Integrated World Economics

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Introduction

This project aims to look at the correlation between the relative value of a currency and trade value between those countries. Looking at the data and after discussing the context I decided on the following Null Hypothesis:

H0: There is no significant relationship between the relative value of a currency and the trade value between those countries.

H1: There is a significant relationship between the relative value of a currency and the trade value between those countries.

Methods

Data sets:

1. Currency data set -This data set stores the daily value of currencies in USD equivalent from January 1994 to January 2020
(https://www.kaggle.com/kianwee/foreign-exchange-rate-1994-2020?select=Exchange_Rate_Report.csv)

2. WTO Trade data set - It contains the product and monetary value in equivalent USD of the product imported and exported by India to every other country for the years 1999, 2004, 2009, 2014, 2019
(https://comtrade.un.org/data/)

Pre-processing & visualisation - Since both the data sets were big, hence pre-processing techniques were employed to reduce their size. For the currency data set, I used a hierarchical average system to represent all the data points in 5-yr intervals to align with the WTO data intervals.

This was only for visualisation purpose. To train the model I continued to use the raw data set to preserve the variance. For visualisation I chose 5 representative currencies with different trade relations (sum export + import) with test country (India) viz. big trade partners like US, China, non-existent trade relations like Canada, trade relations like Thailand. I used PCA to reduce the columns of the trade data (approx. 70 parameters) set to 2 columns which accounted for 96% of variance in the data. For visualisation I chose the same representative countries as with the currency data set

Model:

After evaluating multiple models like Decision tree, logistic regression I chose to use multi-variable linear regression as the best fit model. I used India's currency as a test currency to be my predicted variable. The 53 other currencies were used as predictor variables. I used the coefficients assigned by the model to evaluate their significance (as rated by the regression model) to the prediction. I then cross-referenced the significant currencies with the trade values of the that country to check if it was a significant predictor of relative currency.

