An Analysis on Hypothetical Portfolio: 10/01/2018 - 12/31/2018

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Total Earnings after Holding Period: $1237.40

Introduction

The purpose of this report is to explore the outcome of our portfolio during our holding period of October 1 through December 31, 2018. We first configure data from YahooFinance to compile into a dataset and write out into a .CSV file, attached to the email sent as a part of this report. Then we will print out the Consensus Sell-Side Earnings Estimates, provided by Zacks.com. Finally, we will perform exploratory analytics to discover why our total earnings of our portfolio turned out as $1237.40. We explore 4 distinct periods, as delineated by Graph 2 and explore the major factors at play affecting the largest contributors in those periods.

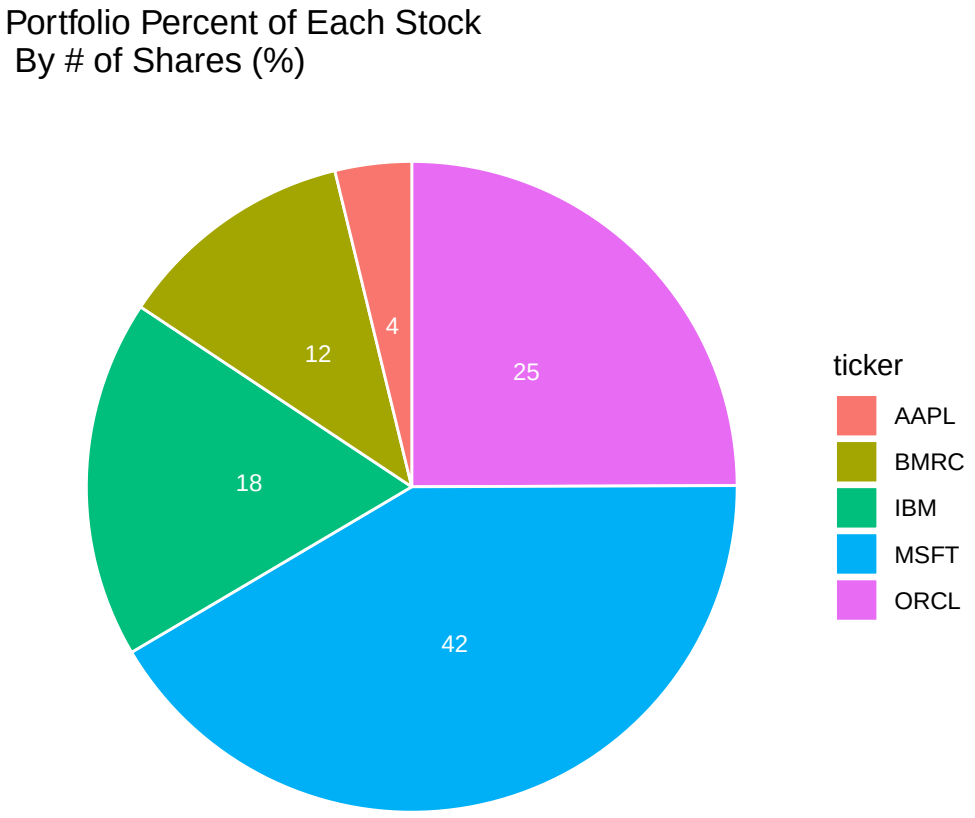
The output of our given analysis gives us a .CSV file with the following columns:
- Date
- xClose – the stock price close at the end of a specific day
- xDailyReturnPS – the difference in stock price close between today and yesterday
- xDailyTotalReturns – xDailyReturnPS * the amount of shares for each company (negative if short, positive if long)
- TotalDailyReturns – sum of all xDailyTotalReturns; demonstrates total gain/loss each day
- TotalReturns – the sum between today's TotalDailyReturns and yesterday's TotalReturns

Portfolio Summary

1. MSFT 350 Shares Long
2. ORCL 210 Shares Short
3. IBM 150 Shares Short
4. AAPL 32 Shares Long
5. BMRC 100 Shares Long

We assume that a Long share corresponds to profit when a stock price increases, and a Short share corresponds to profit when a stock price decreases.

```
piechart
```

