Evaluating Oil Price Forecasts: A Meta-analysis

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Since the regime change in oil price fluctuations in the early 2000's which is associated with significant oil price peaks and troughs, sharp increasing and decreasing patterns, and elevated oil price volatility, the extant literature has highlighted the need for more accurate oil price forecasts. This need stems from the fact that they form important decision-making inputs for several stakeholders, including private businesses, central banks, regulators and the national governments.

Given the increasing interest in this line of research and the studies that have been published, we proceed with a quantitative navigation that will allow us to explore whether there are factors that systematically provide better oil price forecasts. To achieve this, we apply a meta- analysis approach.

We initially performed a Google scholar search using the key combinations "oil price predictability", "oil price forecasts", "oil price forecasting" and "oil price modelling". In order to impose a certain quality threshold, we focused on published papers. The next step was to impose a number of criteria according to which a study can be included in our sample.

For the first criterion, we collected studies that reported at least one relative root mean squared error (RRMSE) of a forecasting framework, relatively to the no-change forecast (or Random Walk). For the second criterion, we required the reported RRMSEs to use Random Walk as the benchmark forecasting framework. For the third criterion, we focused on traditional econometric techniques and thus we excluded studies related to the use of non- standard machine learning techniques.

The total sample consists of 6,089 observations collected from 21 papers. This search was carried out between July and September 2021. We employ a Bayesian Model Averaging (BMA) method in order to perform our meta-analysis approach.

In our attempt to identify factors that systematically influence the reported RRMSEs, we created three forecasting groups namely forecasting frameworks, oil price, and forecasting features for a total of twelve factors. Forecasting frameworks such as Structural, MIDAS, Regression, Combined, Future, and Product are tested against the benchmark ARIMA framework. Oil prices such as WTI and RAC are tested against the benchmark Brent, while we tested forecasts of the real prices against the nominal prices. Finally, we used the horizon feature (short-run against long-run forecasts), period (older against more recent forecasting efforts) and real-time forecasts, as additional factors.

Our empirical findings indicate that MIDAS and Combined forecasts provide systematically better predictions than other forecasting strategies. Furthermore, the forecasting ability is improved when the Brent price is used. Moreover, forecasts of the real prices tend to be better than forecasts of the nominal prices. What is more, shorter forecasting horizons generate forecasts of greater accuracy, whereas the use of real-time forecasts or the more recent forecasting exercises do not seem to yield better forecasts. Robustness checks confirm the stability of our findings.

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The empirical findings imply significant policy implications in the attention of various stakeholders. The existing literature highlights the importance of oil price forecasts for the formulation of regulatory policies in the energy sector, for investment decisions regarding climate change and carbon emissions predictions, for monetary authorities to make predictions in inflation and economic activity, for national governments of both oil-exporters and oil-importers in devising their investment strategies and budget plans.