Wharton Business and Financial Modeling Capstone

PORTFOLIO PERFORMANCE PRESENTATION

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Project Purpose

- Use simple example to demonstrates the importance of portfolio diversification

- Portfolio (VBTLX & VFIAX) vs Single Security (AAPL)
  - VBTLX: Vanguard Total Bond Market Index Fund
  - VFIAX: Vanguard 500 Index Fund Admiral Shares
  - AAPL: Apple Inc.

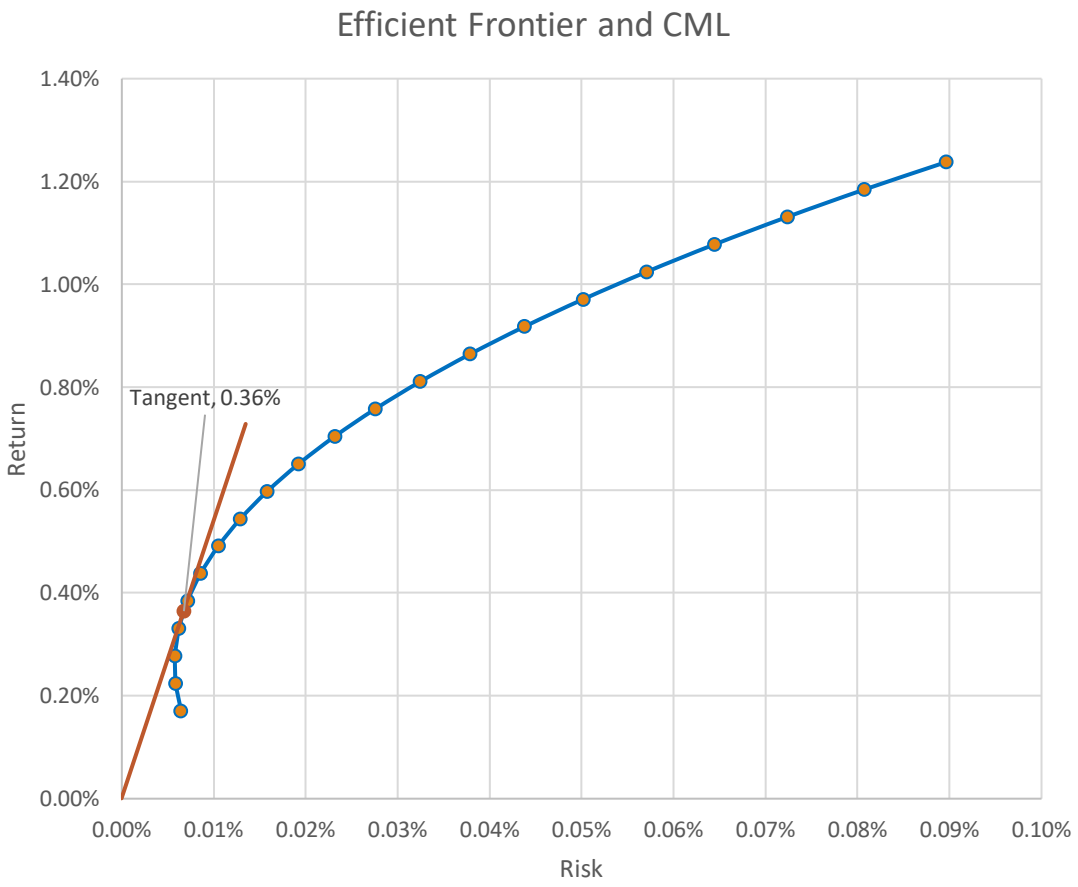
Data and Data Source

VBTLX, VFIAX, and AAPL's Monthly Return From Jan-2012 (Train) To Jul-2016 (Test)

Date	VBTLX	VFIAX	AAPL
Jan-12	0.88%	4.47%	0.61%
Feb-12	-0.04%	4.32%	0.87%
Mar-12	-0.57%	3.29%	0.47%
Apr-12	1.15%	-0.63%	-0.09%
May-12	0.96%	-6.01%	-0.03%
Jun-12	0.04%	4.12%	0.06%
Jul-12	1.39%	1.38%	0.22%
Aug-12	0.04%	2.25%	0.40%
Sep-12	0.12%	2.58%	0.03%
.....			
Jan-16	1.44%	-4.97%	-0.13%
Feb-16	0.67%	-0.14%	12.72%
Mar-16	0.95%	6.78%	-13.99%
Apr-16	0.39%	0.39%	7.18%
May-16	0.02%	1.79%	-4.27%
Jun-16	1.94%	0.26%	9.01%
Jul-16	0.65%	3.68%	1.77%

Data Source

Efficient Frontier and CML - Portfolio



Optimal Risky Portfolio			
Weight_VBTLX	Weight_VFIAX	Risk Free Rate	Fund
81.86%	18.14%	0%	$ 5,000,000.00
Stock	Return	Risk	Sharpe Ratio
Portfolio	0.36%	0.01%	54.0

