
Abstract

Our Robo Advisor provides three different portfolios (low, medium and high) for people with different risk appetite, which will be determined by the risk score in the IPS questionnaire. Each portfolio associated with different risk levels is constructed under different return and volatility requirements.

In this report, we summarized the performance of our portfolios with medium risk level. We divided our capital into both US market and Canadian market. Portfolio assets and weights are selected based on investor's risk appetite and will be rebalanced every 6 months during the 5-year investment horizon. For medium risk portfolio, we will invest in Equity, Fixed Income, Real Estate but not in Commodity, which is relatively more volatile. At last, the performance of the medium risk portfolio will be compared with a specific benchmark.

Different performance and risk metrics of the medium risk portfolio are illustrated in the report including quarterly P&L, Value at Risk (VaR), Expected Shortfall, Sharpe Ratio, Risk Contribution, and some other risk measures. Furthermore, we also implemented scenario tests and stress testing, which evaluates the performance of the medium risk portfolio under different economic scenarios.

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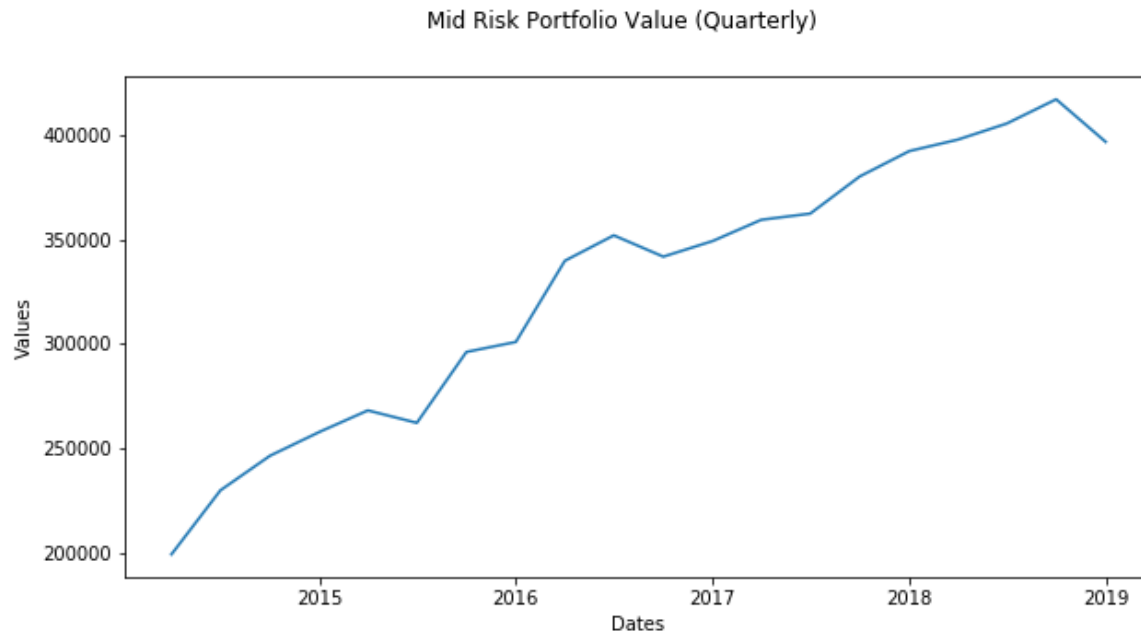
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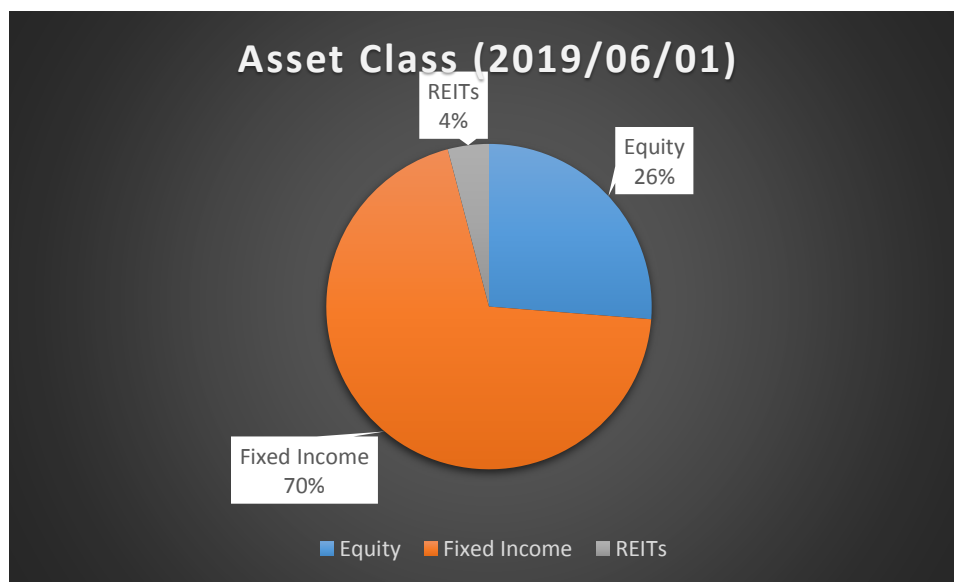
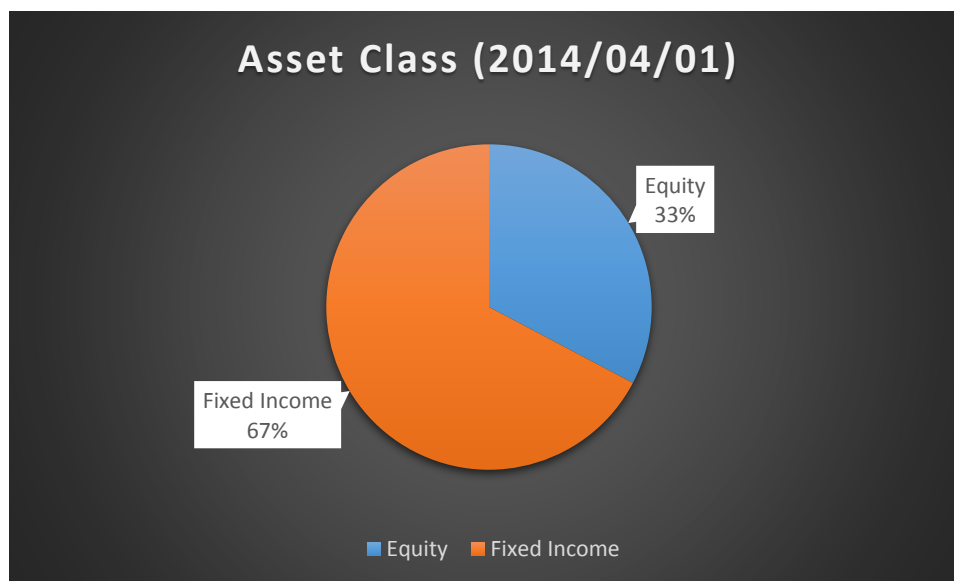
Portfolio Performance and Risk Metrics

