Backtest Portfolio Asset Allocation

This portfolio backtesting tool allows you to construct one or more portfolios based on the selected mutual funds, ETFs, and stocks. You can analyze and backtest portfolio returns, risk characteristics, style exposures, and drawdowns. The results cover both returns and fund fundamentals based portfolio style analysis along with risk and return decomposition by each portfolio asset. You can compare up to three different portfolios against the selected benchmark, and you can also specify any periodic contribution or withdrawal cashflows and the preferred portfolio rebalancing strategy.

The related asset class level portfolio modeling tool allows you to analyze and compare asset class level portfolios with a longer time horizon starting from 1972.

Time Period

Year-to-Year

Start Year

1985

End Year

2022

Include YTD

Yes

Initial Amount

$ 10000 .00

Cashflows

None

Rebalancing

Rebalance monthly

Leverage Type

None

Reinvest Dividends

Yes

Display Income

No

Factor Regression

No

Benchmark

Specify Ticker...

Benchmark Ticker

SPY

Portfolio Names

Default

Portfolio Assets

Portfolio #1

Portfolio #2

Portfolio #3

Asset 1

VOO	
40	%
50	%
50	%

Asset 2

XLRE	
20	%
15	%
10	%

Asset 3

VCIT	
20	%
15	%
10	%

Asset 4

PDBC	
20	%
20	%
30	%

Asset 5

Ticker symbol	
	%
	%

%

Asset 6

Ticker symbol

%

%

%

Asset 7

Ticker symbol

%

%

%

Asset 8

Ticker symbol

%

%

%

Asset 9

Ticker symbol

%

%

%

Asset 10

Ticker symbol

%

%

%

Total

100 %

100 %

100	%

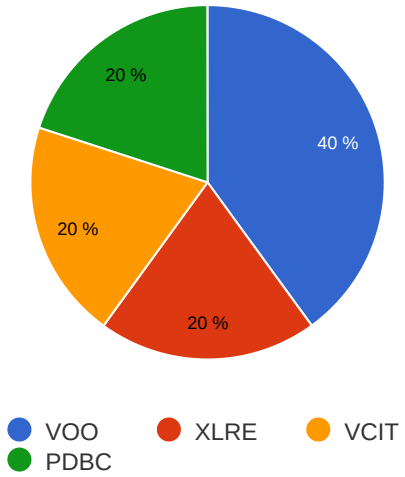
Portfolio Analysis Results (Jan 2016 - Jun 2022)

Note: The time period was constrained by the available data for Real Estate Select Sector SPDR (XLRE) [Nov 2015 - Jun 2022].
Note: The month-to-date results for the current month are not available under the free tier.

Portfolio Allocations

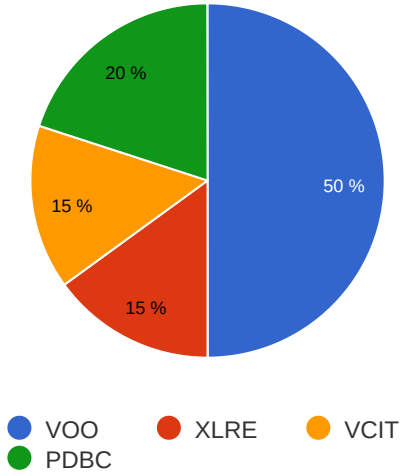
Portfolio 1

Ticker	Name	Allocation
VOO	Vanguard S&P 500 ETF	40.00%
XLRE	Real Estate Select Sector SPDR	20.00%
VCIT	Vanguard Interm-Term Corp Bd ETF	20.00%
PDBC	Invesco Optm Yd Dvrs Cdty Stra No K1 ETF	20.00%



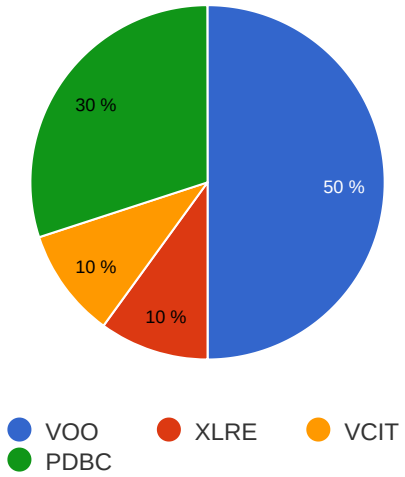
Portfolio 2

Ticker	Name	Allocation
VOO	Vanguard S&P 500 ETF	50.00%
XLRE	Real Estate Select Sector SPDR	15.00%
VCIT	Vanguard Interm-Term Corp Bd ETF	15.00%
PDBC	Invesco Optm Yd Dvrs Cdty Stra No K1 ETF	20.00%



