Forecasting Unemployment Rate in Sri Lanka using Selected Macroeconomic Variables: A Comparative Study of Machine Learning/Deep Learning and Econometric Models[*]

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Abstract

This study investigates the impact of key macroeconomic variables on Sri Lanka's unemployment rate and compares various forecasting models, namely, econometric, Machine Learning (ML), and Deep Learning (DL) to improve unemployment rate prediction accuracy. Using quarterly data from 1998 to 2024, including GDP growth, inflation, interest rates, exports, exchange rates, and tourist earnings, the research evaluates relationships between these indicators and unemployment rate. Traditional econometric analysis, specifically the Vector Error Correction Model (VECM), is employed to capture long-term relationships, while ML models (Random Forest, Support Vector Regression, and Extreme Gradient Boosting) and DL models (Feedforward Neural Network) address non-linear and complex patterns in data. Forecast evaluation shows that Random Forest provides the highest accuracy, with a Mean Absolute Error (MAE) of 0.13, outperforming other models. The VECM, while effective in capturing long-term trends, has limitations in short-term forecasting due to linear assumptions.

This study underscores the potential of ML and DL models in economic forecasting, offering robust supportive techniques to improve traditional econometric methods. These insights can support policymakers in proactive labor market interventions. Accordingly, the findings from this study highlight the need for a hybrid approach that combines economic theory, and the adaptability of non-conventional modeling techniques blended with conventional modeling techniques for economic analysis.

Key Words: Forecasting, Machine Learning, Macroeconomic Variables, Sri Lanka, Unemployment Rate

JEL Classification: C32, C53, E24, E27, E37, E66

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