Project 2: Foreign Exchange Markets

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Introduction

The marketing and accounts receivable managers at our company notify us that we have significant exposure to exchange rates. Our functional currency is U.S Dollars (USD), but we operate in the United Kingdom, European Union, and Japan. The exposure to exchange rates hits the gross revenue of out financial lines.

Our cash flow is also affected by the ebb and flow of accounts receivable components of working capital in producing and selling several products. When the exchange rates are volatile, so are our earnings. The goal of this project is to explore the relationships between the different markets to get a better understanding of how our earnings are affected by the exchange markets. This is especially important as we have missed our earnings forecasts for five consecutive quarters.

Part 1

Importing the Data

First, we will load in time series data of the exchange rates for the European, United Kingdom, Chinese, and Japanese markets. We will obtain the csv file from the turing.manhattan.edu website and view the structure and a sample of the exchange rates file.

```
library(zoo)      #For creating time series objects
```

```
##
## Attaching package: 'zoo'
```

```
## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric
```

```
library(xts)      #For time series analysis
library(ggplot2)  #For creating graphics

#The URL for the exchange data data
URL <- "https://turing.manhattan.edu/~wfoote01/finalytics/data/exrates.csv"

#Reading in the exchange rates and omitting the missing data from the
#url provided by turing.manhattan.edu and keeping the dates as characters
exrates <- na.omit(read.csv(url(URL), stringsAsFactors = F))
#Converting the string dates to actual dates
exrates$DATE <- as.Date(exrates$DATE, "%m/%d/%Y")

#Five columns (date, eur2usd, gbp2usd, cny2usd, jpy2usd)
head(exrates)     #Looking at the data
```

```
##         DATE USD.EUR USD.GBP USD.CNY USD.JPY
## 1 2013-01-28  1.3459  1.5686  6.2240   90.73
## 2 2013-01-29  1.3484  1.5751  6.2259   90.65
```

```
## 3 2013-01-30  1.3564  1.5793  6.2204   91.05
## 4 2013-01-31  1.3584  1.5856  6.2186   91.28
## 5 2013-02-01  1.3692  1.5744  6.2265   92.54
## 6 2013-02-04  1.3527  1.5737  6.2326   92.57
```

```
tail(exrates)     #Looking at the end of the data
```

```
##            DATE USD.EUR USD.GBP USD.CNY USD.JPY
## 1248 2018-01-19  1.2238  1.3857  6.3990  110.56
## 1249 2018-01-22  1.2230  1.3944  6.4035  111.15
## 1250 2018-01-23  1.2277  1.3968  6.4000  110.46
## 1251 2018-01-24  1.2390  1.4198  6.3650  109.15
## 1252 2018-01-25  1.2488  1.4264  6.3189  108.70
## 1253 2018-01-26  1.2422  1.4179  6.3199  108.38
```

```
str(exrates)      #Viewing the structure of the data
```

```
## 'data.frame':    1253 obs. of  5 variables:
##  $ DATE   : Date, format: "2013-01-28" "2013-01-29" ...
##  $ USD.EUR: num  1.35 1.35 1.36 1.36 1.37 ...
##  $ USD.GBP: num  1.57 1.58 1.58 1.59 1.57 ...
##  $ USD.CNY: num  6.22 6.23 6.22 6.22 6.23 ...
##  $ USD.JPY: num  90.7 90.7 91 91.3 92.5 ...
```

```
#1253 different instances of exchange rates
summary(exrates)  #From 28 Jan 2013 to 26 Jan 2018
```

```
##       DATE                USD.EUR         USD.GBP         USD.CNY
##  Min.   :2013-01-28   Min.   :1.038   Min.   :1.212   Min.   :6.040
##  1st Qu.:2014-04-25   1st Qu.:1.107   1st Qu.:1.324   1st Qu.:6.178
##  Median :2015-07-27   Median :1.158   Median :1.514   Median :6.261
##  Mean   :2015-07-26   Mean   :1.199   Mean   :1.474   Mean   :6.401
##  3rd Qu.:2016-10-24   3rd Qu.:1.314   3rd Qu.:1.573   3rd Qu.:6.627
##  Max.   :2018-01-26   Max.   :1.393   Max.   :1.716   Max.   :6.958
##     USD.JPY
##  Min.   : 90.65
##  1st Qu.:102.14
##  Median :109.88
##  Mean   :109.33
##  3rd Qu.:116.76
##  Max.   :125.58
```

```
# USD to  CNY appears to be the most steady
```

Question 1: Nature of Exchange Rates

Becuase we are interested in how each exchange rate changes over time we will want to look at how the different exchange rates appreciate and depreciate. To calculate the appreciation and depreciation over time, we will use the log difference technique. These calculated numbers will be in the units of percent change.