Portfolio 3

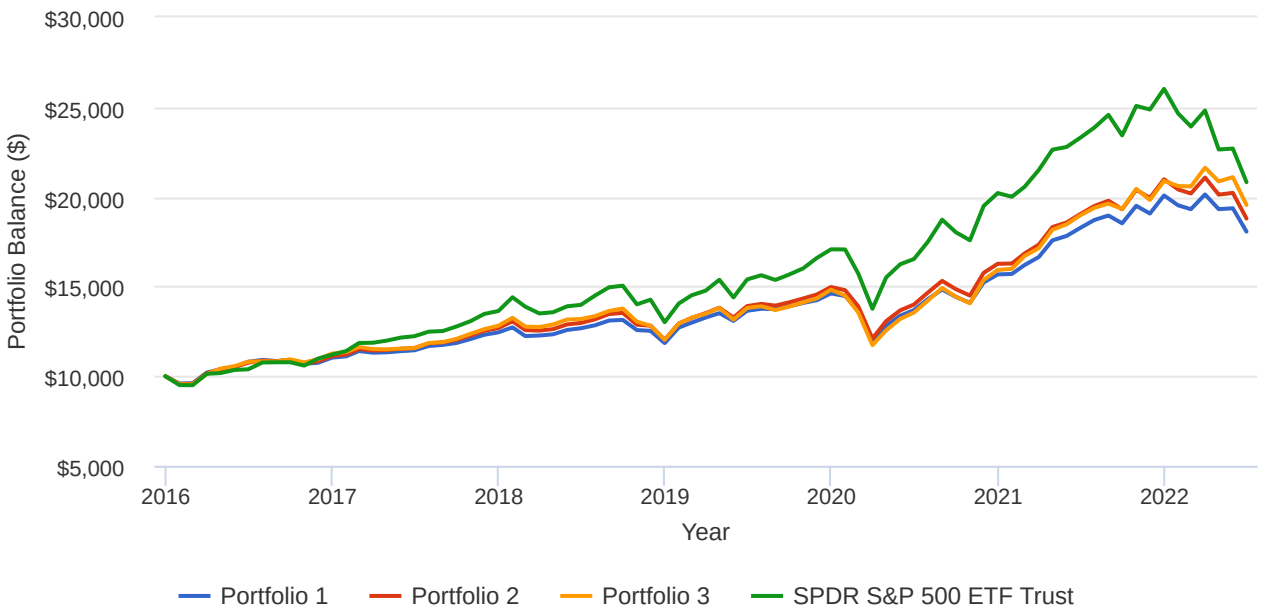
Ticker	Name	Allocation
VOO	Vanguard S&P 500 ETF	50.00%
XLRE	Real Estate Select Sector SPDR	10.00%
VCIT	Vanguard Interm-Term Corp Bd ETF	10.00%
PDBC	Invesco Optm Yd Dvrs Cdty Stra No K1 ETF	30.00%



