THE DATA-CENTRIC FRAMEWORK FOR MULTI-CURRENCY TELEGRAPHIC TRANSFER EXCHANGE RATE ANALYSIS USING MACROECONOMIC INDICATORS IN SRI LANKA

S.P.Y Sithum Sasmika[1], E.R. Chathurika Sandamali, Kasunthika Ratiyalage[2], S.P.Y Sithum Sasmika [1]*

[1]Department of Computational Mathematics, General Sir John Kotelawala Defence University, Sri Lanka

[2] Edith Cowan University, Colombo, Sri Lanka

*Corresponding author: 40-dba-0026@kdu.ac.lk

Abstract

Exchange rates are central to international trade, financial management, investment decisions, and monetary policy, particularly in developing economies exposed to domestic and global macroeconomic shocks. In Sri Lanka, Telegraphic Transfer (TT) exchange rates exhibited marked fluctuations during the recent economic crisis, creating challenges for financial institutions, businesses, and policymakers. Although numerous studies have examined exchange-rate forecasting, limited attention has been given to integrated, Sri Lanka-specific multi-currency analysis of TT rates and macroeconomic indicators. This study develops a data-centric analytical framework for the United States Dollar (USD), British Pound Sterling (GBP), Euro (EUR), and Japanese Yen (JPY) using data from 2013–2025. Historical TT exchange rates from the Central Bank of Sri Lanka were integrated with macroeconomic and global indicators from the International Monetary Fund, World Bank, and Federal Reserve Economic Data. Data quality was audited for date continuity, missingness, duplicate dates, TT buy-sell consistency, and mid-rate accuracy, with missing observations identified rather than automatically imputed. Daily log returns were derived to analyze currency movements, median absolute deviation-based diagnostics were used to flag unusually large movements without automatically removing genuine crisis-period observations, and 30-observation rolling annualized volatility was calculated to capture changing market instability. Cross-currency relationships were examined using daily TT log returns rather than price-level correlations. Results indicate pronounced exchange-rate instability during the crisis period and co-movement among selected currencies. The study contributes a reproducible, quality-audited, multi-currency analytical foundation tailored to Sri Lanka and supports subsequent point-in-time feature engineering, time-varying relationship analysis, and forecasting-model development and evaluation.

Keywords: Telegraphic Transfer Exchange Rates, Macroeconomic Indicators, Multi-Currency Analysis, Feature Engineering, Sri Lanka