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Forecasting UK Socioeconomic Indicators under Political Uncertainty: Classical vs Deep Learning Approaches

Abstract

The growing uncertainty of the international economic and political landscape, accentuated by phenomena such as Brexit and the pandemic, highlights the importance of robust and interpretable decision-support tools. In this environment, operational research (OR) is crucial for designing sustainable and innovative solutions for both society and businesses. This study contributes to this goal by applying advanced time series modelling techniques to inform evidence-based strategic decisions in socio-economic contexts. Time series data on UK job vacancies and 10-year bond yields are analysed alongside the political uncertainty index to explore forecast accuracy and causal relationships. A wide range of forecasting models were evaluated, including classical models (ARIMA and ETS) and deep learning architectures (GRU, LSTM, CNN and a hybrid approach). Performance was assessed across multiple forecast horizons using walk-forward validation and error metrics (sMAPE and R^2). The results demonstrate that classical models outperform deep learning models in the short term, while GRUs demonstrate superior performance in the long term. Granger causality tests confirmed statistically significant relationships between political uncertainty and the economic indicators studied. These findings emphasise the value of integrating OR and AI-based modelling to make resilient and sustainable decisions in uncertain situations and provide valuable insights for designing policies and planning strategies in dynamic economic environments.

Keywords: Socioeconomic Indicators; Political Uncertainty; Time Series Forecasting; ARIMA and ETS Models; Deep Learning Models; Causal Inference

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