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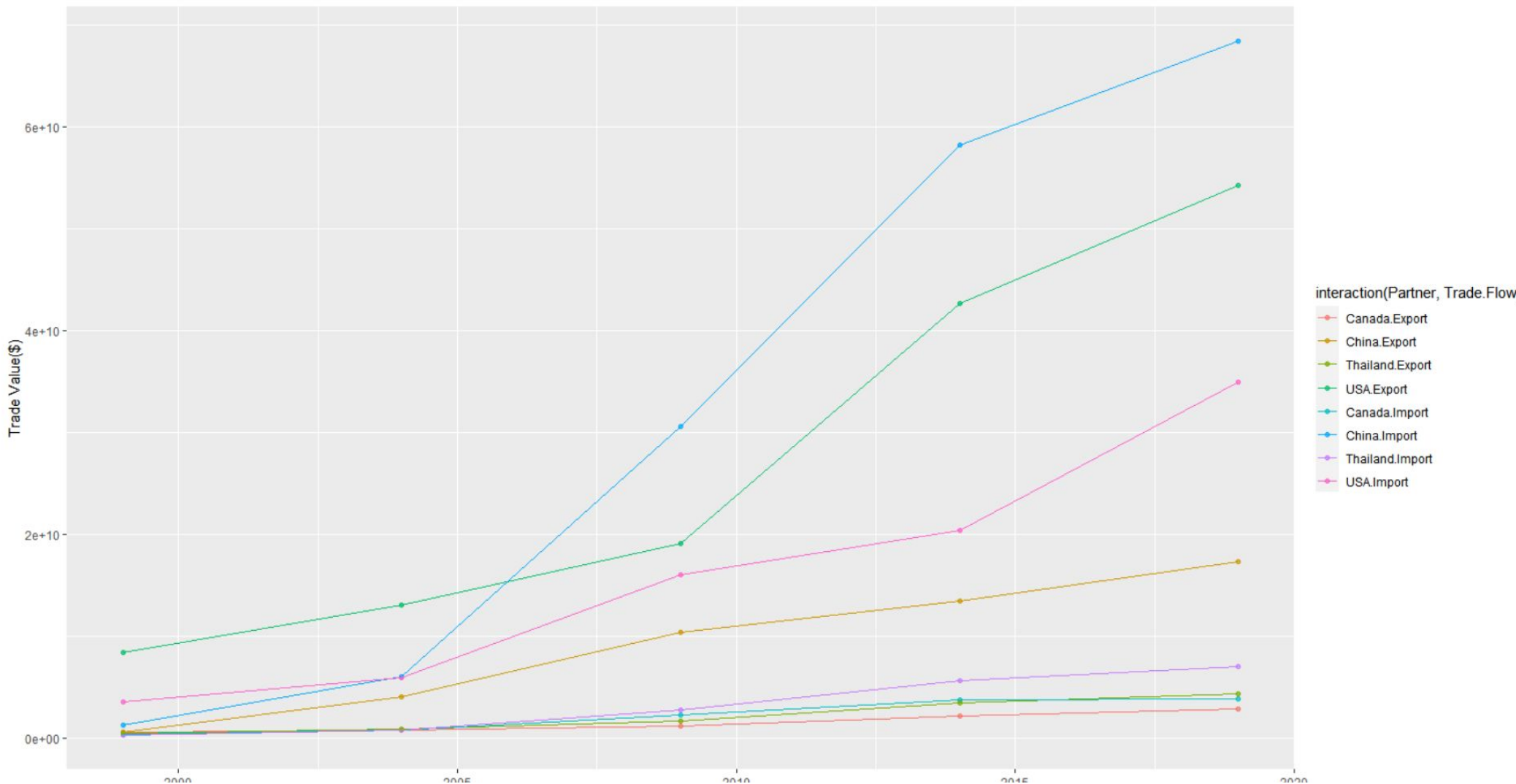
Graph of net import and export representative countries with India
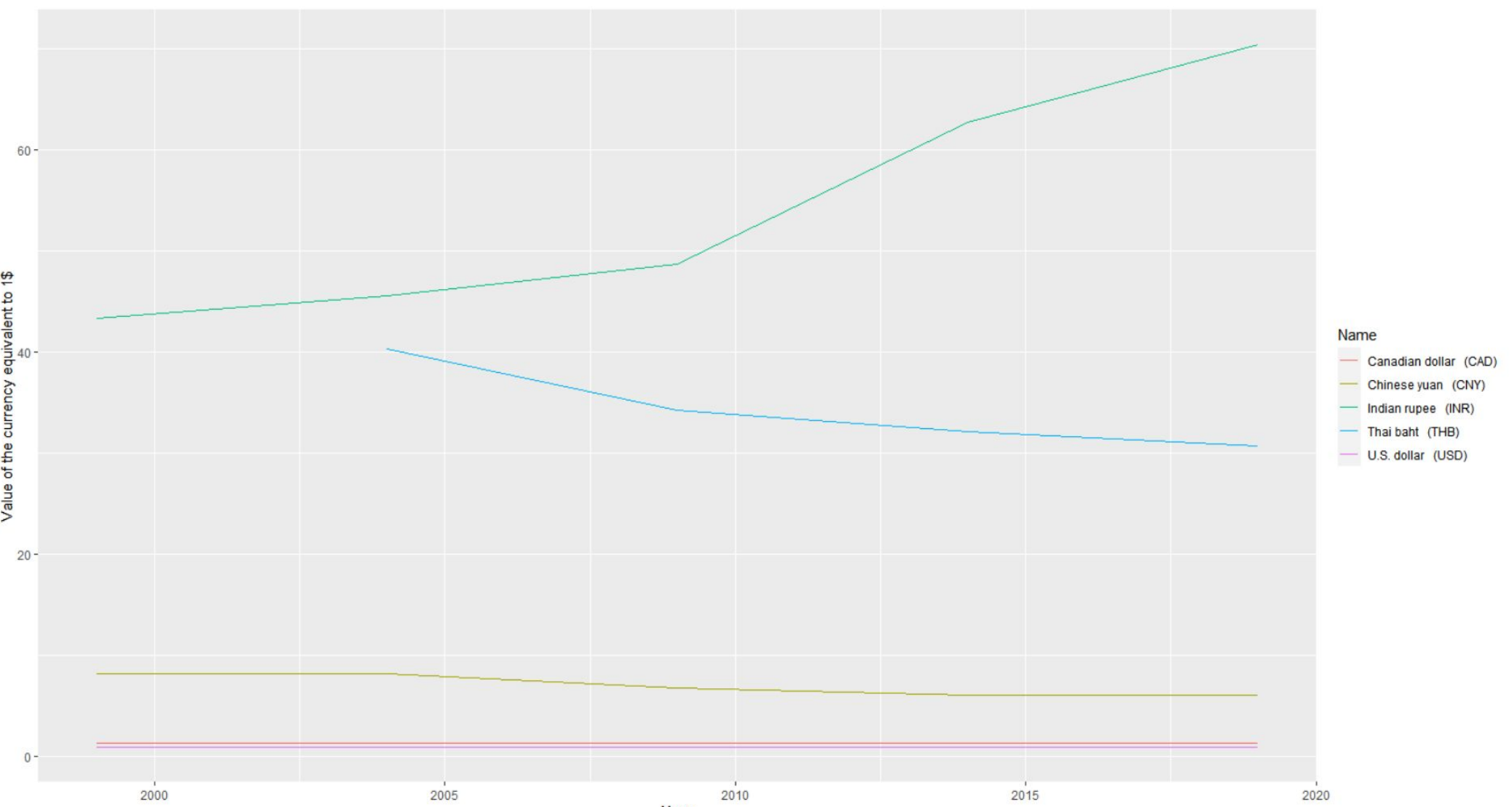
Graph of value of a currency in USD vs Time

Conclusions

Through this exercise it was found, that while trade value is a valid predictor of the relative value of a currency it is not a significant predictor. Hence the null hypothsis cannot be rejected.