



Retirement Simulator

Using Monte Carlo Simulation and other
visualizations



Retirement Calculator

Understanding how much money you need for retirement is difficult. There are multiple different investing strategies available, so it's hard to pick. What is the probability my retirement will run out, using traditional investment portfolios?

Using our retirement calculator, any consumer can input key variables towards retirement to calculate the probability of retirement goals using Monte Carlo simulation.

To use this tool, a consumer only needs to know :

1. Type of Investment
2. Starting Investment value
3. Their average yearly spending
4. Anticipated length of retirement



Portfolio Data

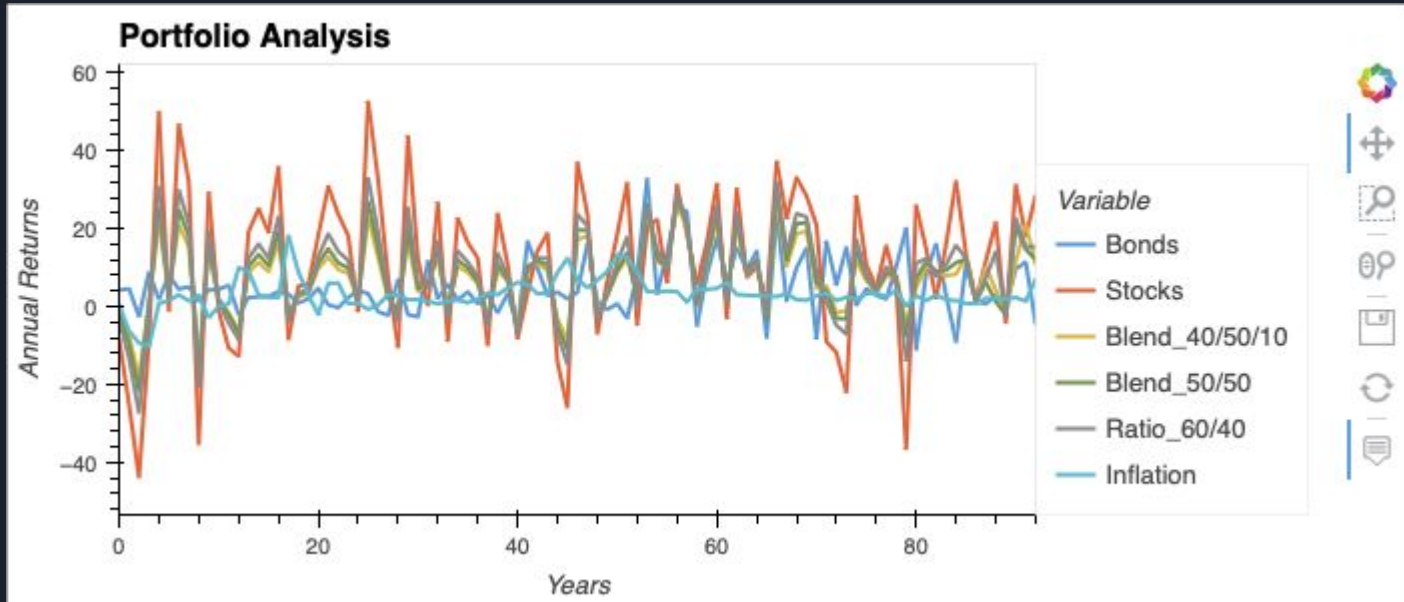
The retirement calculator uses historical data from 1928-2021,

The 5 investment types available are :

- Bonds
- Stocks (SP_500)
- Blend (40-50-10) - 40% Stocks / 50% Bonds / 10% Cash or T Bills
- Blend(50-50) - 50% Stocks / 50% Bonds
- Ratio(60-40) - 60% Stocks / 40% Bonds

