

Project 2: Predicting Foreign Exchange Rates

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Due date: Nov 19 Midnight, 2017

Submission List

Please package the following documents in a single zip file, named with your student ID, and upload to IVLE before deadline.

1. A report not more than 10 pages with 1.5 spacing, which documents the methods using, main findings, and interpretations. Codes and software printouts **should NOT** be included in the report.
2. Prediction results in a txt file with a single column, named with your student ID.
3. Complete codes used for the analysis, with reasonable details of comments

In addition, please submit a hard copy of your report to my office before deadline.

1 Introduction

The dataset (training.csv) contains the series of daily foreign exchange rates from 31 Dec 1979 to 31 Dec 1996. The base currency is USD, and exchange rates eight pairs are included:

1. AUD/USD: Australian dollar vs US dollar
2. GBP/USD: British Pound vs US dollar
3. CAD/USD: Canadian dollar vs US dollar
4. NLG/USD: Dutch Guilders vs US dollar
5. FRF/USD: French franc vs US dollar
6. DEM/USD: German marks vs US dollar
7. JPY/USD: Japanese yen vs US dollar
8. CHF/USD: Swiss franc vs US dollar

For your background information, exchange rates are determined in the foreign exchange market, which is open to a wide range of different types of buyers and sellers, and where currency trading is continuous: 24 hours a day except weekends. A market-based exchange rate will change whenever the values of either of the two component currencies change. A currency will tend to become more valuable whenever demand for it is greater than the available supply. It will become less valuable whenever demand is less than available supply.

The objective of this project is to build statistical models to forecast exchange rates in the future, using only the historical information provided. The project will contains two parts.

2 Part I

In this part, you only need to focus on the series JPY/USD. You are required to analyze the single time series, and develop a model suitable for it. You may consider the following issues when you develop your model.

- Would regression on time be sufficient to model the series?
- Is it reasonable to assume the time series between 1979 and 1996 have the same characteristics? Can dummy variables be created to improve the accuracy of the regression-on-time model?
- Which exponential smoothing parameters are more relevant? What should be the smoothing parameter(s) for it?
- Any seasonable patterns? Is it stationary? Is ARIMA model or SARIMA model helpful?

You can use the one-step ahead prediction error to evaluate your model accuracy. You do **NOT** need to predict the rate of JPY/USD on the test dataset. Please also pay attention to the model assumptions, and model improvements based on diagnostic plots.

3 Part II

The objective of the second part is to develop a prediction model for JPY/USD. In addition to historical data of JPY/USD, you are also free to incorporate historical information of other variables in making your prediction. However, you need to take note that your prediction should not use any future information as input. For example, to predict the exchange rate on Oct-21-2016, you can use all information up to Oct-20-2016, but no information on or after Oct-21-2016. A few issues you can consider when developing the prediction model

- Which exchange rate(s) is (are) closely related to JPY/USD?
- If the two series are “correlated”, which one has the leading information? You might want to use the series leading the change to make predictions. For example, if the GBP/USD always

changes one day earlier than the change in JPY/USD, it can be a potentially good predictor, regardless whether they change in the same direction or opposite directions.

- How many lags should be included? You can generalize the autocorrelation plot across two series to identify the useful lags.

Once you set your model, you need to make predictions on the test datasets. The test data has the same format as the training data, but some of the entries of JPY/USD are missing, which you need to predict. Your prediction accuracy will contribute to the project scores.