Sharpe Ratio	0.862
Annualized Returns	5.6%
Annualized Volatility	6.5%
One-Year 95% VaR	16.3%
One-Year 95% CVaR	1.7%
Money Weighted Returns	3.3%
Time Weighted Returns	5.4%



Asset Allocation

1. Asset Allocation by Asset Class

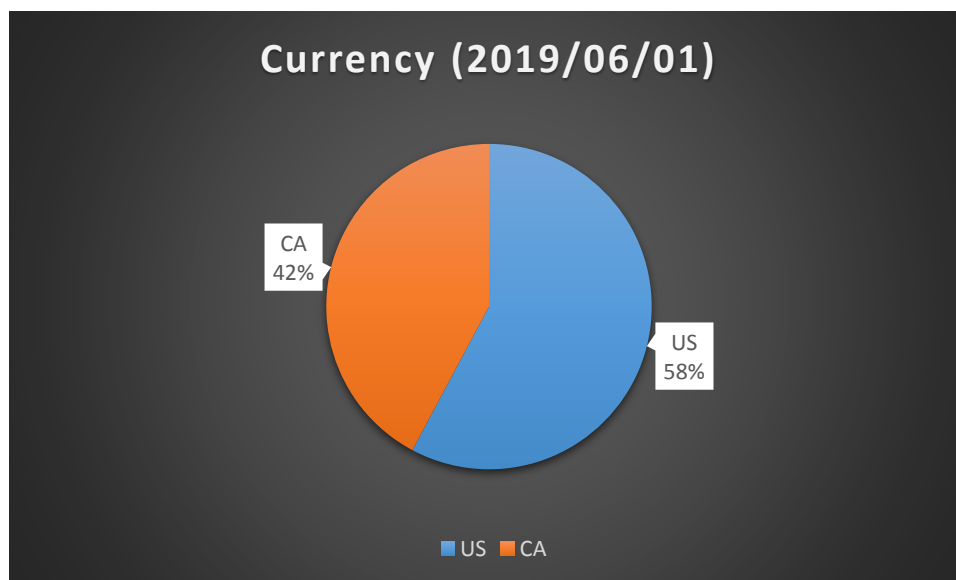
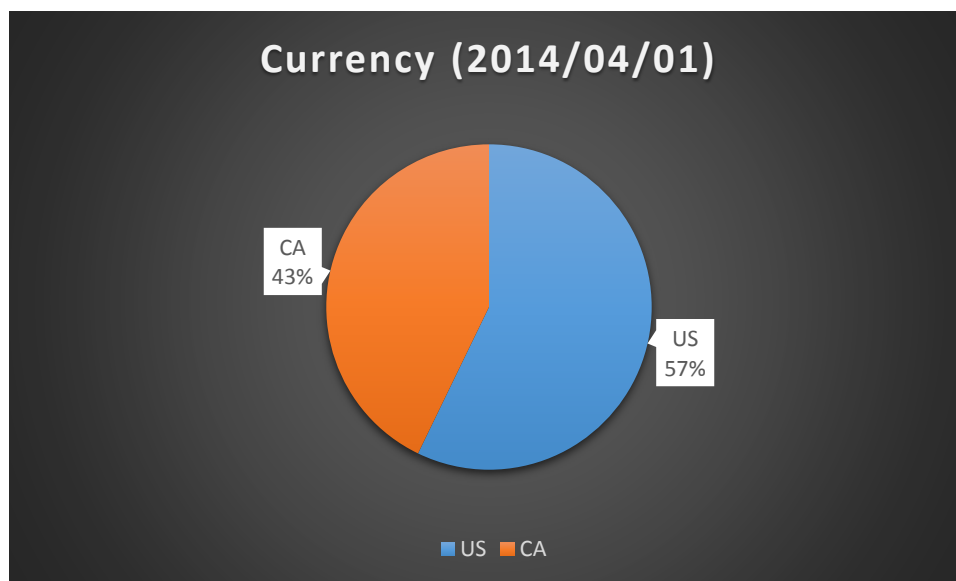