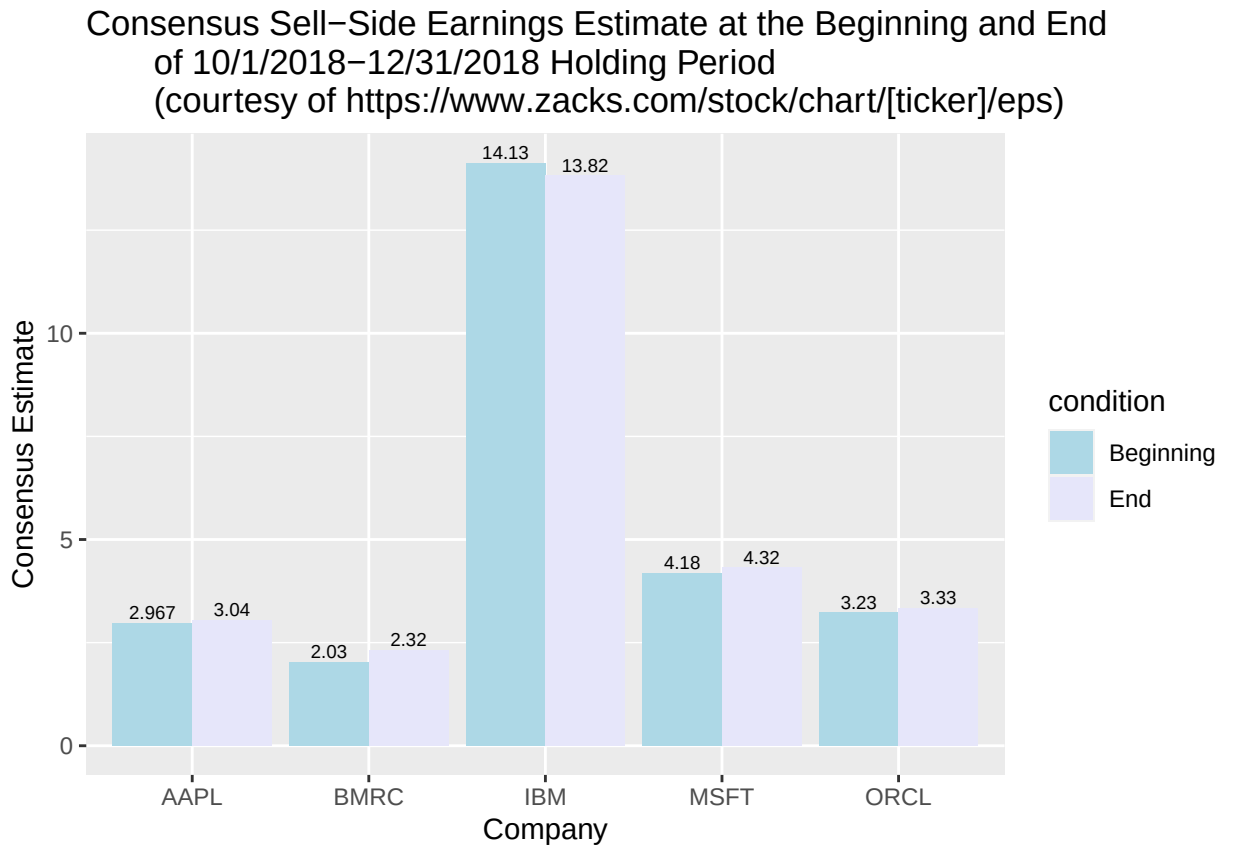


Graph 0: Percent Share of Each Stock in Our Portfolio
We can see that Microsoft has the largest stakes in our portfolio, holding 42% of the investment, and Apple has the least, holding only 4% of the investment.

Consensus Sell-Side Earnings Estimates
Below we get data from the following URLs in order to show consensus sell-side earnings estimates, and then graph them so that they are more easily readable.

https://www.zacks.com/stock/chart/AAPL/eps
https://www.zacks.com/stock/chart/BMRC/eps
https://www.zacks.com/stock/chart/IBM/eps
https://www.zacks.com/stock/chart/MSFT/eps
https://www.zacks.com/stock/chart/ORCL/eps
https://docs.data.nasdaq.com/docs/in-depth-usage-1

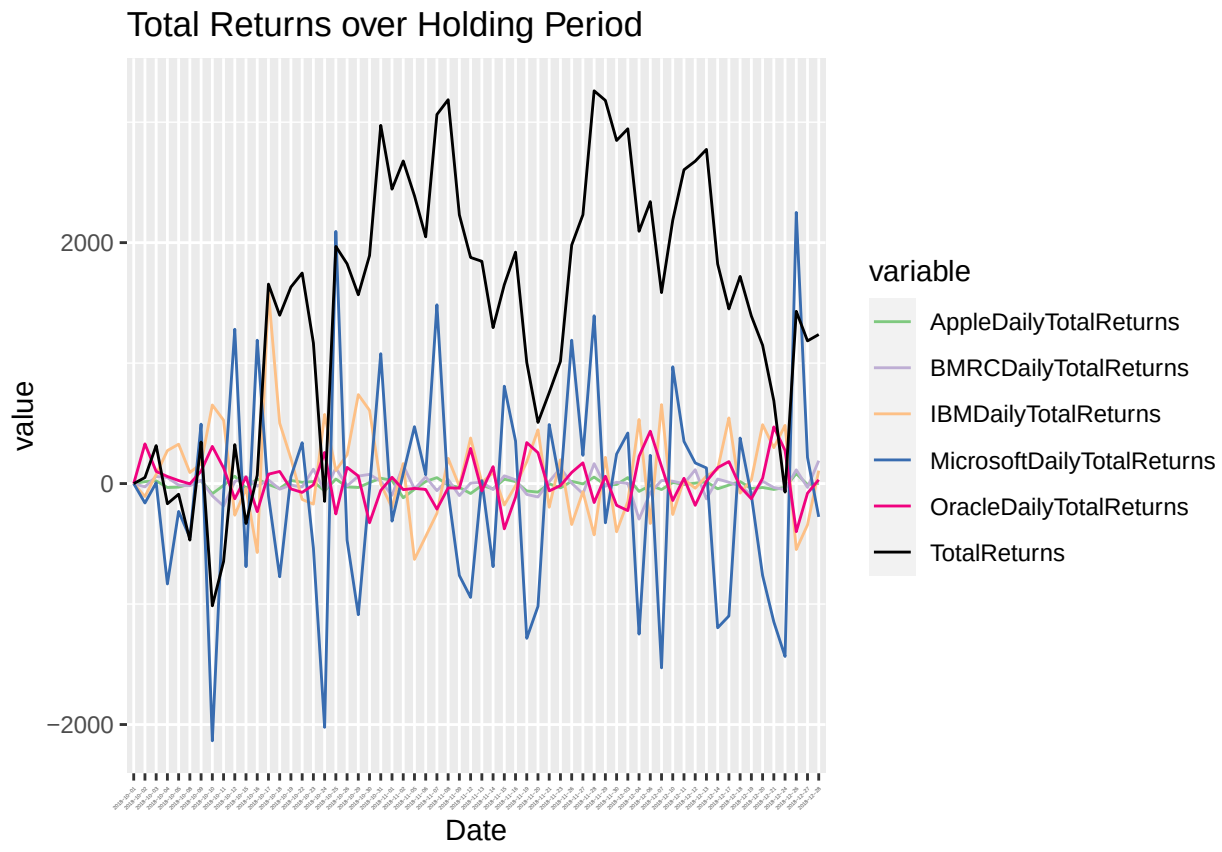
```
graph1
```



Graph 1: We can see that all stocks have an expected increase in EPS, except for IBM, which we have chosen to short in our portfolio.
***A note on this figure: each consensus estimate is from 9/30/2018 and 12/31/2018, except for ORCL, which was collected on 8/31/2018 and 11/30/2018

Analysis: What were the major factors impacting performance?
Here we will graph TotalReturns against xDailyTotalReturns to explore the possible impacts on this portfolio's earnings during the holding period.

