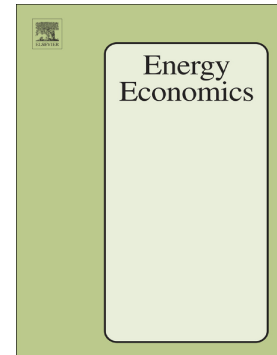
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Predicting carbon market risk using information from macroeconomic fundamentals

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Abstract

Economic theories suggest that carbon price movements are closely related to economic fundamentals. This paper develops an economic state-dependent (SD) approach to evaluate carbon market Value-at-Risk (VaR) that incorporates information from macroeconomic fundamentals into carbon return VaR modeling and forecasting. This method implements an economic SD sampling scheme that utilizes historical carbon return observations from the relevant economic states to predict future carbon market VaR. Applying this SD method to the European Union (EU) carbon market, we confirm that the EU fundamental economy has two distinct states that correspond to "expansion" and "recession" periods and that the carbon returns have different distributions in the two states. We find that the SD method outperforms the traditional non-SD methods in out-of-sample VaR forecasts, and this is particularly evident when the carbon market experiences large-scale economy-driven structural breaks.

JEL classification: C53; C58; Q50

Keywords: Carbon price, Value at risk, Business cycle, Macroeconomy, State-dependence

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