	VBTLX	VFIAX
mean	0.17%	1.24%
stdv	0.80%	2.99%
Covariance	-0.0000174	

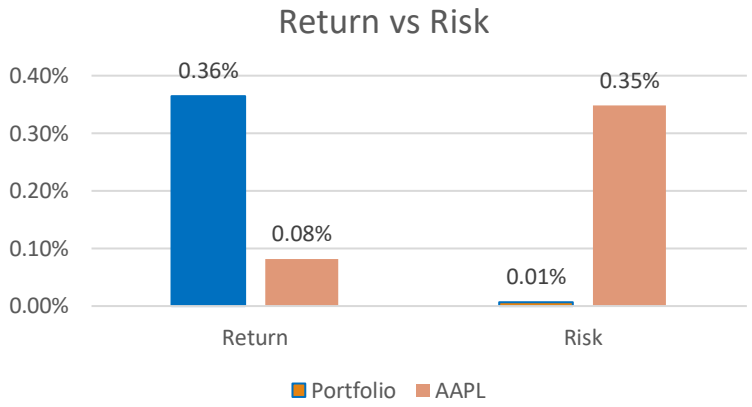
Using excel solver and plotting out the

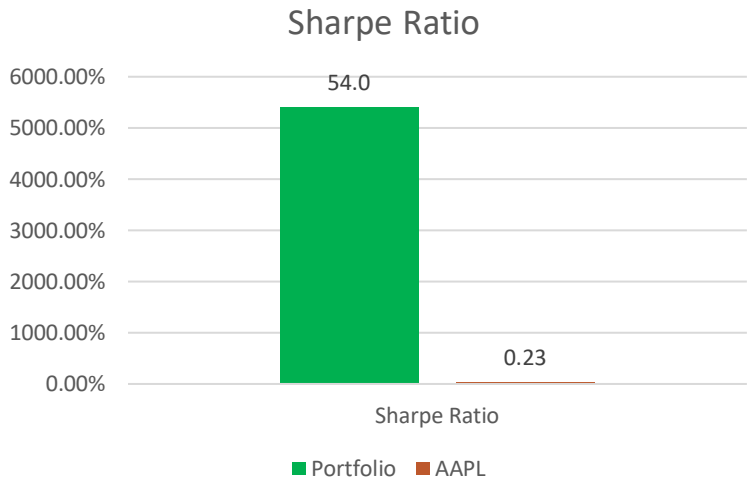
- Efficient Frontier
- Capital Market Line

We can easily visual the optimal return of this portfolio is 0.36% at

- Weight-VBTLX = 81.86%
- Weight-VBFLAX = 18.14%

Comparison – Portfolio vs Single Stock



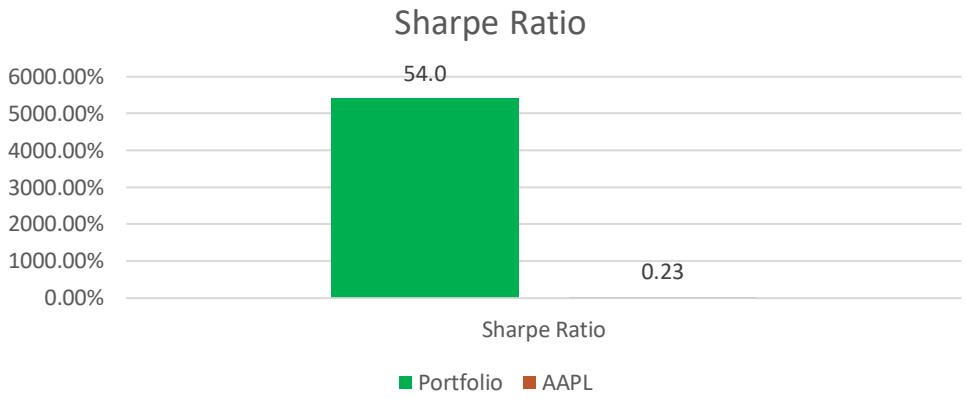


Gain/Loss ($)		
Date	Portfolio	AAPL
Jan-16	$ 13,849.69	$ (6,437.84)
Feb-16	$ 26,224.27	$ 635,234.26
Mar-16	$ 100,915.19	$ (788,488.23)
Apr-16	$ 19,893.57	$ 302,272.53
May-16	$ 17,124.97	$ (226,193.64)
Jun-16	$ 82,039.38	$ 429,942.24
Jul-16	$ 60,971.86	$ 95,874.82
Total	$ 321,018.93	$ 442,204.15

After getting the optimal weight of the portfolio from 2012 – 2015 data and then plug them into 2016 for testing, we found:

1. Total Gain ($): Portfolio < Single
2. Actual Return: Portfolio > Single
3. Actual Risk: Portfolio < Single
4. Sharpe Ratio: Portfolio > Single

Findings



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Based on the data that

1. Total Gain ($): Portfolio is 27% less than Single
2. Sharpe Ratio: Portfolio is 231 times the Single

We would recommend that it is **safer** to diversify your portfolio and in other words: “Avoid putting your eggs in one basket”

Limitations of the Sharpe Ratio

The main problem with the Sharpe ratio is that it is accentuated by investments that don't have a normal distribution of returns. Asset prices are bounded to the downside by zero but have theoretically unlimited upside potential, making their returns right-skewed or log-normal, which is a violation of the assumptions built into the Sharpe ratio that asset returns are normally distributed.