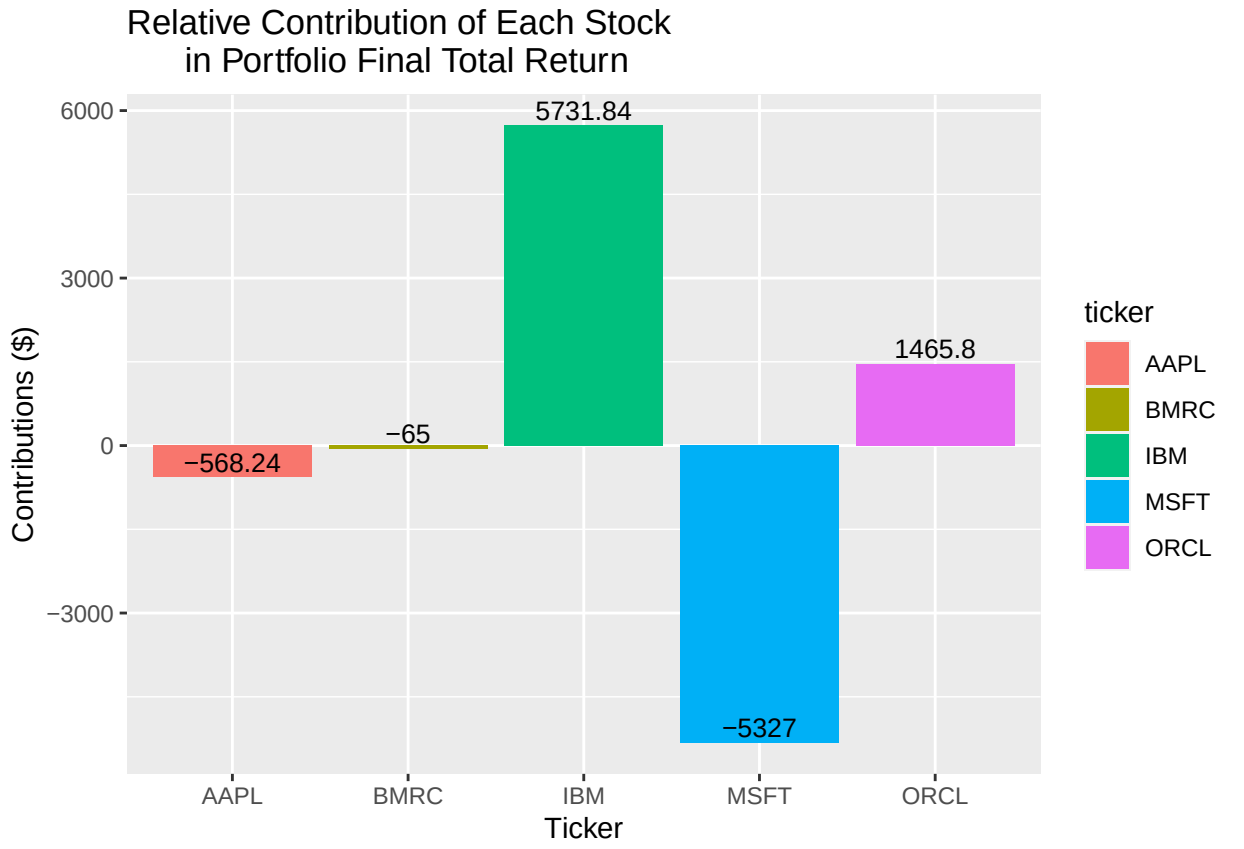
```
df <- master %>%
  select(Date, TotalReturns, AppleDailyTotalReturns, BMRCDailyTotalReturns, IBMDailyTotalReturns, Micros
  gather(key = "variable", value = "value", -Date)

graph2 <- ggplot(df, aes(x = Date, y = value, group = variable)) +
  geom_line(aes(color = variable)) +
  scale_color_manual(values = vib) +
  theme(axis.text.x = element_text(angle = 45, hjust = 1, size = 1.5)) +
  labs(title = "Total Returns over Holding Period")
graph2
```



Graph 2: From this graph, we can see four distinct moments that we will further categorize:
Period 1: 10/1 to 10/24 characterized by relative stability and then massive growth
Period 2: 10/24 to 11/20 characterized by massive growth and then equally massive loss
Period 3: 11/20 to 12/24 characterized by the same trends as period 2
Period 4: 12/24 to 12/28 characterized by final growth until the end of the holding period

It is important to note that each [ticker]DailyTotalReturns lines indicates a change in the scaled EPS values, not a total value. Any value above 0 is still a gain in Total Earnings, even if the line itself is dropping.
***A larger version of this graph will be attached.

```
graph3 <- ggplot(cdf, aes(x = ticker, y = contribution, fill = ticker)) +
  geom_bar(stat = "identity") +
  geom_text(aes(label=round(contribution,2)), vjust=-0.3, size=3.5) +
  labs(title = "Relative Contribution of Each Stock
      in Portfolio Final Total Return") +
  xlab("Ticker") +
  ylab("Contributions ($)")
graph3
```



Graph 3: We can see from this graph that the majority of the contributions of our final earnings comes from Microsoft and IBM. We will spend the majority of our research into these two companies throughout our exploration of our four main periods.