NOTE

We invest more in Fixed Income. Compared with low risk portfolio, we have larger investment in Equity.

Asset Allocation

2. Asset Allocation by Currency

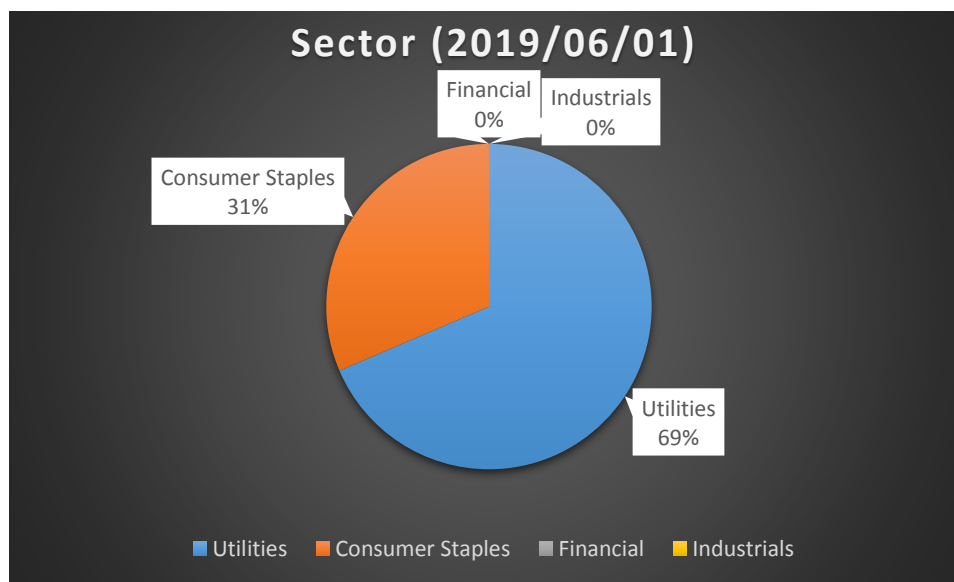
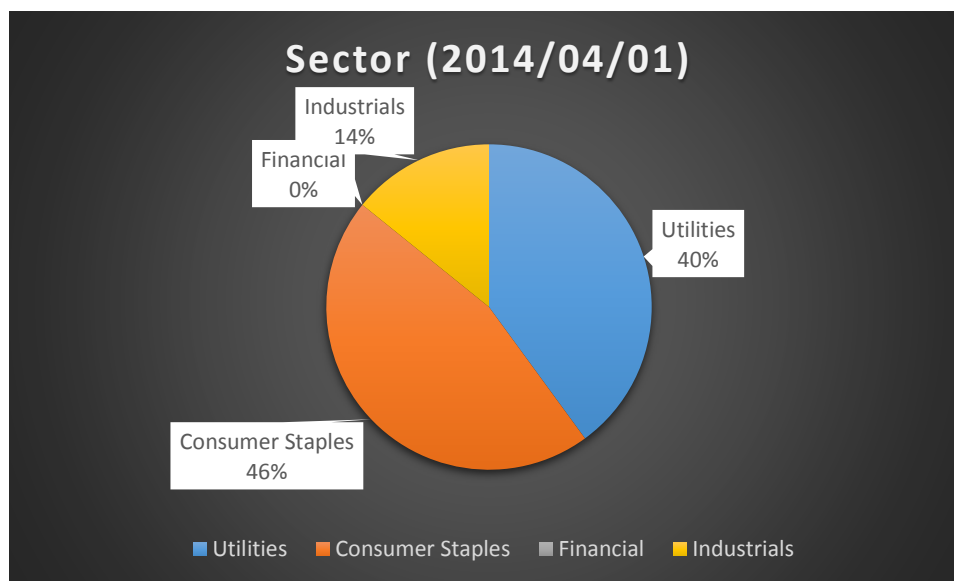


NOTE

Capital split into USD and CAD. We invest more in USD.

