Predicting ExxonMobil's Stock Price

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Overview

- What is the stock market?
- Why is it important?
- History of the stock market
- Data
- Methods
- Findings

What is the stock market?

- Refers to public markets that exist for issuing, buying, and selling stocks that trade on a stock exchange or over-the-counter
- Stocks: represent fractional ownership in a company
- Stock market is a place where investors can buy and sell ownership of investible assets
- Once an investor purchases a share of stock in a company, that investor becomes part-owner in that company

Why is the stock market important?

- Allows for companies to go "public" on the market
- Companies can raise capital from investors, which allows for continued growth as well as providing opportunity to pay short term debts and obligations
- Investors can purchase shares of stock providing them the opportunity to share in the profits of the companies they invest in

History of the stock market

- Philadelphia Stock Exchange: First exchange to open in the US in 1790
- Stocks used to be traded with hand-written sheets of paper in coffee shops, while now mostly everything is electronic with the advancements in technology
- When stocks were traded, it was like the wild west. There was no regulation and companies could make thousands upon thousands of dollars when virtually no business had ever even taken place yet
- Theoretical strategy has always been to buy low and sell high, or short sell high and buy back low

Data

- Gathering proper and unbiased data is crucial to any analyzation and model to be run for any prediction process in practice
- Yahoo Finance is a very trusted source for market information
- Historical returns for XOM were gathered from Yahoo Finance since January 2nd, 1970 up to April 20th, 2018
- The data contains the open, high, low, close, and adjusted close prices for XOM each day
- Assumption: Efficient Market Hypothesis

Methods and Findings

- Quantmod
- chartSeries
- Technical Analysis
- Distribution Analysis
- Random Walk
- Monte Carlo Simulation

Quantmod

- The first method began with downloading and importing all of the stock data of interest
- To do so, the user needs to call on the "quantmod" package in R and use the "getSymbols" function

```{r}
# Calling quantmod
library("quantmod")

# Gathering historical stock data for Exxon Mobil since
January 2nd, 1970
getSymbols("XOM", src='yahoo', from="1970-01-02")

```

Figure: XOM Stock Performance

chartSeries

- In order to visualize the trends and performance of XOM, we can use the chartSeries function to create plots with additive properties

Figure: Stock Price Performance

Technical Analysis

- The study of past market action to try to gauge what the market might do in the future
- Using additive properties in the chartSeries function, we can produce TA for any time range

Figure: 2018 Technical Analysis

Distribution Analysis

- ▶ In order to simulate data through a Random Walk and iterate with Monte Carlo Simulation, it is important to analyze the distribution of the data

- ▶ After automating the log daily returns and using the ggplot2 function in the tidyverse package to produce a histogram, we see that the distribution of log daily returns is in fact a normal distribution
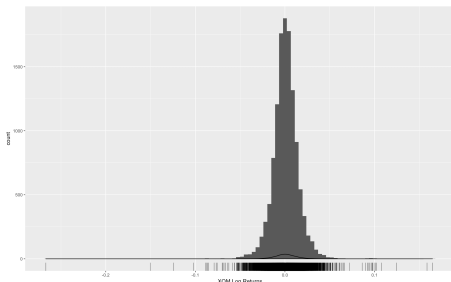

Figure: Log Daily Returns

Random Walk

- ▶ A Random Walk is a statistical phenomenon where a variable follows no discernible trend and moves seemingly at random
- ▶ Because the mean and standard deviation of the log return data was found, this random walk experiment can in fact be produced
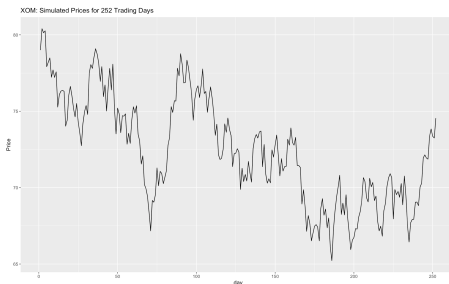- ▶ This one Random Walk shows that we would lose money. Is it trustworthy?

Figure: Random Walk

Monte Carlo Simulation

- ▶ Used to model the probability of different outcomes in a process that cannot easily be predicted due to the intervention of random variables.

- ▶ Technique used to understand the impact of risk and uncertainty in prediction and forecasting models
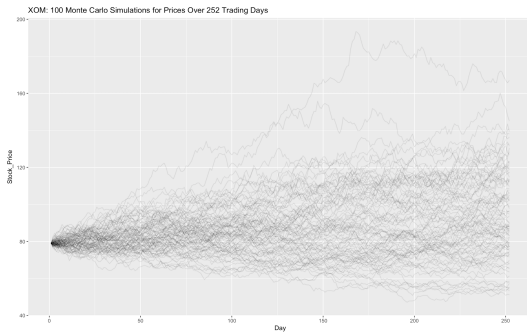

Figure: Monte Carlo Simulation

Results

- The 95 percent confidence interval is between 54.72 and 140.11
- The median, or most likely estimated price is 89.17

0.5%	2.5%	25%	50%	75%	97.5%	99.5%
52.29	54.72	77.17	89.17	112.95	140.11	156.13

Figure: Estimated Prices

What did we learn?

- The Stock Market refers to public markets that exist for issuing, buying, and selling stocks that trade on a stock exchange or over-the-counter
- The Stock Market allows for companies to go "public" on the market
- Theoretical strategy has always been to buy low and sell high, or short sell high and buy back low
- Applying Technical Analysis
- Analyzing Data
- Applying Random Walk Theory
- Applying Monte Carlo Simulation