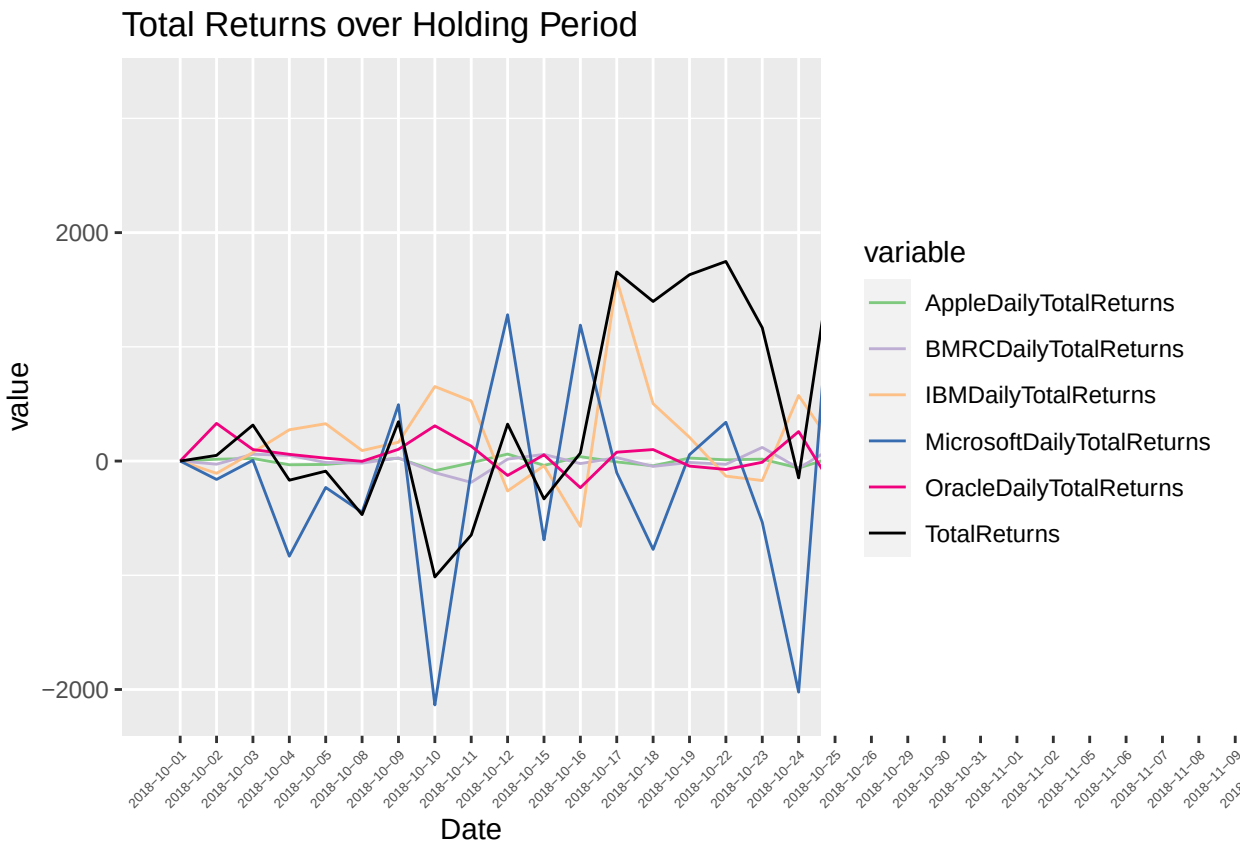
Period 1: 10/1 to 10/24

General factors at play during all periods could be policy mistakes by the Federal reserve, rising interest rates, weakness in banking sector, growing deficits from Trump's 2017 corporate tax cut, Midterm election jitters, seasonal October volatility, Brexit, Italy's budget crisis, and more. (https://www.marketwatch.com/story/why-the-dow-tumbled-600-points-and-the-nasdaq-fell-into-correction-territory-for-the-first-time-in-2-years-2018-10-24)

We see that all stocks are decreasing, so the only reason we would be gaining towards the latter half of Period 1 is if our short stocks (IBM & ORCL) were decreasing. In fact, this is the case. IBM experienced a 15% decrease in the latter half of Period 1 (Fig. 4d & 4e). Oracle experiences an 8% decrease during this period, while IBM experiences an 18% decrease, contributing in gains to our total returns. Facebook and Ford were also dropping dramatically during this period, especially around October 10th–one factor could be generally the reducing returns in tech companies during October volatility. Additionally, cloud service growth slowed considerably in that period for IBM, as it was competing against Google, Amazon, and Microsoft's much user-friendly interfaces for cloud services. Oracle's SQL databse is much more expensive and difficult to operate than other SQL databases emerging in the market. (https://www.ft.com/content/f1b88258-6df4-3f88-a2f6-84922cffba7b).

Microsoft has largest impact, as shown by Figure 4c. Though no longer serving in any official capacity to the company, co founder Paul Allen died from cancer during this period, and the Windows 10 updates seemed to be having problems, which could contribute to its 10% decrease during the period. Since we hold 350 shares of Microsoft, which is 41.6% of our portfolio holdings, even small fluctuations will make large impacts on our earnings.

```
graph2 + coord_cartesian(xlim = c(0, 18)) +
  theme(axis.text.x = element_text(angle = 45, hjust = 1, size = 5))
```



Graph 2.1: Total Returns vs. Daily Total Returns for each stock during Period 1 (10/1 to 10/24)

```
par(mfrow=c(2,3))
plot(master$AppleClose, xlim = c(1,18), type = "o", ylab = "Apple Close", xlab = "Fig. 4a")
plot(master$BMRCClose, xlim = c(1,18), type = "o", ylab = "BMRC", xlab = "Fig. 4b")
plot(master$MicrosoftClose, xlim = c(1,18), type = "o", ylab = "Microsoft", xlab = "Fig. 4c")
plot(master$OracleClose, xlim = c(1,18), type = "o", ylab = "Oracle", xlab = "Fig. 4d")
plot(master$IBMClose, xlim = c(1,18), type = "o", ylab = "IBM", xlab = "Fig. 4e")

par(mfrow=c(1,1))
```