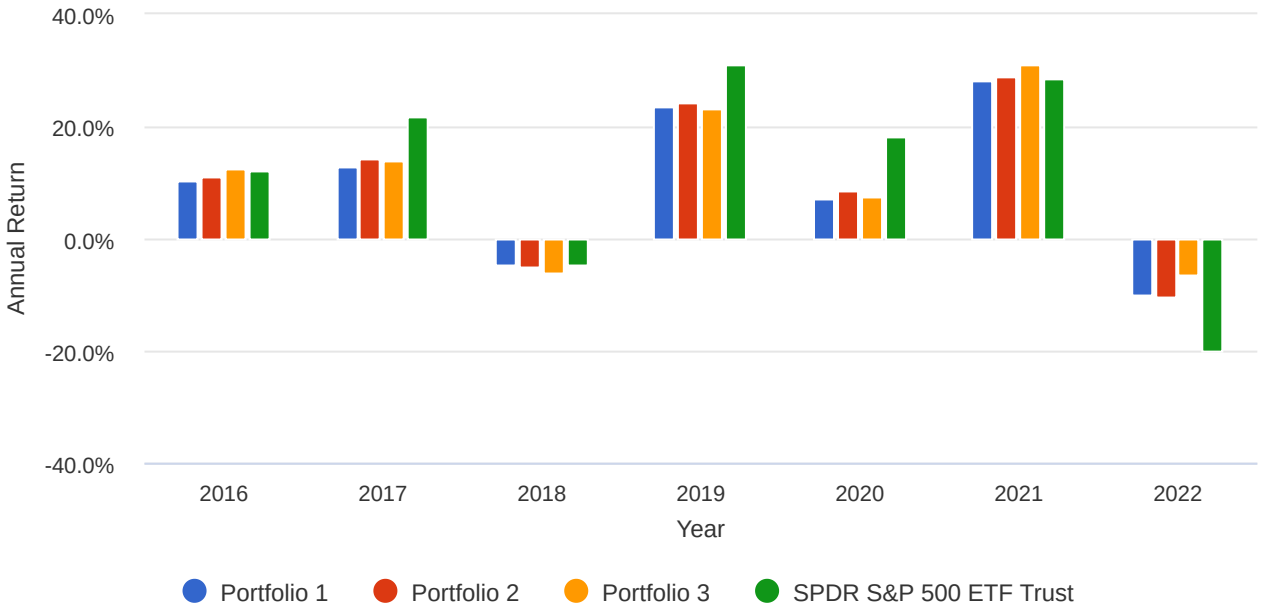
Portfolio Returns

Portfolio	Initial Balance	Final Balance	CAGR	Stdev	Best Year	Worst Year	Max. Drawdown	Sharpe Ratio	Sortino Ratio	Ma Correla
Portfolio 1	$10,000	$18,058	9.52%	11.54%	28.10%	-10.05%	-18.43%	0.77	1.14	
Portfolio 2	$10,000	$18,786	10.19%	12.15%	28.97%	-10.45%	-19.18%	0.78	1.17	
Portfolio 3	$10,000	$19,545	10.86%	12.60%	31.21%	-6.43%	-20.85%	0.81	1.20	
SPDR S&P 500 ETF Trust	$10,000	$20,817	11.94%	15.33%	31.22%	-19.98%	-19.98%	0.75	1.13	

Portfolio Growth



Annual Returns



Trailing Returns

	Total Return			Annualized Return			Annualized Standard Deviation	
Name	**3 Month**	**Year To Date**	**1 year**	**3 year**	**5 year**	**Full**	**3 year**	**5 year**
Portfolio 1	-10.30%	-10.05%	-1.12%	9.79%	9.56%	9.52%	14.36%	12.56%
Portfolio 2	-10.86%	-10.45%	-1.30%	10.54%	10.18%	10.19%	15.06%	13.29%
Portfolio 3	-9.61%	-6.43%	3.07%	12.29%	11.07%	10.86%	15.53%	13.80%
SPDR S&P 500 ETF Trust	-16.11%	-19.98%	-10.61%	10.58%	11.23%	11.94%	18.59%	16.88%

Trailing return and volatility are as of last full calendar month ending June 2022

Notes on results:

- IMPORTANT: The projections or other information generated by Portfolio Visualizer regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results and are not guarantees of future results. Results may vary with each use and over time.
- The results do not constitute investment advice or recommendation, are provided solely for informational purposes, and are not an offer to buy or sell any securities. All use is subject to terms of service.
- Investing involves risk, including possible loss of principal. Past performance is not a guarantee of future results.
- Asset allocation and diversification strategies do not guarantee a profit or protect against a loss.
- Hypothetical returns do not reflect trading costs, transaction fees, commissions, or actual taxes due on investment returns.
- The results are based on information from a variety of sources we consider reliable, but we do not represent that the information is accurate or complete.
- Refer to the related documentation sections for more details on terms and definitions, methodology, and data sources.
- Portfolio model information represents a blended portfolio consisting of the model's underlying positions and assigned weights provided by the user and rebalanced at the specified schedule. The results were constructed using net of fee mutual fund performance. Portfolio Visualizer does not provide preferential treatment to any specific security or investment.
- The results are based on the total return of assets and assume that all received dividends and distributions are reinvested.
- Market capitalization refers to the total value of all a company's shares of stock. It is calculated by multiplying the price of a stock by its total number of outstanding shares. Large cap refers to a company with a market capitalization value of more than $10 billion, mid cap refers to a company with a market capitalization value between $2 and $10 billion, and small cap refers to a company with a market capitalization value below $2 billion. For funds and portfolios the equity market capitalization is calculated based on the long position of the equity holdings.
- Credit quality measures the ability of a bond issuer to repay a bond's interest and principal in a timely manner. Ratings agencies research the financial health of each bond issuer and assign ratings to the bonds being offered. Lower-rated bonds generally offer higher yields to compensate investors for the additional risk. AAA is the highest possible rating that may be assigned to an issuer's bonds by any of the major credit rating agencies. Bonds rated AAA to AA are known as high-grade bonds, bonds rated A to BBB are known as medium-grade bonds, and bonds rated BB to C are known as non-investment grade bonds. An issuer will receive a rating of D if it is already in default on some of its debt. For funds and portfolios the fixed income credit quality break-down is calculated based on the long position of the fixed income holdings.
- A fixed income maturity date refers to the specific date on which the investor's principal will be repaid. Duration measures a bond's or fixed income portfolio's price sensitivity to interest rate changes. If a bond has a duration of 5 years, and interest rates increase by 1%, the bond's price will decline by approximately 5%. Conversely, if a bond has a duration of 5 years and interest rates fall by 1%, the bond's price will increase by approximately 5%. A fixed income portfolio's duration is computed as the weighted average of individual bond durations held in the portfolio.
- Compound annualized growth rate (CAGR) is the annualized geometric mean return of the portfolio. It is calculated from the portfolio start and end balance and is thus impacted by any cashflows.
- The time-weighted rate of return (TWRR) is a measure of the compound rate of growth in a portfolio. This is calculated from the holding period returns (e.g. monthly returns), and TWRR will thus not be impacted by cashflows. If there are no external cashflows, TWRR will equal CAGR.