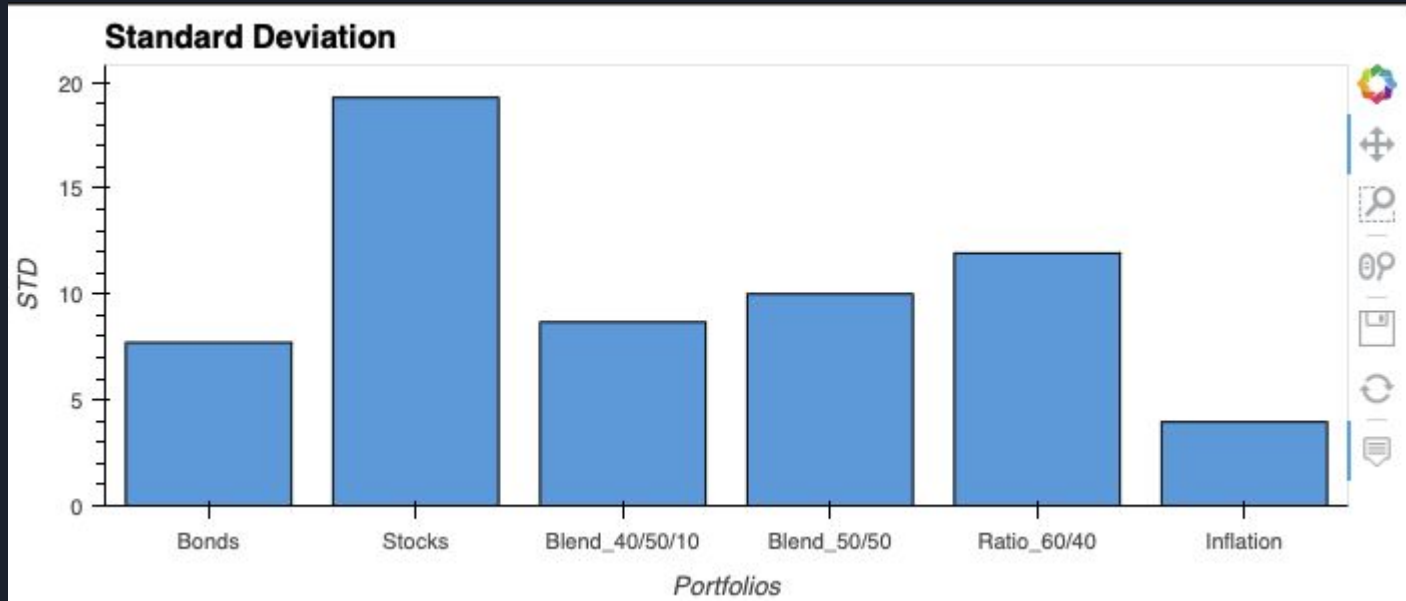
The data we used was clean, and were annualized returns of these portfolios.

Analysis of Investment types



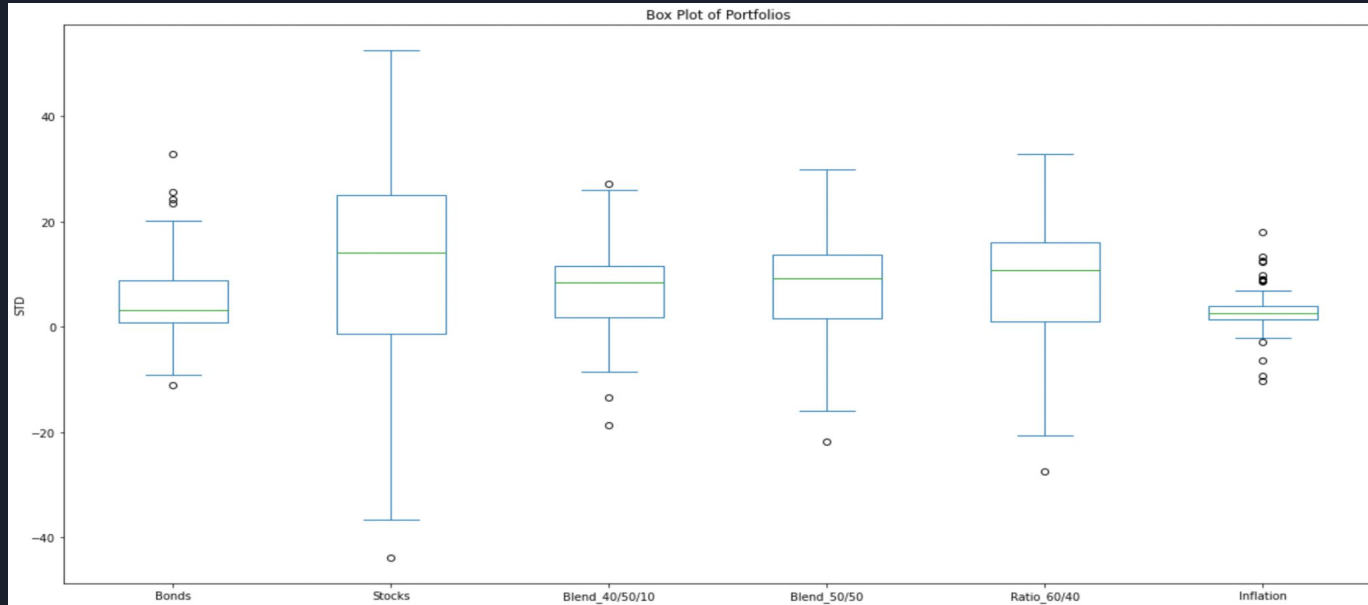
This graph displays the cumulative returns between the mixed investment types

