IIF Distinguished Lecture Series on:

"Recent Advances in Forecasting Energy Prices: Data, Models, and Risk Analysis"

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The IIF Distinguished Lecture Series addresses the long-standing question of whether model-based forecasts of energy prices can improve upon a common benchmark. Comparing a broad range of forecasting methods, it highlights the importance of accounting for institutional features specific to different energy markets when designing forecasting models and selecting predictor variables with a focus on oil, gasoline, and natural gas. It also covers model selection and combination approaches to guard against forecasting failure of individual models. The practical usefulness of predictive densities derived from the best-performing models is illustrated with the construction of indicators that signal the likelihood of a buildup of upward or downward energy price pressures, an analysis of scenario-based tail events, and risk assessments for energy producers and consumers. The IIF Distinguished Lecture Series provides a set of new quantitative measures that enrich the toolkit of policymakers, business managers, and market participants.

OUTLINE

Lecture 1: *Are Oil Prices Forecastable?*

We revisit efforts over the past decade to develop models that can outperform the simple random walk benchmark in out-of-sample forecasting of the real price of oil at the monthly frequency for horizons of up to two years. We discuss evidence on the usefulness of a variety of economically motivated forecasting models with an emphasis on how to select and measure relevant predictor variables and how to take market-specific features into account.

Lecture 2: *Forecasting Other Energy Prices*

We examine whether the same types of models and predictor variables that helped improve the forecast accuracy of oil prices are useful for forecasting gasoline prices and natural gas prices or whether different energy prices call for different modeling strategies. We discuss the role of real-time data constraints and consider variable-specific nowcasting techniques. We explore the benefits of dynamic model selection and forecast pooling and provide guidance for regular forecast updates for practitioners.

Lecture 3: ***Conditional Forecasting and Structural Scenario Analysis***

We show how to assess the implications of hypothetical developments of market fundamentals on the future evolution of energy prices either by conditioning on a pre-determined path for individual predictor variables or by constructing forecast scenarios about future energy demand and supply conditions from structural models. We consider both linear and nonlinear models for this purpose.

Lecture 4: ***Putting Energy Price Forecasts to Use***

We introduce a set of real-time monitoring tools that provide policymakers and market participants with a quantitative assessment of expected oil price risks and future energy demand conditions. We show how to use predictive densities to develop producer and consumer distress indices, to derive measures of oil price uncertainty and skewness, and to conduct stress testing based on alternative risk scenarios. We also discuss how to construct shock measures and decompose forecast errors to understand their source.