The Application of Machine Learning Techniques as an Alternative to Economic Models for Exchange Rate Prediction

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Abstract:

This study addresses the Meese-Rogoff Puzzle by introducing the latest machine learning techniques as alternatives for exchange rate prediction. Using RMSE as a comparison metric, Meese and Rogoff found that economic models are unable to outperform the random walk model as predictors of exchange rates in the short term. Decades after this study, no statistical prediction technique has proven effective in overcoming this obstacle; even though there were positive results, they did not apply to all currencies and time periods. The recent advancement of artificial intelligence technologies has revolutionized exchange rate prediction methods.

Leveraging this technology, we applied five machine learning techniques aiming to overcome the Meese-Rogoff puzzle. We considered the daily period for the currencies of the Brazilian real, Japanese yen, British pound, euro, and Chinese yuan against the US dollar, over a time horizon from 2010 to 2023. Our results showed that none of the presented techniques managed to produce an RMSE lower than the Random Walk model; however, some of their performance, especially the LSTM and N-BEATS models, approached expectations, being superior to the ARIMA model. The results also suggest that machine learning models have unexplored potential, representing, in the long term, an effective possibility in the quest to surpass the Meese-Rogoff puzzle.

Keywords:

Exchange Rate, Machine Learning, Deep Learning.