Asset Allocation

3. US Equity Allocation by Sector

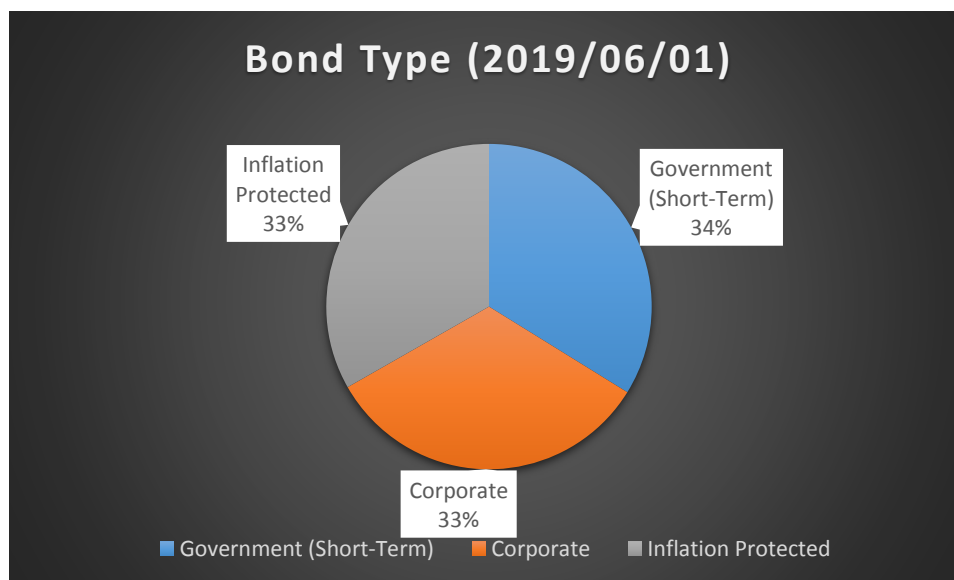
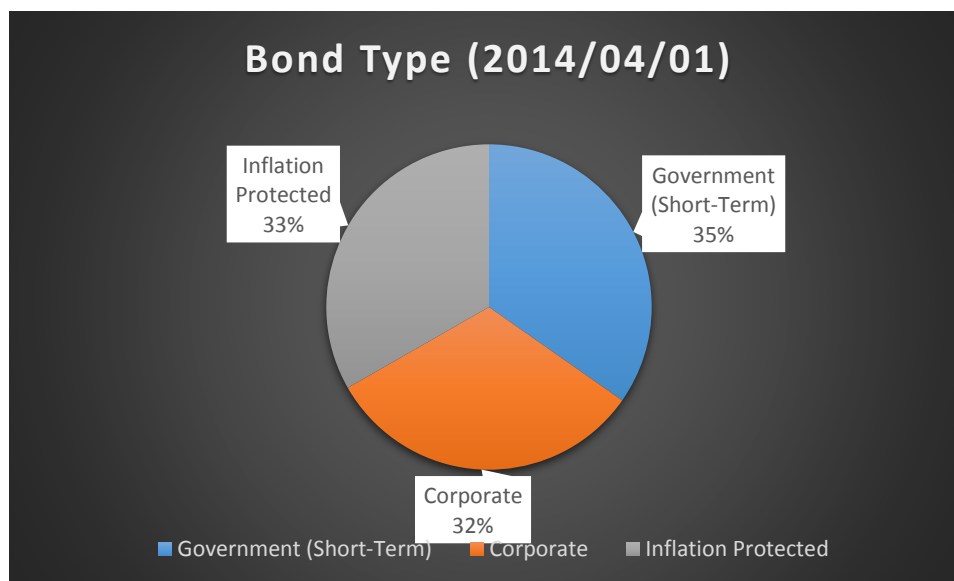


NOTE

Initially, we invest mostly in Consumer Staples. In mid risk portfolio we do not invest in Financial sector. We short Consumer Staples Equities at the end and invest mostly in Utilities.

