

# Forecasting oil prices with non-linear dynamic regression modeling

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## Abstract-

The recent energy crisis has renewed interest in forecasting crude oil prices. This paper focuses on identifying the main drivers determining the evolution of crude oil prices and proposes a statistical learning forecasting algorithm based on regression analysis that can be used to generate future oil price scenarios. A combination of a generalized additive model with a linear transfer function with ARIMA noise is used to capture the existence of combinations of non-linear and linear relationships between selected input variables and the crude oil price. The results demonstrate that the physical market balance or fundamental is the most important metric in explaining the evolution of oil prices. The effect of the trading activity and volatility variables are significant under abnormal market conditions. We show that forecast accuracy under the proposed model supersedes benchmark specifications, including the futures prices and analysts' forecasts. Four oil price scenarios are considered for expository purposes.

**Index Terms-** oil prices forecasting; Brent futures; GAM model; transfer function models; scenarios analysis

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