615 Final Project

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14/12/2020

Introduction

In this project, I will use online investment advice that was available at the beginning of July 2020. to make investment decisions and then track my investments through the fall until 1 December. I choose three stocks and track the value of my portfolios.

Three portfolios I made:

50% AAPL, 25% GOOG, 25% AMZN

25% AAPL, 50% GOOG, 25% AMZN

25% AAPL, 25% GOOG, 50% AMZN

EDA

```
#get individual asset returns grouped by asset
stock_returns <- c("AAPL", "GOOG", "AMZN") %>%
  tq_get(get  = "stock.prices",
         from = "2020-07-01",
         to   = "2020-12-02") %>%
  group_by(symbol) %>%
  tq_transmute(select     = adjusted,
               mutate_fun = periodReturn,
               period     = "daily",
               col_rename = "Ra")
```

```
#get baseline asset returns
baseline_returns <- "XLK" %>%
  tq_get(get  = "stock.prices",
         from = "2020-07-01",
         to   = "2020-12-02") %>%
  tq_transmute(select     = adjusted,
               mutate_fun = periodReturn,
               period     = "daily",
               col_rename = "Rb")
```

```
stock_returns_multi <- stock_returns %>%
    tq_repeat_df(n = 3)
```

Weights table

```
weights <- c(
    0.50, 0.25, 0.25,
```

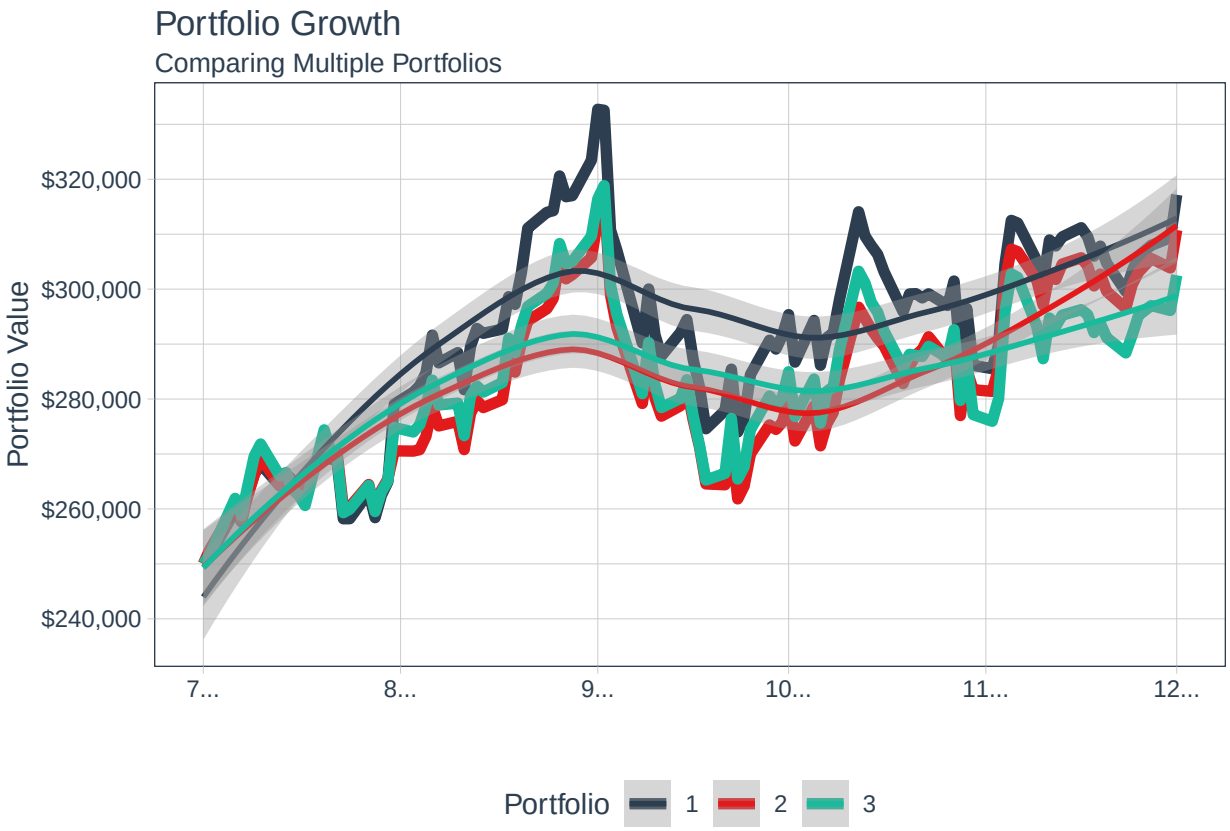
```
    0.25, 0.50, 0.25,
    0.25, 0.25, 0.50
)
stocks <- c("AAPL", "GOOG", "AMZN")
weights_table <-  tibble(stocks) %>%
    tq_repeat_df(n = 3) %>%
    bind_cols(tibble(weights)) %>%
    group_by(portfolio)

weights_table
```

```
## # A tibble: 9 x 3
## # Groups:   portfolio [3]
##   portfolio stocks weights
##       <int> <chr>    <dbl>
## 1         1 AAPL      0.5
## 2         1 GOOG      0.25
## 3         1 AMZN      0.25
## 4         2 AAPL      0.25
## 5         2 GOOG      0.5
## 6         2 AMZN      0.25
## 7         3 AAPL      0.25
## 8         3 GOOG      0.25
## 9         3 AMZN      0.5
```

```
portfolio_returns_multi <- stock_returns_multi %>%
    tq_portfolio(assets_col  = symbol,
                 returns_col = Ra,
                 weights     = weights_table,
                 col_rename  = "Ra")
```

```
portfolio_growth_multi <- stock_returns_multi %>%
    tq_portfolio(assets_col   = symbol,
                 returns_col  = Ra,
                 weights      = weights_table,
                 col_rename   = "investment.growth",
                 wealth.index = TRUE) %>%
    mutate(investment.growth = investment.growth * 250000)
```

```
portfolio_growth_multi %>%
    ggplot(aes(x = date, y = investment.growth, color = factor(portfolio))) +
    geom_line(size = 2) +
    labs(title = "Portfolio Growth",
         subtitle = "Comparing Multiple Portfolios",
         x = "", y = "Portfolio Value",
         color = "Portfolio") +
    geom_smooth(method = "loess") +
    theme_tq() +
    scale_color_tq() +
    scale_y_continuous(labels = scales::dollar)
```