- The money-weighted rate of return (MWRR) is the internal rate of return (IRR) taking into account cashflows. This is the discount rate at which the present value of cash inflows equals the present value of cash outflows.
- Total return is the combined return in income and capital appreciation from investment in an asset. Yield measures the current cash income received from investment in an asset. Bonds provide yield in the form of interest payments and stocks through dividends.
- Standard deviation (Stdev) is used to measure the dispersion of returns around the mean and is often used as a measure of risk. A higher standard deviation implies greater the dispersion of data points around the mean.
- Sharpe Ratio is a measure of risk-adjusted performance of the portfolio, and it is calculated by dividing the mean monthly excess return of the portfolio over the risk-free rate by the standard deviation of excess return, and the displayed value is annualized.
- Sortino Ratio is a measure of risk-adjusted return which is a modification of the Sharpe Ratio. While the latter is the ratio of average returns in excess of a risk-free rate divided by the standard deviation of those excess returns, the Sortino Ratio has the same denominator divided by the standard deviation of returns below the risk-free rate.
- Treynor Ratio is a measure of risk-adjusted performance of the portfolio. It is similar to the Sharpe Ratio, but it uses portfolio beta (systematic risk) as the risk metric in the denominator.
- Calmar Ratio is a measure of risk-adjusted performance of the portfolio. It is calculated as the annualized return over the past 36 months divided by the maximum drawdown over the past 36 months based on monthly returns.
- Risk-free returns are calculated based on the Federal Reserve 3-Month Treasury Bill (secondary market) rates.
- Downside deviation measures the downside volatility of the portfolio returns unlike standard deviation, which includes both upside and downside deviations. Downside deviation is calculated based on negative returns that hurt the portfolio performance.
- Correlation measures to what degree the returns of the two assets move in relation to each other. Correlation coefficient is a numerical value between -1 and +1. If one variable goes up by a certain amount, the correlation coefficient indicates which way the other variable moves and by how much. Asset correlations are calculated based on monthly returns.
- Skewness is a measure of the asymmetry of the probability distribution or returns from a normal Gaussian distribution shape about its mean. Negative skewness is associated with the left (typically negative returns) tail of the distribution extending further than the right tail; and positive skewness is associated with the right (typically positive returns) tail of the distribution extending further than the left tail.
- Excess kurtosis is a measure of whether a data distribution is peaked or flat relative to a normal distribution. Distributions with high kurtosis tend to have a distinct peak near the mean, decline rather rapidly, and have heavy or fat tails.
- A drawdown refers to the decline in value of a single investment or an investment portfolio from a relative peak value to a relative trough. A maximum drawdown (Max Drawdown) is the maximum observed loss from a peak to a trough of a portfolio before a new peak is attained. Drawdown values are calculated based on monthly returns.
- Value at Risk (VaR) measures the scale of loss at a given confidence level. If the 5% VaR is -3% the portfolio return is expected to be greater than -3% 95% of the time and less than -3% 5% of the time. Value at Risk can be calculated directly based on historical returns based on a given percentile or analytically based on the mean and standard deviation of the returns.
- Conditional Value at Risk (CVaR) measures the scale of the expected loss once the specific Value at Risk (VaR) breakpoint has been breached, i.e., it calculates the average tail loss by taking a weighted average between the value at risk and losses exceeding the value at risk.
- Beta is a measure of systematic risk and measures the volatility of a particular investment relative to the market or its benchmark. Alpha measures the active return of the investment compared to

the market benchmark return. R-squared is the percentage of a portfolio's movements that can be explained by movements in the selected benchmark index.

