Introduction

As students at an American University with rapidly increasing tuition and cost of living, financial aid has been a frequent thing on most of our minds, especially for international students. Along with managing student loans and visas, international students also have to worry about the fluctuating exchange rates in their respective countries. With the large impact that the Covid-19 pandemic had on the global economy, the exchange rates have been inconsistent making financial aid in the United States even more complicated. With this project we look to investigate the daily exchange rates between USD and Brazilian Real using the exchange rates for the previous 6 months, the inflation rates, and the interest rates from both countries. Using this data, we will use Bayesian modeling to show the impacts these factors have on the changing exchange rate. We plan to model the predicted rates for the next 6 months using factors that impact the exchange rate the most.

Data Analysis Plan

Starting this project required us to acquire large amounts of data on the key factors that relate to the conversation rates of Brazilian Real and United States Dollars. We may make a correlation with factors such as inflation and interest rates, public debt, cuts to the current account, and the amount of exports.

We focused on the exchange, inflation, and interest rates for the previous 6 months the inflation rates for more focused data.

There is a blessing in disguise for this data, as we are now in a post-COVID society, so there is value in seeing the trend of the economy in a more relaxed state to predict what could happen shortly due to the given circumstances.

Math formalism overview

Let D be the distribution of the exchange rate for the following four weeks, and let P be the six parameters (previous exchange rates, inflation rates, interest rates, public debts, current account balance, amount of exports) at a given moment. Then, we have:

$$P(D|P) = \frac{P(P|D) \cdot P(D)}{P(P)}$$

Posterior: it is what we want (to predict the exchange rates given the 6 parameters at the present moment).

Likelihood: we will assume that the prediction of the exchange rates work as a linear function in terms of our 6 parameters.

Priors: we will start with normal distributions for all 6 parameters. We will confirm one by one if this yields impossible or completely unreasonable values; if so, we will change the distribution.

Evidence: the evidence is an integral; we will ignore it for now (basically assuming it is equal to 1).