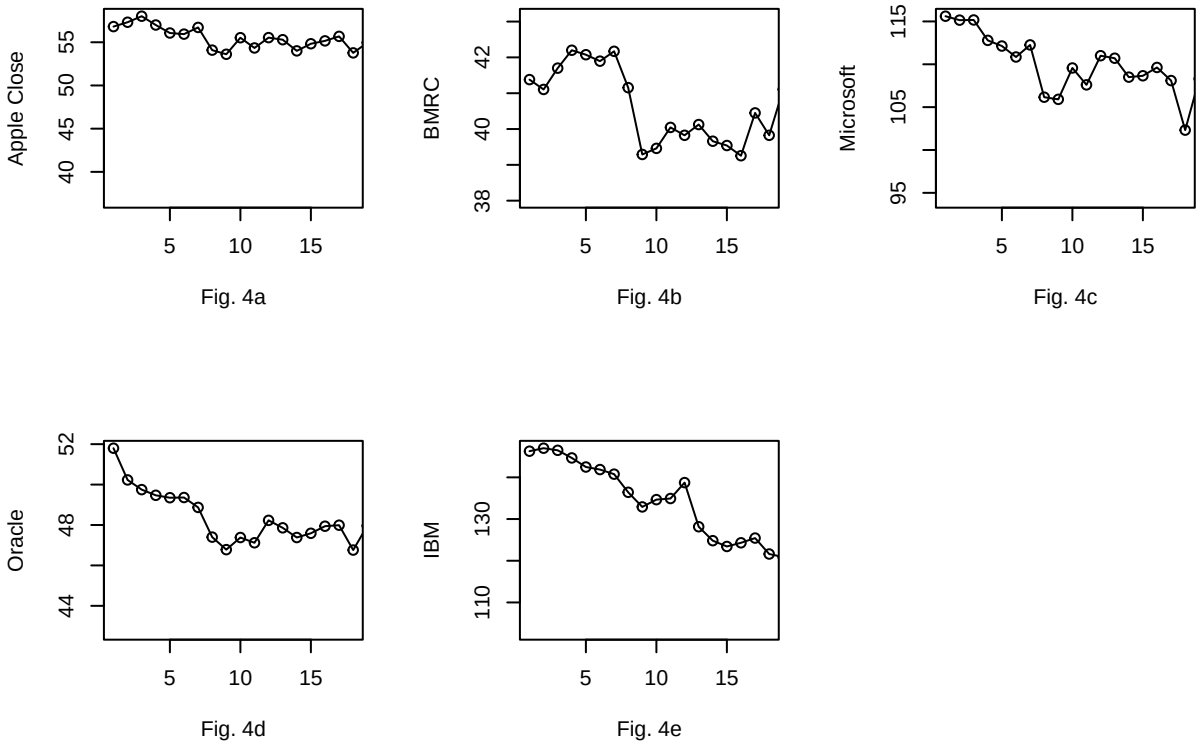


Figure 4a-4e: Daily close during Period 1 for each portfolio stock.

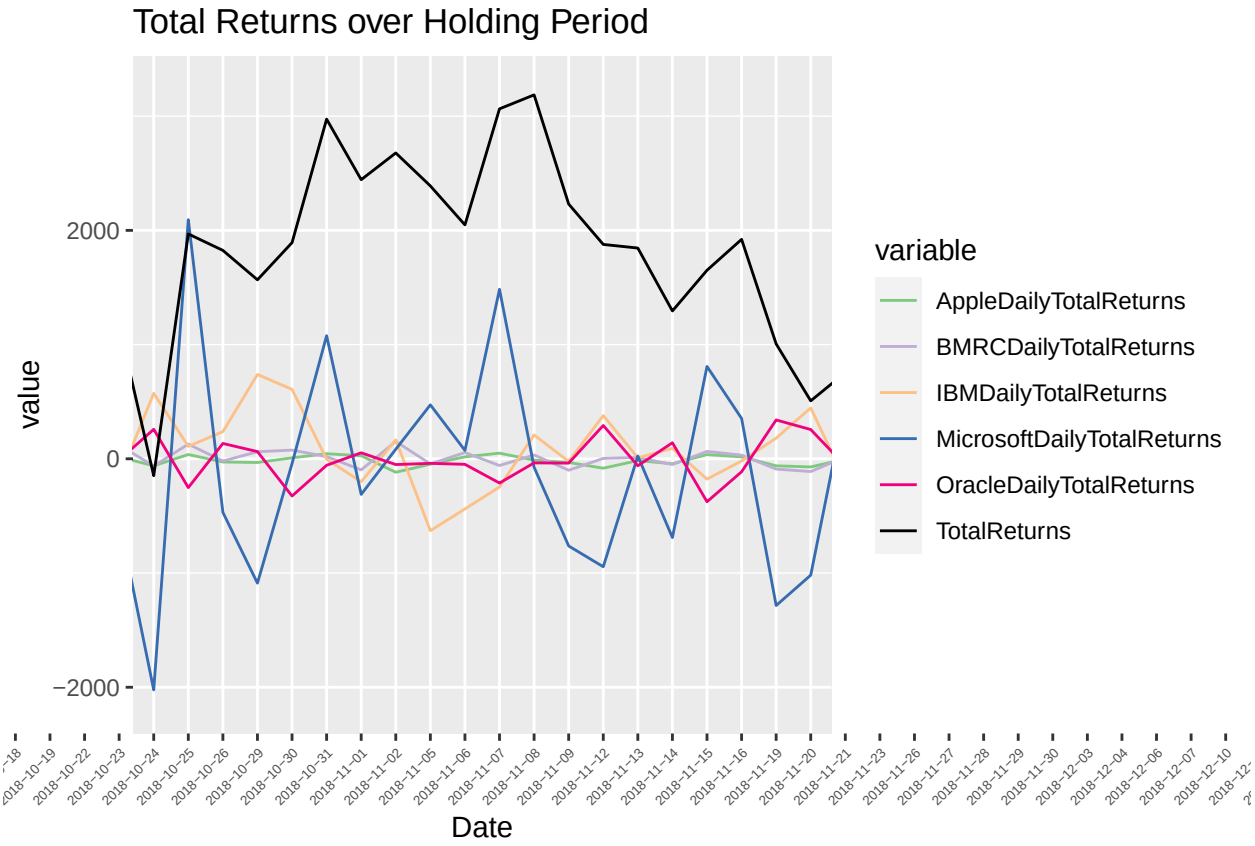
Period 2: 10/24 to 11/20

In this period we see BMRC and Microsoft (Fig. 5b & 5c) closely follow the trend of TotalReturns in Graph 2.2, perhaps indicating some influences at play. In addition, towards the end of the period, where our Total Returns falls, Oracle (Fig. 5d) also increases, and this is a shorted stock. Microsoft and Oracle seem to be the main factors influencing our total returns in this period, So we explore the news from Oracle's increase in stock, Microsoft's increase and decrease in stock, and BMRC's increase during this time.

During this time, Trump's trade war against China worried tech investors, which could contribute to Apple and Microsoft's fall in stock. Apple also had disappointing iPhone sales. However, during this period, Microsoft Azure services helps software maker top estimates, and Office 365 posts robust gains in flat PC market. This could correlate to Microsoft's dramatic fluctuations during this period. During this period, however, Microsoft experienced a low of 102 and a high of 112 (Fig. 5c), indicating only 9-10% variation in prices, which could also be due to technical factors.

