Fin642 Project
Fall 2019

Prediction of USD/CNY Exchange Rate

Prepared by Group 5: Jessie Le, Jinesha Jain, Yi Jin, Zizhen Jia

Drexel University

Abstract

This project investigates the factors that affect exchange rate movements between USD and CNY and makes forecasting for future USD/CNY exchange rate. Current literature suggests that historical exchange rates are influenced by the difference between US and China in term of inflation rate, short-term interest rate, and forward premium. Using monthly data for the sample period from 2005M01 to 2015M12, this project estimates two types of models: time series model and regression model. The time series model is to extract the historical pattern to forecast future exchange rate between USD and CNY. The regression model is to link the exchange rate change to some economic fundamentals. The time series analysis suggests that the exchange rate change follows an autoregressive model using data from the most recent time period. The evidence from the regression model indicates that the change in exchange rate is positively correlated with the change in forward premium of the most recent time period and the difference of inflation rate and interest rate between US and China from the last period don't have significant effect on the change of USD/CNY exchange rate. The root of mean squared error suggests that the time series model outperforms the regression model.

Method and Data

Methodology: Time series model vs. Regression analysis

Data Source: Data stream international

Definition and measure of variables:

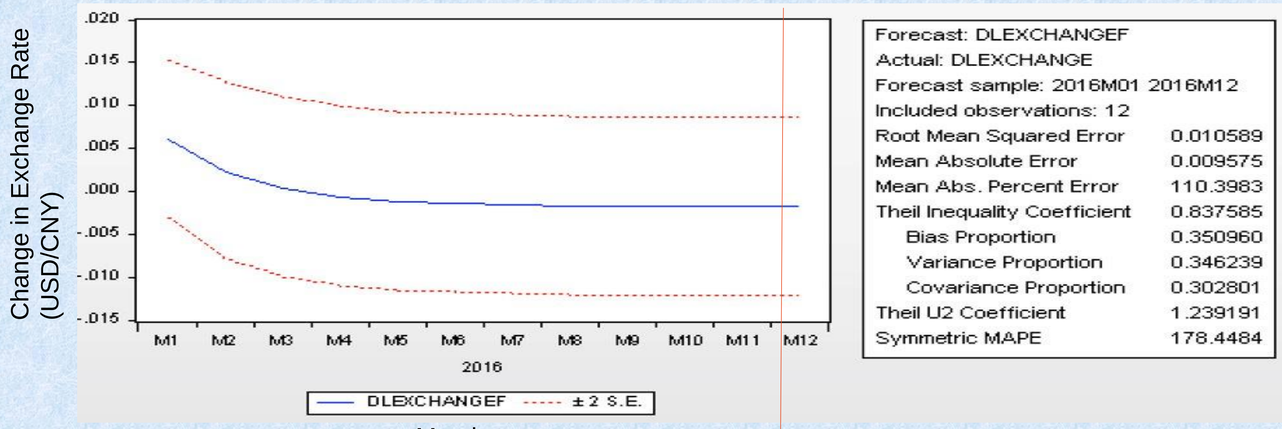
1. Inflation Rate: the natural log difference of consumer price
2. Interest Rate: one-month euro-currency deposit rates for each country
3. Exchange rate: prices of the Chinese currency per unit of the U.S. dollar
4. Spot rate: end-of-the-month spot exchange rate
5. Forward Rate: one-month forward exchange rate

Estimated Results

1. Time series model

In time series model, the original exchange rate between USD and CNY is nonstationary, and the series is stationary after taking first log difference on original rate. The ACF and PACF outputs identified the model of AR(1). Estimation output shows model is significant, diagnostic of residuals indicates residual is white noise, and forecasting result shows below along with estimation outputs. The out-of-sample period is Jan – Dec, 2016. The model is:

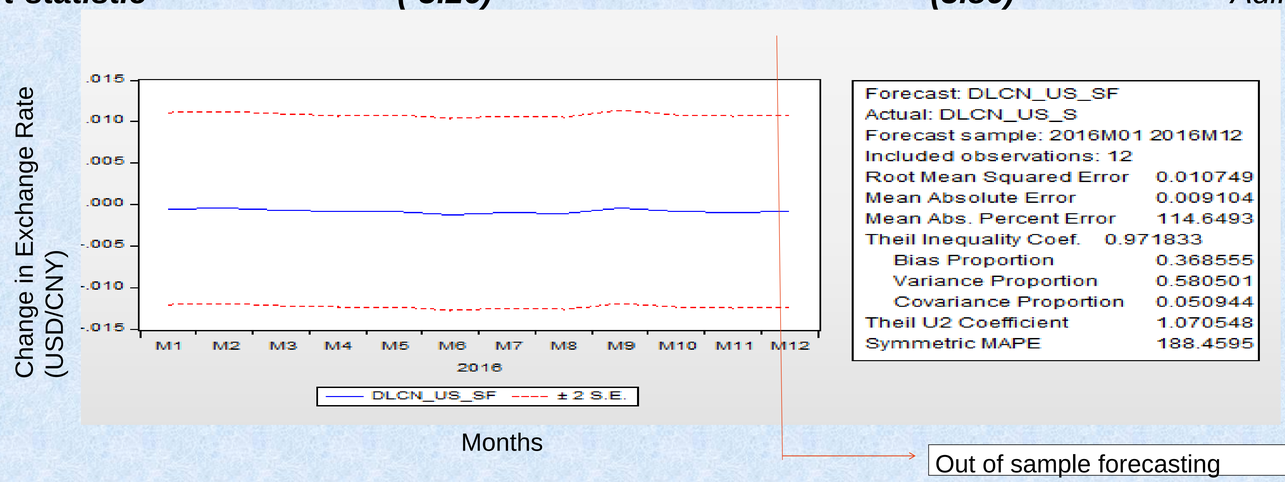
Δ Log Exchange Rate$_t$ = -0.0001 + 0.5208* Δ Log Exchange Rate$_{t-1}$ + error (*t*)
t-statistic ***(-2.22)*** ***(6.59)*** $AdiR^2$= 0.25



2. Regression model

In regression model, the exchange rate change is positively related with the forward exchange premium from the latest time period at 1% significant level. The model is:

Δ Log Exchange Rate$_t$ = -0.0017 + 0.6345* [Log Forward Rate$_{t-1}$ - Log Spot Rate$_{t-1}$] + error (*t*)
t-statistic ***(-3.26)*** ***(3.86)*** $AdiR^2$= 0.11



Conclusion

Evidence suggests that exchange rate between USD and CNY can be predicted using data from previous months. The time series model is superior to the regression model on the basis of both out-of-sample predictions and in-sample estimations.

Future Work

Although time series model outperforms regression model in this specific case, it is useful to combine both models to get more insights about the relationship between exchange rate and other economic indicators. We also suggest tracking and updating time series model on a daily basic to update the model with patterns from the newest data. In addition, the methodologies employed in this project can be applied to exchange rate between any pairs of currencies.

References

1. Thomas C.Chiang, 2005. International Parity Conditions and market risk, *Encyclopedia of Finance,* Chapter 6, 344 – 355.
2. Richard H Clarida, Mark P.Taylor, 1997. The term structure of forward exchange premiums and the forecastability of spot exchange rates: Correcting the errors, *The Review of Economics and Statistics,* Number 3, 353 – 356.

Acknowledgement

We are grateful to the support of Business Condition and Forecasting course – FIN642 as well as the advice from our professor, Dr Thomas Chiang.