Asset Allocation

4. US Fixed Income Allocation by Bond Type

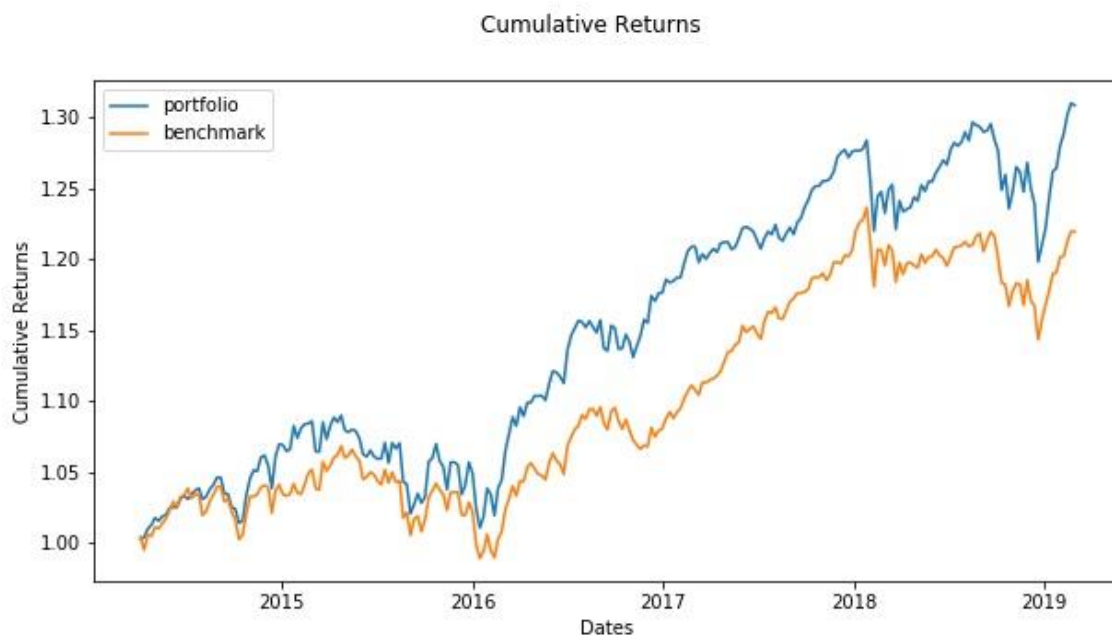


NOTE

Our portfolio allocation based on portfolio variance minimization. In this case, we happened to invest equally in three bond types for Fixed Income ETFs.

Benchmark Comparison

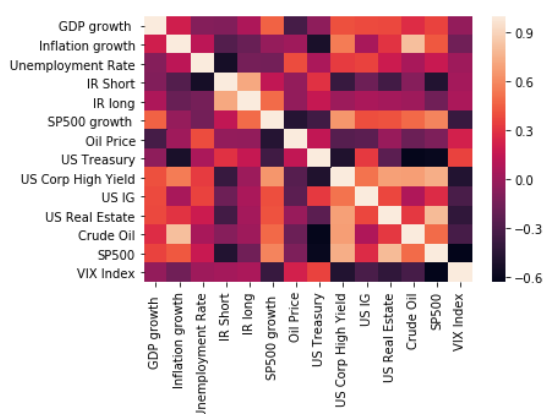
Mid Risk Trading Period Cumulative Returns with Benchmark



In general, our portfolio performs better than the benchmark. Our benchmark is iShares Core Moderate Allocation ETF (AOM).

Scenario Test

We divided our capital into US and Canadian Market. Therefore, we split our scenario tests into two parts, each part focus on portfolio in a particular market. We also generated the factor correlation matrix between the economic factors and the market factors. From the heatmap below, we can see that the correlations between the market factors are stronger than the correlations between economic factors. We long an out-of-the-money put option only for FX hedging, therefore its performance is not included in our portfolio P&L. Note the option is only excised under extreme scenario when US dollar plummets, and its payoff is not able to cover the premium cost.



US market scenario test

Since the assets in our US portfolio are all picked from the US market, we only focus on economic factors in the US market starting from April 2014. The forecast economic factors we include in U.S Scenarios are Real GDP (% change), Inflation (% change), Unemployment (%), Short-term Interest Rate, Long-term Interest Rate, S&P 500 growth (%), Oil price and FX rate in 2015. We construct the up scenario, the base scenario, and down scenarios based on Deloitte reports on U.S economy forecasts, which are listed below:

US Scenario	UP	Base	Down
Real GDP (% change)	3	2.3	2
Inflation (% change)	0.8	0.6	0.5
Unemployment (%)	5.4	5.4	5.5
IR Short (%)	0.23	0.21	0.16
IR Long (%)	2.34	2.33	2.31
S&P 500 (%)	4.54	1.13	3.04
Oil (\$/bbl, WTI)	54.45	50.9	46.22
FX (USD/CAD)	1.25	1.2	1.16

We also did the stress testing based on the economic factors data in 2008.