Warren Buffet had previously purchased 41.4M in shares from Oracle, which would contribute to the stock's increase. Generally, Oracle only experienced an 8% increase, so this could be due to technical fluctuations in the stock market rather than major factors.

```
par(mfrow=c(1,1))
graph2 + coord_cartesian(xlim = c(18, 37)) +
  theme(axis.text.x = element_text(angle = 45, hjust = 1, size = 5))
```



Graph 2.2: Returns vs. Daily Total Returns for each stock during Period 2 (10/24 to 11/20)

```
par(mfrow=c(2,3))
plot(master$AppleClose, xlim = c(18,37), type = "o", ylab = "Apple Close", xlab = "Fig. 5a")
plot(master$BMRCClose, xlim = c(18,37), type = "o", ylab = "BMRC", xlab = "Fig. 5b")
```

```
plot(master$MicrosoftClose, xlim = c(18,37), type = "o", ylab = "Microsoft", xlab = "Fig. 5c")
plot(master$OracleClose, xlim = c(18,37), type = "o", ylab = "Oracle", xlab = "Fig. 5d")
plot(master$IBMClose, xlim = c(18,37), type = "o", ylab = "IBM", xlab = "Fig. 5e")
```

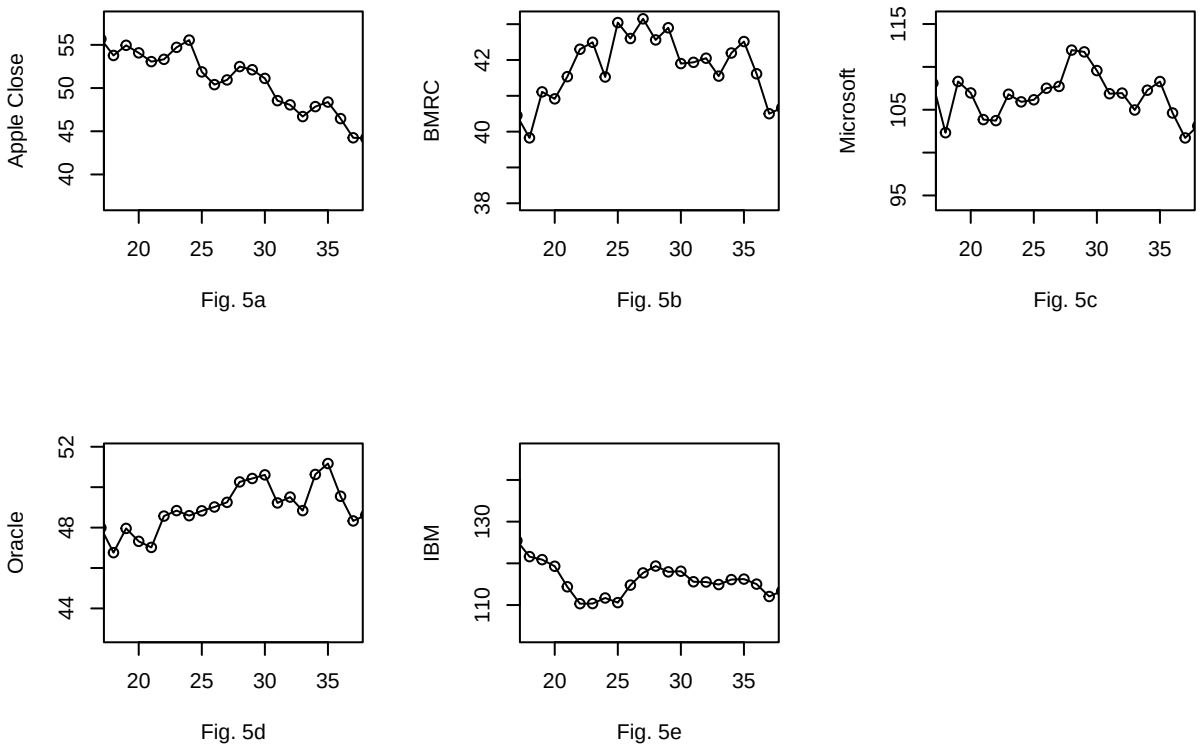


Figure 5a-5e: Daily close during Period 2 for each portfolio stock

Period 3: 11/20 to 12/24

According to Graph 2.3, we see sharp decreases in Microsoft Earnings on 12/04, 12/07, 12/17 and 12/24, which cause sharp drops in Total Returns. Throughout this period, we also generally have positive returns from Oracle and IBM, which means their stocks are trending down (Fig. 6d & 6e). We investigate what factors contributed to IBM and Oracle's down-trends, and why Microsoft experienced these drops (which are likely <20% due to the high number of MSFT shares in our portfolio).