- Active return is the investment return minus the return of its benchmark. For periods longer than 12 months this is displayed as annualized value, i.e., annualized investment return minus annualized benchmark return.
- Tracking error, also known as active risk, is the standard deviation of active return. This is displayed as annualized value based on the standard deviation of monthly active returns.
- Information ratio is the active return divided by the tracking error. It measures whether the investment outperformed its benchmark consistently.
- Gain/Loss ratio is a measure of downside risk, and it is calculated as the average positive return in up periods divided by the average negative return in down periods.
- Upside Capture Ratio measures how well the fund performed relative to the benchmark when the market was up, and Downside Capture Ratio measures how well the fund performed relative to the benchmark when the market was down. An upside capture ratio greater than 100 would indicate that the fund outperformed its benchmark when the market was up, and a downside capture ratio below 100 would indicate that the fund lost less than its benchmark when the market was down. To calculate upside capture ratio a new series from the portfolio returns is constructed by dropping all time periods where the benchmark return is less than equal to zero. The up capture is then the quotient of the annualized return of the resulting manager series, divided by the annualized return of the resulting benchmark series. The downside capture ratio is calculated analogously.
- All risk measures for the portfolio and portfolio assets are calculated based on monthly returns.
- Gross expense ratio reflects the total annual operating expenses paid by each fund. Net expense ratio reflects what investors were charged after waivers, reductions, and reimbursements.
- Price to earnings (P/E) ratio of a stock is calculated by dividing the current price of the stock by its trailing 12 months' earnings per share. For funds the price to earnings ratio is computed as the weighted average of fund holdings.
- The annual results for 2022 are based on monthly returns from January to June.
- The results assume monthly rebalancing of portfolio assets to match the specified allocation.

		Portfolio 1		Portfolio 2		Portfolio 3		SPDR S&P 500 ETF Trust		Vanguard S&P 500 ETF (VOO)
Year	**Inflation**	**Return**	**Balance**	**Return**	**Balance**	**Return**	**Balance**	**Return**	**Balance**	
2016	2.07%	10.33%	$11,033	11.14%	$11,114	12.57%	$11,257	12.00%	$11,200	12.17%
2017	2.11%	12.77%	$12,442	14.13%	$12,684	13.82%	$12,813	21.70%	$13,631	21.77%
2018	1.91%	-4.82%	$11,842	-5.09%	$12,038	-6.17%	$12,022	-4.56%	$13,009	-4.50%
2019	2.29%	23.41%	$14,614	24.37%	$14,971	23.29%	$14,821	31.22%	$17,071	31.35%
2020	1.36%	7.24%	$15,672	8.64%	$16,265	7.41%	$15,920	18.37%	$20,208	18.29%
2021	7.04%	28.10%	$20,076	28.97%	$20,978	31.21%	$20,888	28.74%	$26,016	28.78%
2022	6.28%	-10.05%	$18,058	-10.45%	$18,786	-6.43%	$19,545	-19.98%	$20,817	-19.95%

