README File

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Contents

1 Introduction

This README file provides instructions to run the project on forecasting the nominal effective exchange rate of Switzerland. The project includes scripts for data preparation, model estimation, forecasting, and evaluation. Each script is described in detail, along with guidance on how to update the data for reproducibility and transferability.

2 Project Workflow

To run the project:

1. Place all scripts and datasets in the same working directory.
2. Open the `Main.R` script in RStudio.
3. Ensure the working directory is correctly set in `Main.R`.
4. Source the `Main.R` script to execute all steps in order.

3 Scripts Overview

3.1 `Packages Loading.R`

This script ensures that all required R packages are installed and loaded. It sets the CRAN mirror and installs packages if they are not already available. Refer to Section 5 for the list of required packages.

3.2 `Data Treatment.R`

Purpose: This script handles data cleaning, preprocessing, and interpolation. Raw data is processed into usable formats for further analysis.

3.3 `Data Analysis.R`

Purpose: Conducts stationarity testing, adjusts for seasonality, and visualizes key variables. Outputs include graphs and summary statistics of the data.

3.4 `Model Estimation.R`

Purpose: Estimates the Taylor Rule and Uncovered Interest Rate Parity (UIP) models to forecast exchange rates. Outputs include estimated coefficients and diagnostic metrics.

3.5 `Point Forecasting.R`

Purpose: Generates point forecasts for NEER (Nominal Effective Exchange Rate) changes across multiple horizons (1, 6, 12, and 18 months).

3.6 `Forecast Evaluation.R`

Purpose: Evaluates the accuracy of the forecasts using comparison metrics against a random walk benchmark.

3.7 `Density Forecast.R`

Purpose: Evaluates the quality of prediction intervals and density forecasts. It includes Likelihood Ratio (LR) tests, Probability Integral Transform (PIT) analysis, and autocorrelation testing.

4 Updating Data

This section describes the datasets used in the project and provides instructions on how to update them to ensure that the project can be easily transferred to another economist. The datasets must be updated with the latest data available from the specified sources. The following is a list of datasets, their sources and their purposes.

4.1 Datasets Overview

- **Trade Shares Data:**
  - **Source:** Swiss Federal Statistical Office (SFO).
  - **Description:** Annual trade shares for USA, Euro Area, China, and UK. Derived using the formula:

$$TradeShare = \frac{Exports + Importsforacountry}{TotalExports + TotalImports}$$

  - **File:** `Trade_Shares.csv`.
- **Nominal Exchange Rates Data:**
  - **Source:** Investing.com.
  - **Description:** Monthly nominal exchange rates for key trading partners.
  - **File:** `Nominal_Exchange_Rate.csv`.
- **Inflation Data:**
  - **Source:** Federal Reserve Economic Data (FRED).
  - **Description:** Year-over-year percentage changes in inflation for USA, Euro Area, China, and UK.
  - **File:** `Inflation.csv`.
- **Quarterly Industrial Production Data (Switzerland):**
  - **Source:** Federal Reserve Economic Data (FRED).
  - **Description:** Switzerland's quarterly industrial production index (Base 100 set to March 2021).
  - **File:** `Industrial Index Switzerland Quarterly FRED.xlsx`.
- **Monthly Industrial Production Data (Switzerland):**
  - **Source:** Swiss Statistical Office (SFO).
  - **Description:** Switzerland's monthly industrial production index (Base 100 set to March 2021).
  - **File:** `Industrial Index Switzerland Monthly CONF.xlsx`.
- **Industrial Production Data (China):**
  - **Source:** Federal Reserve Economic Data (FRED).
  - **Description:** China's monthly industrial production index (Base 100 set to March 2021).
  - **File:** `Industrial_Production_China.csv`.
- **Industrial Production Data Interpolated:**
  - **Source:** Federal Reserve Economic Data (FRED).

  - **Description:** Monthly industrial production indices for all countries, standardized to a base of 100 as of March 2021. Interpolations are performed for Switzerland and China.
  - **File:** `Industrial_Production_Interpolated.csv`.

- **Industrial Production Data Interpolated and Forecasted:**
  - **Source:** Federal Reserve Economic Data (FRED).
  - **Description:** Monthly industrial production indices for all countries, standardized to a base of 100 as of March 2021. Forecasting for Switzerland, Euro Area, and UK is performed.
  - **File:** `Industrial_Production_Interpolated_Forecasted.csv`.

5 List of Required Packages

The following R packages are required for the project. They cover a range of functionalities, including data manipulation, statistical analysis, and visualization.

- **Data Processing and Analysis:**
  - `seasonal`: Seasonal adjustment for time-series data.
  - `tseries`: Statistical tests for time-series data (e.g., stationarity tests).
  - `tempdisagg`: Temporal disaggregation of quarterly data (e.g., Denton-Cholette method).
  - `forecast`: Time-series forecasting models, including ARIMA and exponential smoothing.
  - `sandwich`: Robust HAC covariance estimation for regression models.
  - `strucchange`: Structural change analysis and QLR testing for regression models.

- **Data Visualization:**
  - `ggplot2`: Visualization of trends, distributions, and other graphical representations.

- **Data Import/Export:**
  - `openxlsx`: Export data to Excel files.
  - `readxl`: Import data from Excel files.
  - `writexl`: Write data to Excel files.

Run the script `Packages Loading.R` to automatically install and load all the required packages. This ensures that all dependencies are handled consistently and that the project environment is correctly set up.