US Scenario	Stress Testing
Real GDP (% change)	-8.45
Inflation (% change)	-0.92
Unemployment (%)	5.80
IR Short (%)	2.79
IR Long (%)	3.86
S&P 500 (%)	-23.56
Oil (\$/bbl, WTI)	133.37
FX (USD/CAD)	0.98

Canadian market scenario test

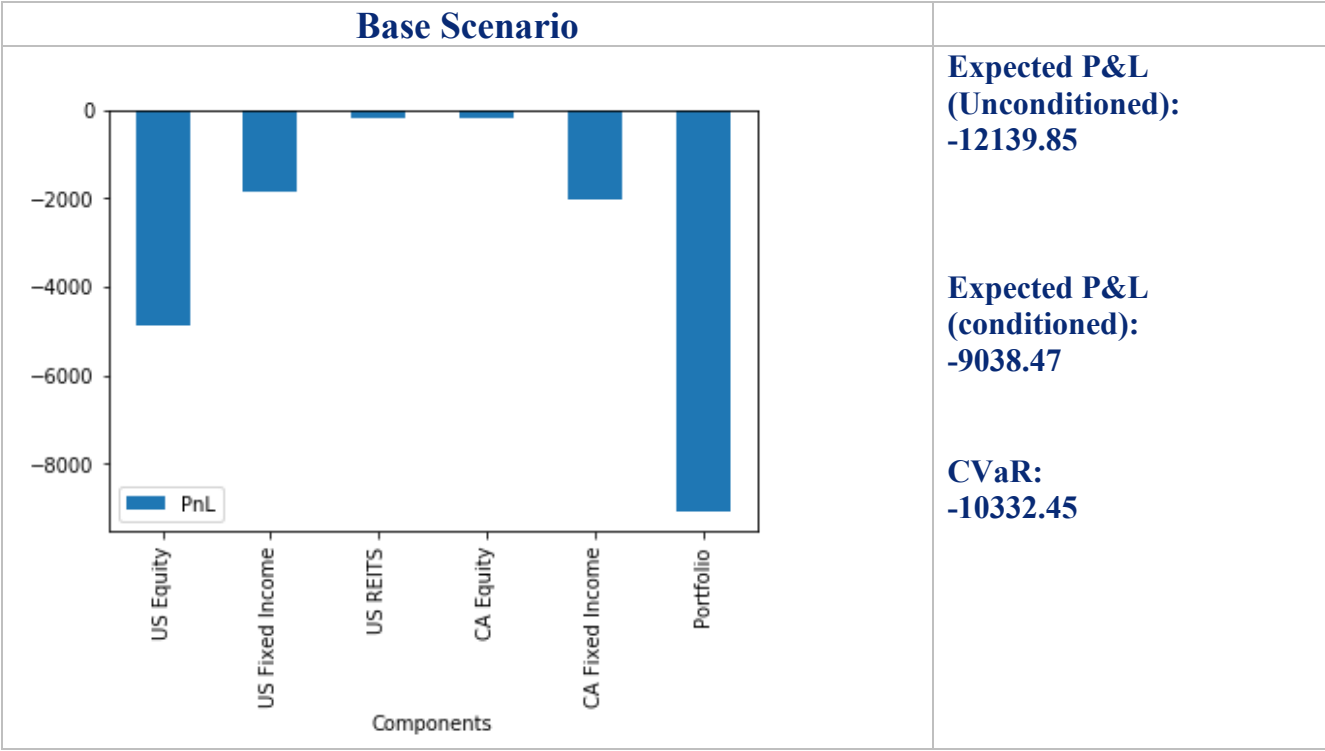
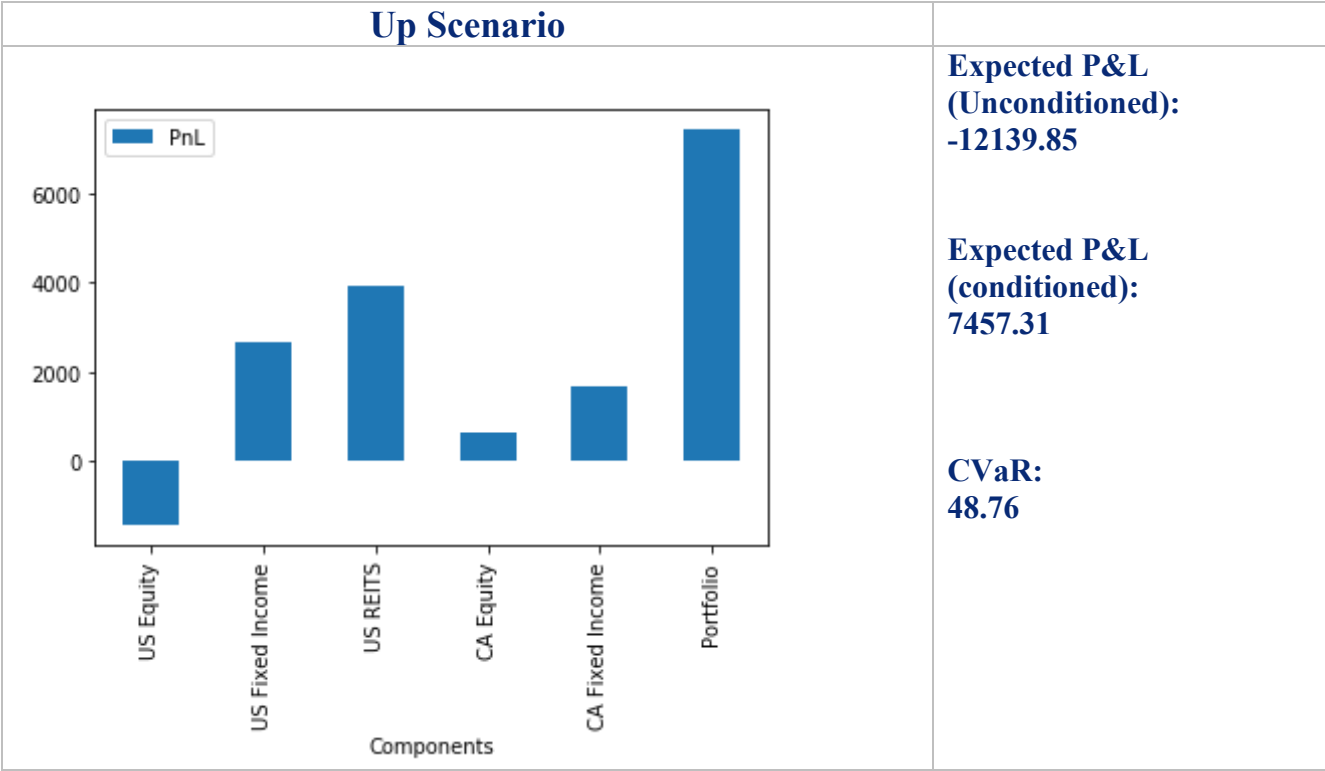
Similar analysis is performed for the Canadian market.