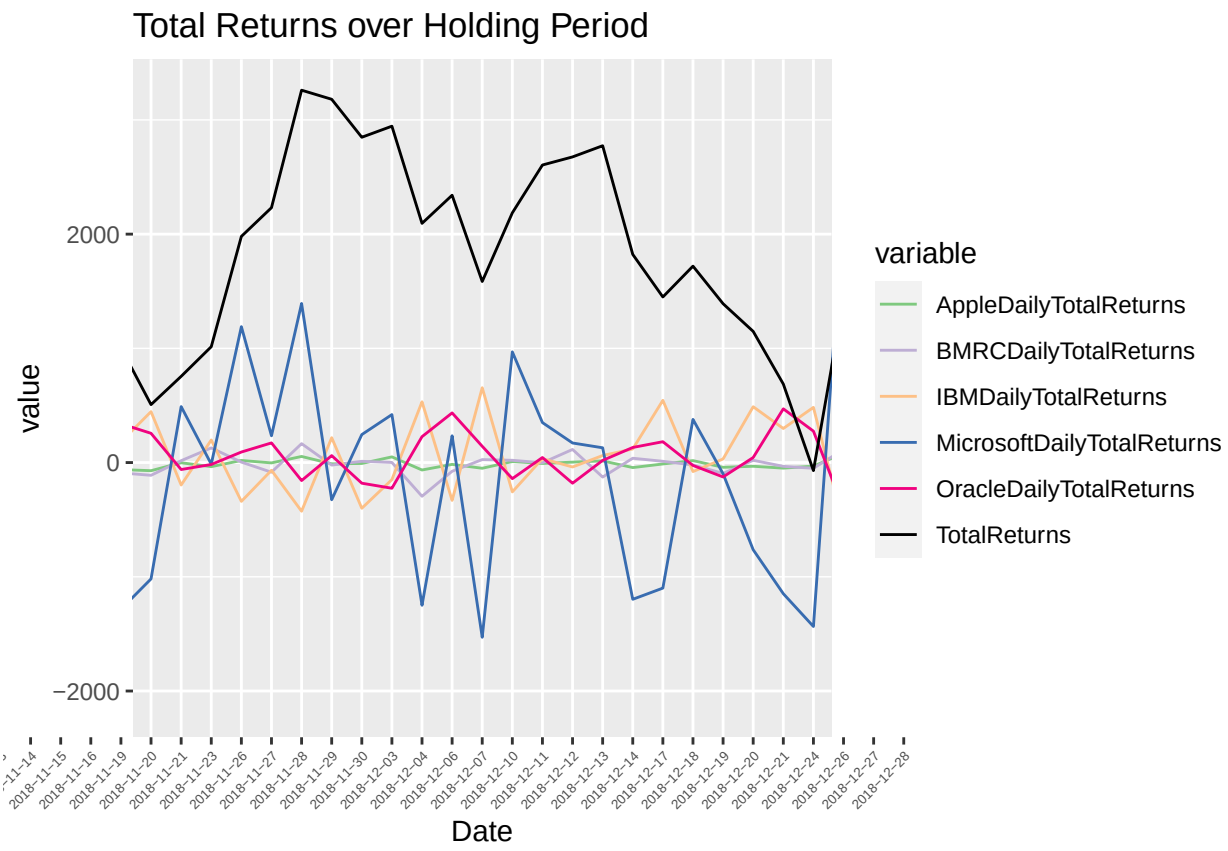
On December 4th, the NY Fed announced that the US economy could handle more rate hikes, which contributed to decreases in all stocks (see #46 in Fig. 6a-6e).

This period is largely impacted by the China-US trade war. Trump described himself as a "Tariff Man," causing the Dow Jones to decrease. This could help explain the decreases of IBM and Oracle's 19% decrease in period 3.

On Christmas Eve, Microsoft experienced a 17% drop in comparison to Period 3's max price. This could likely be due to former President Trump's tweets criticizing the Federal Reserve. As we can see from Fig. 6a-6e, all stocks tanked on that day, resulting in neutral returns for our portfolio.

In summary, the US-China Trade War and various rate hike directions are factors that influenced our holdings during this period.

```
par(mfrow=c(1,1))
graph2 + coord_cartesian(xlim = c(37, 59)) +
  theme(axis.text.x = element_text(angle = 45, hjust = 1, size = 5))
```



Graph 2.3: Returns vs. Daily Total Returns for each stock during Period 3 (11/20 to 12/24)

```
par(mfrow=c(2,3))
plot(master$AppleClose, xlim = c(37, 59), type = "o", ylab = "Apple Close", xlab = "Fig. 6a")
plot(master$BMRCClose, xlim = c(37, 59), type = "o", ylab = "BMRC", xlab = "Fig. 6b")
plot(master$MicrosoftClose, xlim = c(37, 59), type = "o", ylab = "Microsoft", xlab = "Fig. 6c")
plot(master$OracleClose, xlim = c(37, 59), type = "o", ylab = "Oracle", xlab = "Fig. 6d")
plot(master$IBMClose, xlim = c(37, 59), type = "o", ylab = "IBM", xlab = "Fig. 6e")
```

