Weather forecast and energy prices

Master Thesis

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Abstract

This Master thesis examines the impact of weather forecasts on energy prices in the United States. For this purpose, five different weather variables are created, their benchmark is a monthly average temperature forecast. The Holt-Winters, rather than the seasonal ARIMA and cumulative average model, provides most accurate predictions. After testing all the included variables for the presence of a unit root, a robust linear regression model is applied. The study shows that strongest price reactions occur 3 to 7 and 18 to 24 trading days prior to a weather event. Analyses taking into account seasonal weather forecasts further suggest that the heating fuel markets behave Informationally Efficient. Winter temperature conditions of the East, rather than the Midwest were found to be strongest correlated with Mont Belvieu Propane prices. Summer temperature conditions of the South region have been found to be most correlated with Henry Hub Natural Gas prices. The price behavior of natural gas, heating oil and propane, spot and future prices can be explained through the immediacy of consumption, or storage respectively. Spot and future prices react strongest to weather conditions at the beginning of a season; in November and December for the winter period, June and July for the summer season. A Two-Stage Least Squares analysis using Arctic Oscillation and North Atlantic Oscillation index values as instrumental variables partially confirmed results of the regression analyses.

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