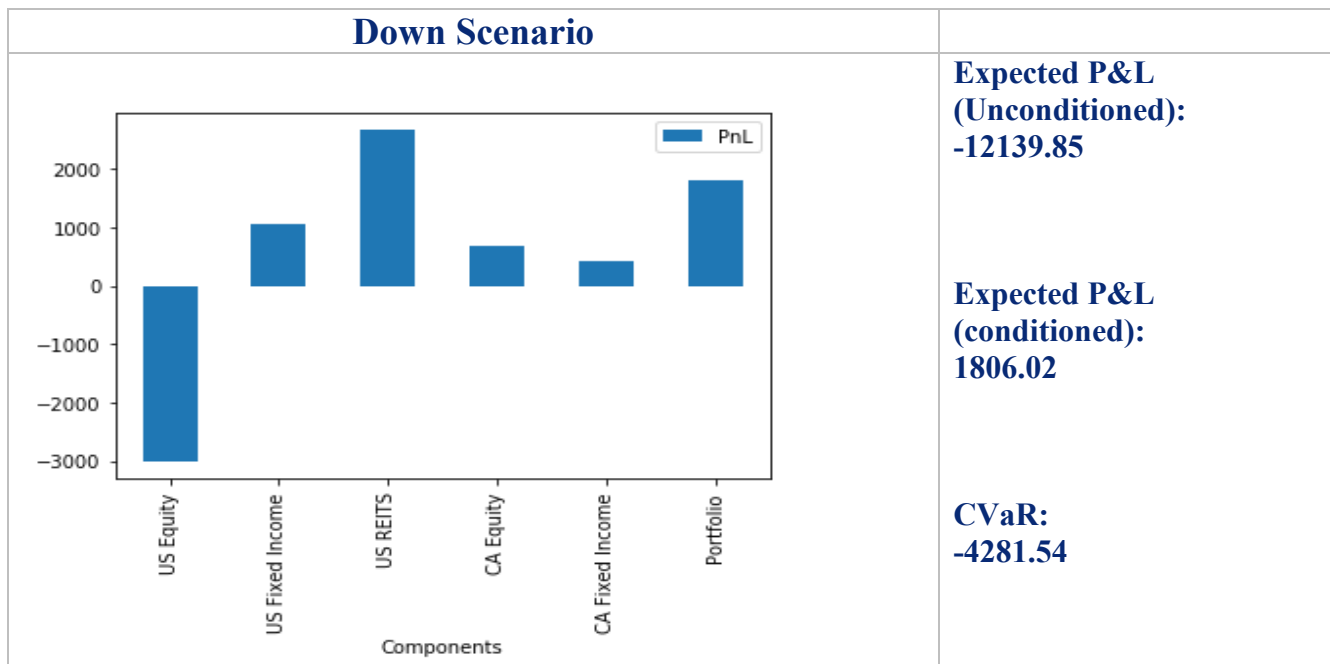
CA Scenario	UP	Base	Down
Real GDP (% change)	2.6	2	1.7
Inflation (% change)	1.5	1.4	1.2
Unemployment (%)	6.8	7	7.1
IR Short (%)	0.81	0.8	0.74
IR Long (%)	1.32	1.3	1.28
S&P 500 (%)	4.54	1.13	3.04
Oil (\$/bbl, WTI)	54.45	50.9	46.22