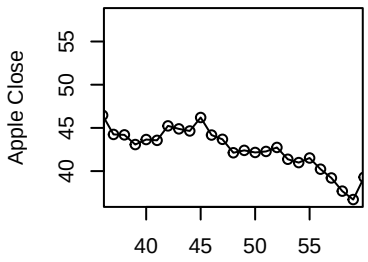


Fig. 6a

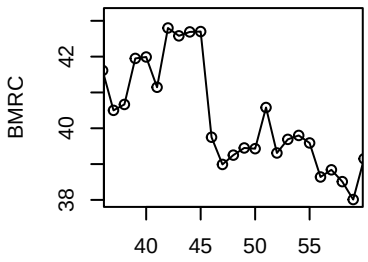


Fig. 6b

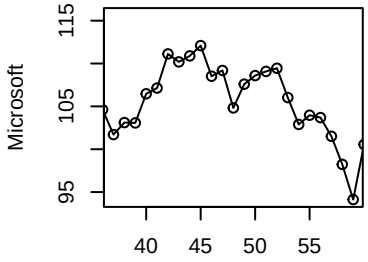


Fig. 6c

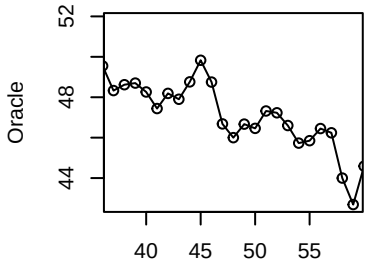


Fig. 6d

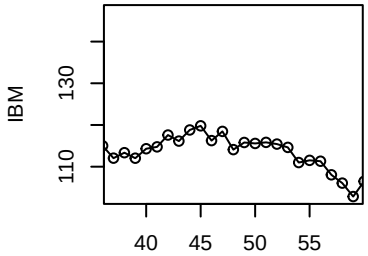


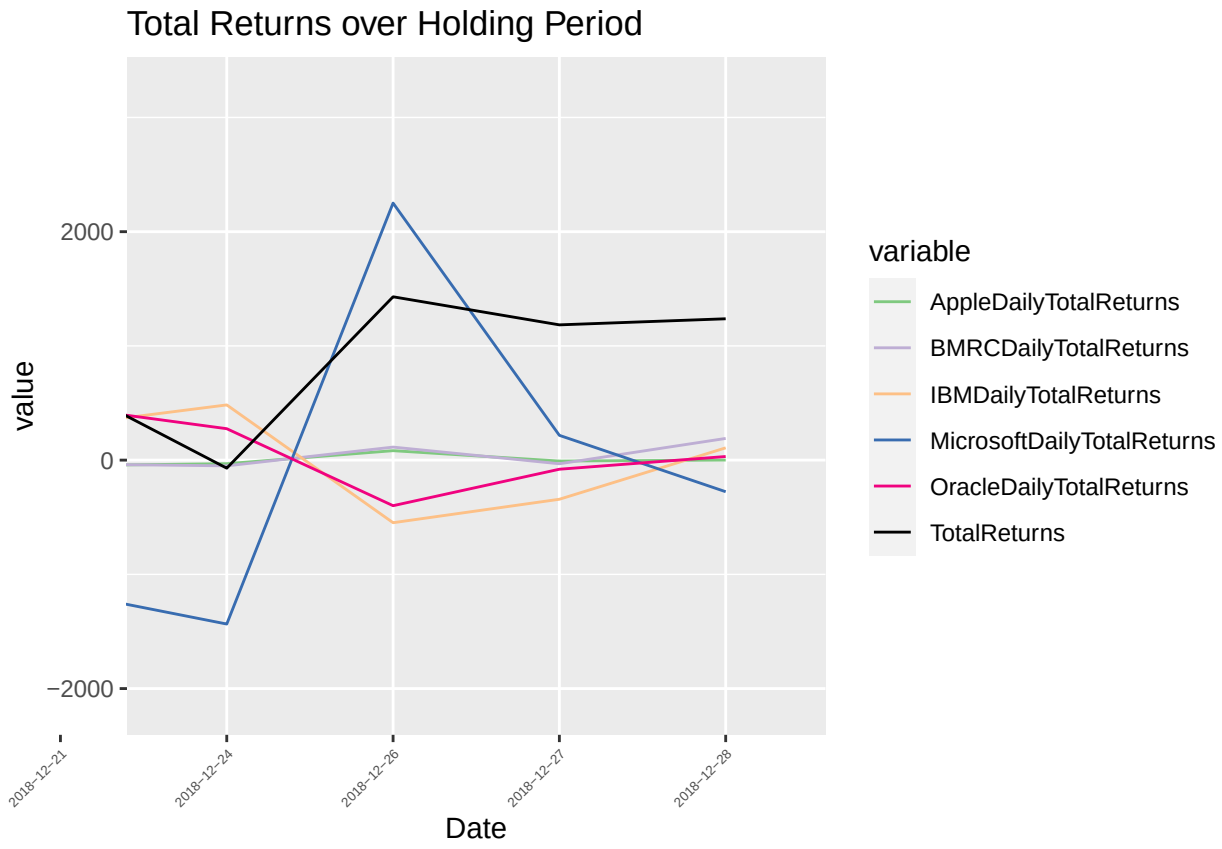
Fig. 6e

Figure 6a-6e: Daily close during Period 3 for each portfolio stock

Period 4: 12/24 to 12/28

Just around this period, there is a boom in the Down Jones. Stocks were trading in the seven-day period that often brings a so-called "Santa Claus rally," an annual window during which equities tend to rise. This would explain the increase in Microsoft, which contributes most to the Total Returns. This is an upturn from a very low December.

```
par(mfrow=c(1,1))
graph2 + coord_cartesian(xlim = c(59, 62)) +
  theme(axis.text.x = element_text(angle = 45, hjust = 1, size = 5))
```



Graph 2.4: Returns vs. Daily Total Returns for each stock during Period 4 (12/24 to 12/31)

```
par(mfrow=c(2,3))
plot(master$AppleClose, xlim = c(59, 62), type = "o", ylab = "Apple Close", xlab = "Fig. 7a")
plot(master$BMRCClose, xlim = c(59, 62), type = "o", ylab = "BMRC", xlab = "Fig. 7b")
plot(master$MicrosoftClose, xlim = c(59, 62), type = "o", ylab = "Microsoft", xlab = "Fig. 7c")
plot(master$OracleClose, xlim = c(59, 62), type = "o", ylab = "Oracle", xlab = "Fig. 7d")
plot(master$IBMClose, xlim = c(59, 62), type = "o", ylab = "IBM", xlab = "Fig. 7e")
```

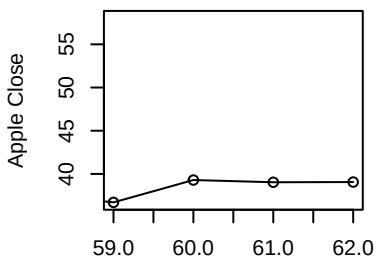


Fig. 7a

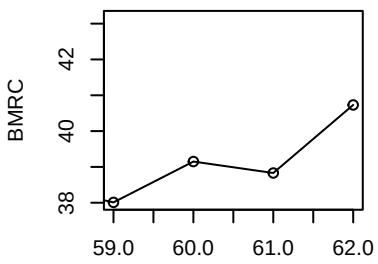


Fig. 7b

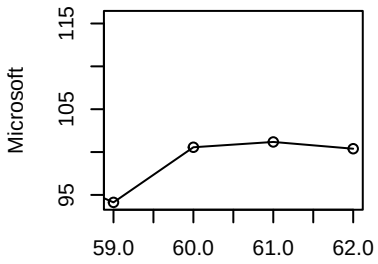


Fig. 7c

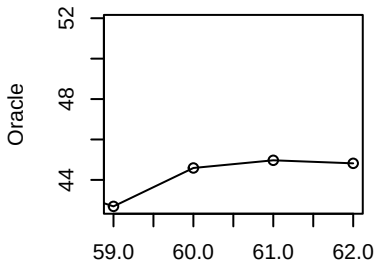


Fig. 7d

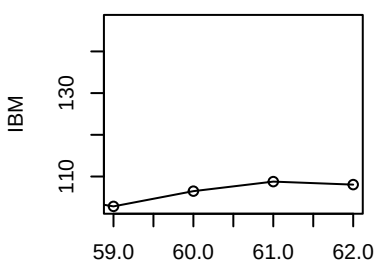


Fig. 7e

Figure 6a-6e: Daily close during Period 4 for each portfolio stock