Annual return for 2022 is from 01/01/2022 to 06/30/2022

		Portfolio 1		Portfolio 2		Portfolio 3		SPDR S&P 500 ETF Trust		Vanguard S&P 500 ETF (VOO)
Year	Month	Return	Balance	Return	Balance	Return	Balance	Return	Balance	
2016	1	-4.15%	$9,585	-4.34%	$9,566	-4.55%	$9,545	-4.98%	$9,502	-4.91%
2016	2	0.20%	$9,605	0.10%	$9,576	0.01%	$9,546	-0.08%	$9,494	-0.21%
2016	3	6.17%	$10,197	6.20%	$10,169	5.96%	$10,115	6.72%	$10,133	6.87%
2016	4	1.85%	$10,386	1.96%	$10,369	3.03%	$10,421	0.39%	$10,173	0.35%
2016	5	1.22%	$10,512	1.31%	$10,504	1.30%	$10,557	1.70%	$10,346	1.75%
2016	6	2.75%	$10,801	2.35%	$10,751	2.35%	$10,805	0.35%	$10,382	0.32%
2016	7	0.94%	$10,903	1.10%	$10,869	0.20%	$10,826	3.65%	$10,761	3.68%
2016	8	-0.55%	$10,844	-0.34%	$10,832	-0.04%	$10,821	0.12%	$10,773	0.12%
2016	9	0.59%	$10,907	0.65%	$10,902	1.10%	$10,941	0.01%	$10,774	0.04%
2016	10	-2.04%	$10,685	-1.90%	$10,695	-1.59%	$10,767	-1.73%	$10,587	-1.79%
2016	11	0.57%	$10,746	1.25%	$10,829	1.69%	$10,949	3.68%	$10,977	3.73%
2016	12	2.67%	$11,033	2.63%	$11,114	2.81%	$11,257	2.03%	$11,200	2.07%
2017	1	0.67%	$11,107	0.83%	$11,206	0.78%	$11,344	1.79%	$11,401	1.78%
2017	2	2.64%	$11,399	2.74%	$11,514	2.45%	$11,622	3.93%	$11,848	3.88%
2017	3	-0.79%	$11,309	-0.72%	$11,431	-0.98%	$11,507	0.13%	$11,863	0.13%
2017	4	0.17%	$11,329	0.21%	$11,455	-0.11%	$11,495	0.99%	$11,981	1.04%
2017	5	0.56%	$11,392	0.61%	$11,525	0.36%	$11,536	1.41%	$12,150	1.40%
2017	6	0.43%	$11,442	0.40%	$11,572	0.22%	$11,561	0.64%	$12,228	0.63%
2017	7	2.08%	$11,680	2.18%	$11,824	2.48%	$11,848	2.06%	$12,479	2.06%
2017	8	0.53%	$11,742	0.47%	$11,880	0.41%	$11,897	0.29%	$12,515	0.29%
2017	9	0.92%	$11,850	1.21%	$12,024	1.52%	$12,078	2.01%	$12,768	2.04%
2017	10	1.86%	$12,070	2.04%	$12,269	2.35%	$12,362	2.36%	$13,068	2.33%
2017	11	1.95%	$12,306	2.12%	$12,529	2.09%	$12,620	3.06%	$13,468	3.06%
2017	12	1.10%	$12,442	1.23%	$12,684	1.53%	$12,813	1.21%	$13,631	1.28%
2018	1	2.25%	$12,722	2.96%	$13,059	3.43%	$13,253	5.64%	$14,399	5.59%
2018	2	-3.82%	$12,235	-3.78%	$12,566	-3.70%	$12,763	-3.64%	$13,875	-3.73%
2018	3	0.25%	$12,266	-0.20%	$12,540	-0.19%	$12,738	-2.74%	$13,495	-2.48%
2018	4	0.55%	$12,333	0.66%	$12,624	1.12%	$12,881	0.52%	$13,565	0.35%

2018	5	1.98%	$12,577	2.08%	$12,886	2.16%	$13,159	2.43%	$13,894	2.42%
2018	6	0.76%	$12,672	0.62%	$12,966	0.20%	$13,185	0.58%	$13,974	0.76%
2018	7	1.29%	$12,836	1.56%	$13,168	1.22%	$13,346	3.70%	$14,492	3.56%
2018	8	2.07%	$13,101	2.24%	$13,462	2.18%	$13,636	3.19%	$14,955	3.22%
2018	9	0.28%	$13,138	0.49%	$13,529	0.99%	$13,771	0.59%	$15,044	0.58%
2018	10	-4.33%	$12,569	-4.89%	$12,868	-5.31%	$13,039	-6.91%	$14,004	-6.84%
2018	11	-0.34%	$12,526	-0.41%	$12,814	-1.75%	$12,811	1.85%	$14,264	1.89%
2018	12	-5.46%	$11,842	-6.06%	$12,038	-6.16%	$12,022	-8.79%	$13,009	-8.84%
2019	1	7.33%	$12,710	7.45%	$12,934	7.50%	$12,924	8.01%	$14,051	7.92%
2019	2	2.13%	$12,981	2.39%	$13,244	2.62%	$13,262	3.24%	$14,507	3.25%
2019	3	2.21%	$13,268	2.03%	$13,513	1.64%	$13,480	1.81%	$14,769	1.92%
2019	4	1.84%	$13,512	2.25%	$13,817	2.37%	$13,800	4.09%	$15,372	4.03%
2019	5	-3.19%	$13,081	-3.96%	$13,269	-4.70%	$13,152	-6.38%	$14,392	-6.35%
2019	6	4.31%	$13,645	4.81%	$13,908	4.97%	$13,806	6.96%	$15,393	6.99%
2019	7	0.81%	$13,756	0.86%	$14,028	0.67%	$13,899	1.51%	$15,626	1.46%
2019	8	-0.15%	$13,736	-0.68%	$13,932	-1.54%	$13,685	-1.67%	$15,365	-1.64%
2019	9	1.14%	$13,893	1.31%	$14,114	1.39%	$13,876	1.95%	$15,664	1.97%
2019	10	1.36%	$14,082	1.55%	$14,332	1.69%	$14,111	2.21%	$16,010	2.18%
2019	11	1.09%	$14,235	1.53%	$14,552	1.61%	$14,337	3.62%	$16,590	3.63%
2019	12	2.67%	$14,614	2.88%	$14,971	3.38%	$14,821	2.90%	$17,071	2.97%
2020	1	-1.01%	$14,466	-1.20%	$14,792	-2.24%	$14,489	-0.04%	$17,064	-0.04%
2020	2	-5.55%	$13,663	-6.11%	$13,888	-6.50%	$13,547	-7.92%	$15,713	-8.10%
2020	3	-12.75%	$11,921	-12.88%	$12,100	-13.41%	$11,730	-12.46%	$13,755	-12.46% -
2020	4	7.46%	$12,810	8.01%	$13,069	6.99%	$12,551	12.70%	$15,502	12.79%
2020	5	4.36%	$13,369	4.59%	$13,669	5.10%	$13,190	4.76%	$16,240	4.74%
2020	6	2.34%	$13,681	2.36%	$13,992	2.69%	$13,545	1.78%	$16,529	1.83%
2020	7	4.54%	$14,302	4.82%	$14,667	4.99%	$14,222	5.89%	$17,502	5.88%
2020	8	3.69%	$14,831	4.40%	$15,313	4.90%	$14,918	6.98%	$18,724	6.97%