We also did the stress testing based on the economic factors data in 2008.

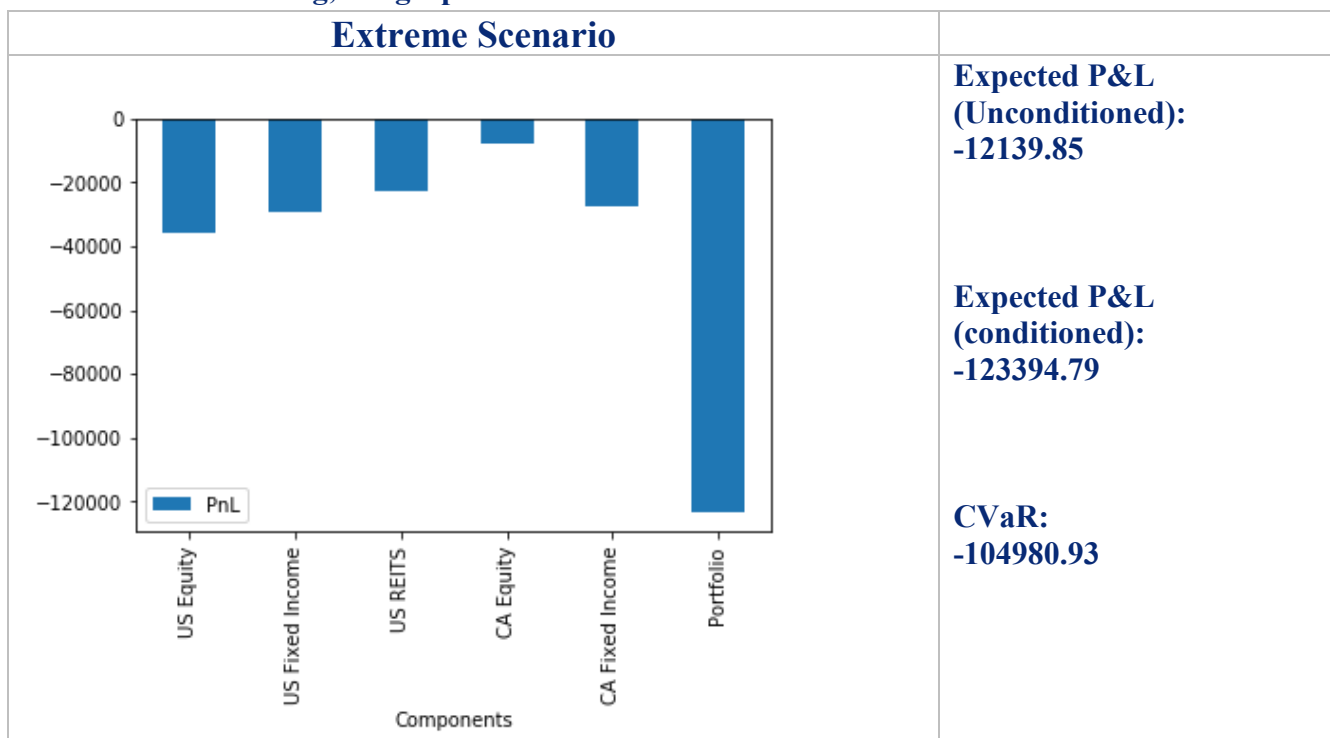
CA Scenario	Stress Testing
Real GDP (% change)	-4.60
Inflation (% change)	-1.10
Unemployment (%)	6.10
IR Short (%)	3.40
IR Long (%)	3.64
S&P 500 (%)	-23.56
Oil (\$/bbl, WTI)	133.37

We plotted the distributions of our expected conditional US Portfolio P&L under the three economic scenarios mentioned above and calculated the Conditional Value-at-Risk (CVaR) for portfolios with medium risk level.





Under the stress testing, the graph is shown below:



From the table, we can see that our portfolio performs better in the Up scenario and worse performance in the Base and Extreme scenario comparing to the Down scenario. It is probably because that the Fed Fund Rates remains at low in the Down Scenario, and this drives the stock market levels higher.