CAPM table

```
RaRb_multiple_portfolio <- left_join(portfolio_returns_multi,
                                     baseline_returns,
                                     by = "date")
```

```
#create the CAPM table of multiple portfolios
RaRb_multiple_portfolio %>%
    tq_performance(Ra = Ra, Rb = Rb, performance_fun = table.CAPM)
```

```
## # A tibble: 3 x 13
## # Groups:   portfolio [3]
##   portfolio ActivePremium    Alpha AnnualizedAlpha  Beta `Beta-` `Beta+`
##       <int>         <dbl>    <dbl>           <dbl> <dbl>   <dbl>   <dbl>
## 1         1         0.223  3.00e-4          0.0709  1.20    1.14    1.23
## 2         2         0.140  3.00e-4          0.0749  1.06    1.09    1.02
## 3         3         0.038 -1.00e-4         -0.0208  1.14    1.04    1.19
## # ... with 6 more variables: Correlation <dbl>, `Correlationp-value` <dbl>,
## #   InformationRatio <dbl>, `R-squared` <dbl>, TrackingError <dbl>,
## #   TreynorRatio <dbl>
```

The annual Alpha value for the three portfolios are 7%, 7% and -2% seperately.

Analysis

```r
#Calculate profit and return rate of three multiple portfolios
d = which(portfolio_growth_multi$date == "2020-12-01")
profit1 = portfolio_growth_multi$investment.growth[d[1]] - 250000
profit2 = portfolio_growth_multi$investment.growth[d[2]] - 250000
profit3 = portfolio_growth_multi$investment.growth[d[3]] - 250000

rate_of_return_1 = profit1/250000
rate_of_return_2 = profit2/250000
rate_of_return_3 = profit3/250000

print(cbind(profit1, profit2, profit3))
```

```
##       profit1  profit2  profit3
## [1,] 67176.29 60767.38 52530.25
```

```r
print(cbind(rate_of_return_1, rate_of_return_2, rate_of_return_3))
```

```
##      rate_of_return_1 rate_of_return_2 rate_of_return_3
## [1,]        0.2687051        0.2430695         0.210121
```

Conclusion

For the three portfolios, I will choose the first one because it has the highest return rate and profit.

Reference

Data is from : finance.yahoo.com