Bar plot of STD



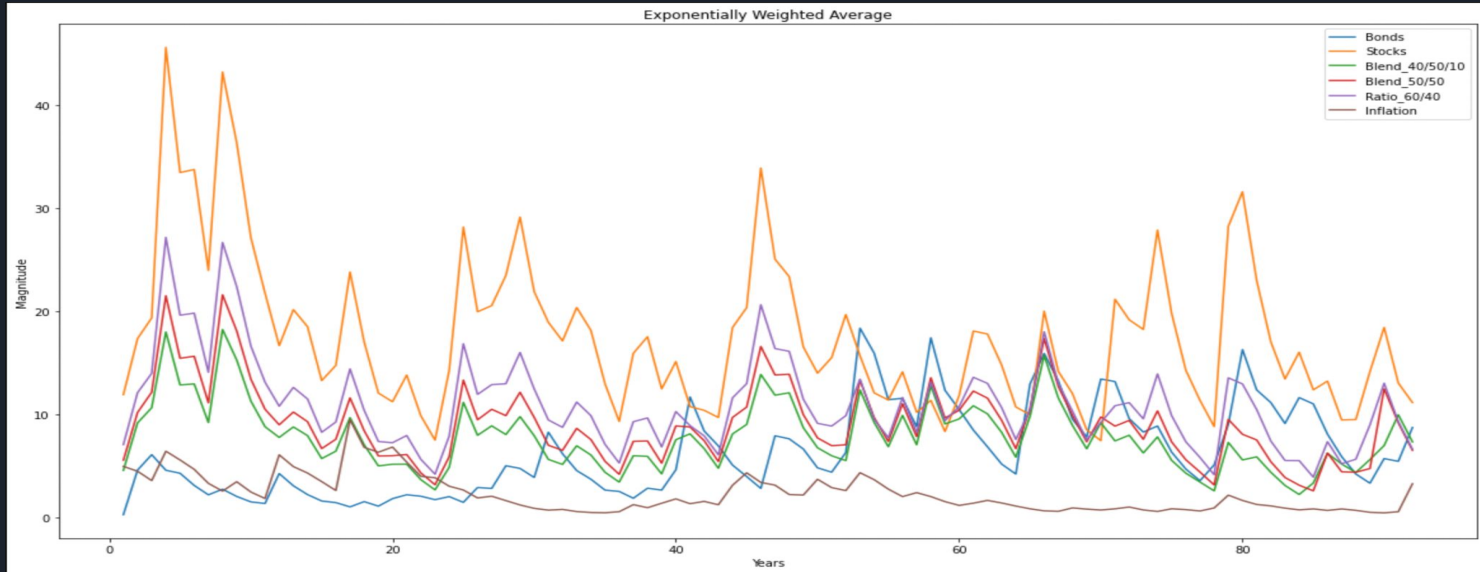
A bar graph to display the Standard Deviation of the portfolios

