

STA206 Project Proposal

Predicting Exchange Rates

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1. Group Membership

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2. Which Data to Analyze We use data from Quandl.com, a service that provides clean, documented data from a wide variety of sources including the US Federal Reserve, World Bank, and the National Bank of Korea. The data is loaded directly using a web API. Using this service will make it easier to repeat the analysis in the future, or conduct similar analyses between different countries.

There are 25 variables to analyze. 11 economic indicators for each country, as well as season (winter, spring, summer, fall), and possibly time. The number of observations(cases) is 403, one for each month from 1981 to 2014.

Exchange rate between Korean Won and US dollar is the primary Y variable.

Brief Description of Variables For each country we will examine the following variables.

- **gdp** The gross domestic product. Units: USD Million
- **unemployment rate** The percentage of the labor force who are unemployed and actively seeking work. Units: Percent (monthly)
- **exports** The total value of the goods and services produced domestically and purchased by foreign entities. Units: USD Million (Monthly)
- **imports** The total value of a country's imports of physical goods and payments to foreigners for services like shipping and tourism. Units: USD Million (Monthly)
- **interest rate** The monthly average of the central bank policy rate. This is the interest rate the central bank charges on loans to commercial banks. Units: Percent (Monthly)

- **inflation rate** The growth rate of the prices. (Monthly)
- **consumer produce index** The Consumer Price Index (CPI) is a measure of inflation related to the cost of living. It tracks the prices of essential goods and services like food and healthcare, and weighs those price changes according to their relative importance. The overall change in prices is the inflation rate, which can be positive or negative. The standard CPI fails to account for price drops resulting from improved production technologies, so the chained CPI was crafted to allow for a continuously changing basket of goods. Units: Index Points 2010=100, NSA (Monthly)
- **debt** The total amount of public and private debt owned by foreign creditors. Units: USD Million Current Prices, NSA (quarterly)
- **gdp deflator** The relative difference between the real and nominal GDPs. Units: Index Points NSA
- **government spending** The yearly expenditure of the federal government. Units: KRW Billion Constant Prices, SA
- **political party** Categorical variable for the political party of the president.

3. Questions of interest

- Can we predict the exchange rate between two countries using various economic indicators?
- When is the best time to exchange the currency from won(Korea currency) to dollar or vice versa?
- Can we find a predict/relationship equation that could be applied over other countries' currency?

4. Plan for the data analysis As usual, we start plotting, pair scatter plots, and comparing correlations to pick model candidates. Can we use cross-validation? Since we will have factors(season, presidential political parties), could we use 2-way anova the currency rate would different across season, politics? After obtaining a final model, we also will check if similar models can be used between other pairs of contries.

Anticipated problems Some variables like GDP are reported annually or quarterly. To use them with the variables that are at a monthly grain we will have to impute the missing values. Some variables in the data are paired (i.e. gdp for Korea, gdp for USA etc.), so they could be highly correlated. How well do we handle the correlations? Do we add time as variable?