2020	9	-2.76%	$14,421	-3.01%	$14,851	-3.27%	$14,431	-3.74%	$18,023	-3.75%
2020	10	-2.33%	$14,085	-2.42%	$14,492	-2.57%	$14,060	-2.49%	$17,574	-2.55%
2020	11	8.08%	$15,223	8.73%	$15,757	9.24%	$15,359	10.88%	$19,486	10.95%
2020	12	2.95%	$15,672	3.23%	$16,265	3.65%	$15,920	3.71%	$20,208	3.75%
2021	1	0.17%	$15,699	0.08%	$16,279	0.42%	$15,987	-1.02%	$20,002	-1.02%
2021	2	3.17%	$16,197	3.45%	$16,841	4.49%	$16,704	2.78%	$20,558	2.77%
2021	3	2.73%	$16,639	2.92%	$17,332	2.57%	$17,133	4.54%	$21,492	4.57%
2021	4	5.60%	$17,571	5.67%	$18,314	6.01%	$18,162	5.29%	$22,629	5.29%
2021	5	1.39%	$17,816	1.38%	$18,566	1.68%	$18,467	0.66%	$22,777	0.67%
2021	6	2.51%	$18,263	2.52%	$19,034	2.69%	$18,963	2.25%	$23,289	2.26%
2021	7	2.43%	$18,707	2.38%	$19,488	2.23%	$19,386	2.44%	$23,858	2.45%
2021	8	1.34%	$18,957	1.51%	$19,782	1.22%	$19,623	2.98%	$24,568	2.95%
2021	9	-2.31%	$18,520	-2.41%	$19,306	-1.53%	$19,322	-4.66%	$23,423	-4.66%
2021	10	5.28%	$19,499	5.63%	$20,392	5.78%	$20,438	7.02%	$25,067	7.04%
2021	11	-2.22%	$19,066	-2.23%	$19,937	-3.01%	$19,823	-0.80%	$24,865	-0.73%
2021	12	5.30%	$20,076	5.22%	$20,978	5.37%	$20,888	4.63%	$26,016	4.55%
2022	1	-2.75%	$19,523	-2.72%	$20,407	-1.38%	$20,599	-5.27%	$24,644	-5.24%
2022	2	-1.10%	$19,309	-1.08%	$20,186	-0.10%	$20,579	-2.95%	$23,917	-2.98%
2022	3	4.26%	$20,131	4.40%	$21,075	5.07%	$21,622	3.76%	$24,815	3.78%
2022	4	-4.08%	$19,310	-4.53%	$20,120	-3.53%	$20,859	-8.78%	$22,637	-8.78%
2022	5	0.27%	$19,362	0.48%	$20,217	1.13%	$21,095	0.23%	$22,688	0.26%
2022	6	-6.73%	$18,058	-7.08%	$18,786	-7.35%	$19,545	-8.25%	$20,817	-8.26%

Returns Based Style Analysis

Style Category	Portfolio 1	Portfolio 2	Portfolio 3	SPDR S&P 500 ETF Trust
Large-cap Value	34.58%	37.01%	39.02%	46.41%

Style analysis is based on monthly returns from January 2016 to June 2022 and uses total portfolio return with monthly rebalancing. Returns based style analysis aims to explain the portfolio returns based on asset class exposures, it does not identify the actual portfolio holdings.