Standard Deviations of portfolios



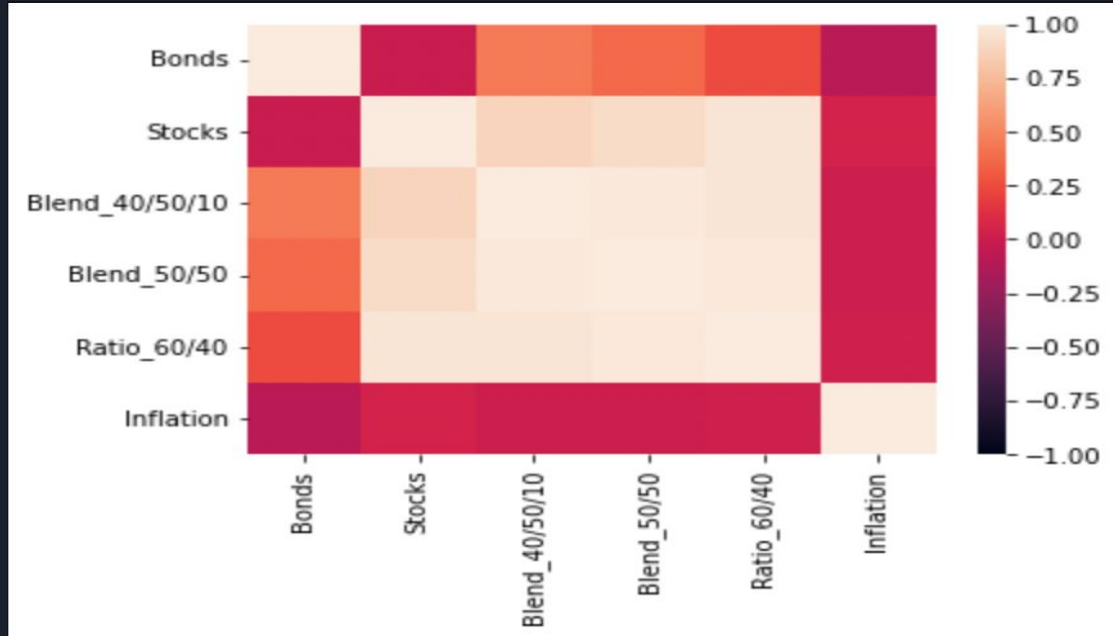
Box plots are used to understand the volatility of the different investment types

Exponentially Weighted Average



This graph shows the EWA of our portfolios. As shown, the portfolio (stocks) have the highest upside potential

Correlation



This graph displays the correlation between the portfolios.

Simulator Demo - Part 1 (Terminal Version)

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~  $$  RETIREMENT SIMULATOR  $$  ~~~~~~  
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How long will your retirement nest egg last?  
How much could your investments grow?  
Answer a few questions to see a long-term projection.  
Then try making a few changes to view the impact on your results.  
  
How are your savings allocated?  
  
Stocks = S&P 500  
Bonds = 10 year Treasury Bond  
60/40 = 60% S&P 500 / 40% Treasury Bond  
SB Blend = 50% S&P 500 / 50% Treasury Bond  
SBC Blend = 40% S&P 500 / 50% Treasury Bond / 10% Cash  
Crypto = FUTURE FUNCTIONALITY  
Custom = FUTURE FUNCTIONALITY  
  
Press ENTER to accept default value shown in [brackets].  
  
Enter investment type: (stocks, bonds, 60/40, sb, sbc):  
[60/40]: stocks
```

Simulator Demo - Part 2 (GUI Version)

Retirement Simulator Widget

What is your approximate investment balance?

Current Value:
2759046.76

How much is your average spending per year?

Current Value:
64994.60

How many years do you want your savings to last?

Current Value:
21.03

Choose your portfolio makeup.

STOCKS | BONDS | 60/40 | 50/50 | STOCKS, BONDS, & CASH (50/40/10)

How long will your savings last?

Run Simulation!



Summary

When predicting outcomes 30 to 40 years into the future can be a challenge. We are better off trying to keep things simple and focus on the most important and controllable issues. You can control when you retire, your investment asset allocation, how much you save, and how much you spend, but you can't control the stock market, interest rates, and inflation.

Monte Carlo Simulation gives you a more realistic assessment of how the future may unfold by looking at a wide variety of potential market scenarios that take fluctuating market returns into account. Instead of basing calculations on just one average rate of return, we generate thousands and thousands of simulations of hypothetical market scenarios, and calculate the impact on your savings during your retirement. Each simulation includes up and down markets of various lengths, intensities, and combinations.



Questions

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