Style Category	Portfolio 1	Portfolio 2	Portfolio 3	SPDR S&P 500 ETF Trust
Large-cap Growth	20.51%	24.36%	19.48%	53.49%
Mid-cap Value	6.35%	5.80%	3.44%	0.00%
Mid-cap Growth	0.00%	0.00%	0.00%	0.00%
Small-cap Value	0.00%	0.00%	3.10%	0.00%
Small-cap Growth	0.00%	0.00%	0.00%	0.00%
Global ex-US Developed Markets	5.11%	6.38%	12.86%	0.00%
Emerging Markets	0.99%	1.19%	2.16%	0.00%
Corporate Bonds	21.19%	13.57%	2.16%	0.00%
Long-Term Treasuries	0.00%	0.00%	0.00%	0.00%
Intermediate-Term Treasuries	0.00%	0.00%	0.00%	0.00%
Short-Term Treasuries	11.26%	11.67%	17.78%	0.10%
R Squared	**90.85%**	**93.06%**	**88.53%**	**99.95%**

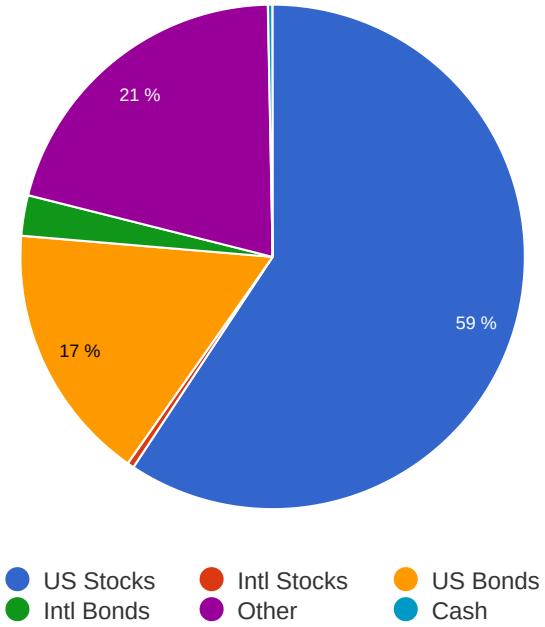
Style analysis is based on monthly returns from January 2016 to June 2022 and uses total portfolio return with monthly rebalancing. Returns based style analysis aims to explain the portfolio returns based on asset class exposures, it does not identify the actual portfolio holdings.

Holdings Based Style Analysis for Portfolio 1

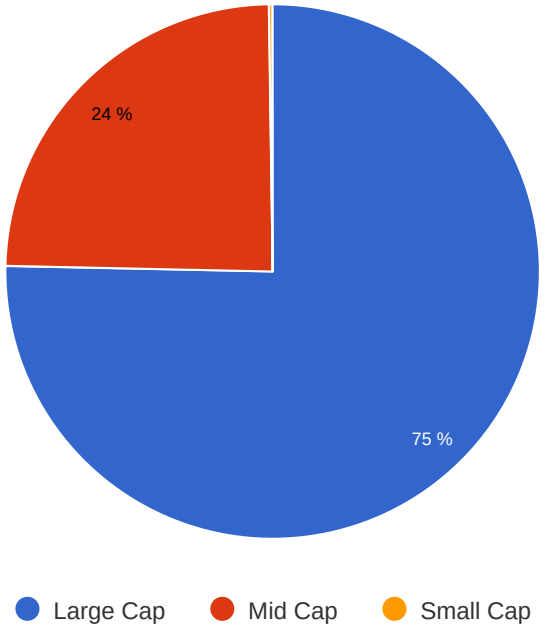
				Yield		Expense Ratio				Contributi	
Ticker	Name	Category	Weight	SEC	TTM	Net	Gross	P/E	Duration	Return	
VOO	Vanguard S&P 500 ETF	Large Blend	40.00%	1.62%	1.63%	0.03%	0.03%	18.45		$3,826	50
XLRE	Real Estate Select Sector SPDR	Real Estate	20.00%	2.82%	3.10%	0.10%	0.10%	29.31		$1,438	23
VCIT	Vanguard Interm-Term Corp Bd ETF	Corporate Bond	20.00%	4.73%	2.61%	0.04%	0.04%		6.37	$186	6
PDBC	Invesco Optm Yd Dvrs Cdty Stra No K1 ETF	Commodities Broad Basket	20.00%	0.68%	39.64%	0.62%	0.64%			$2,609	20

100.00%	**2.29%**	**9.72%**	**0.16%**	**0.17%**	**22.07**	**6.37**	**$8,058**	**100**

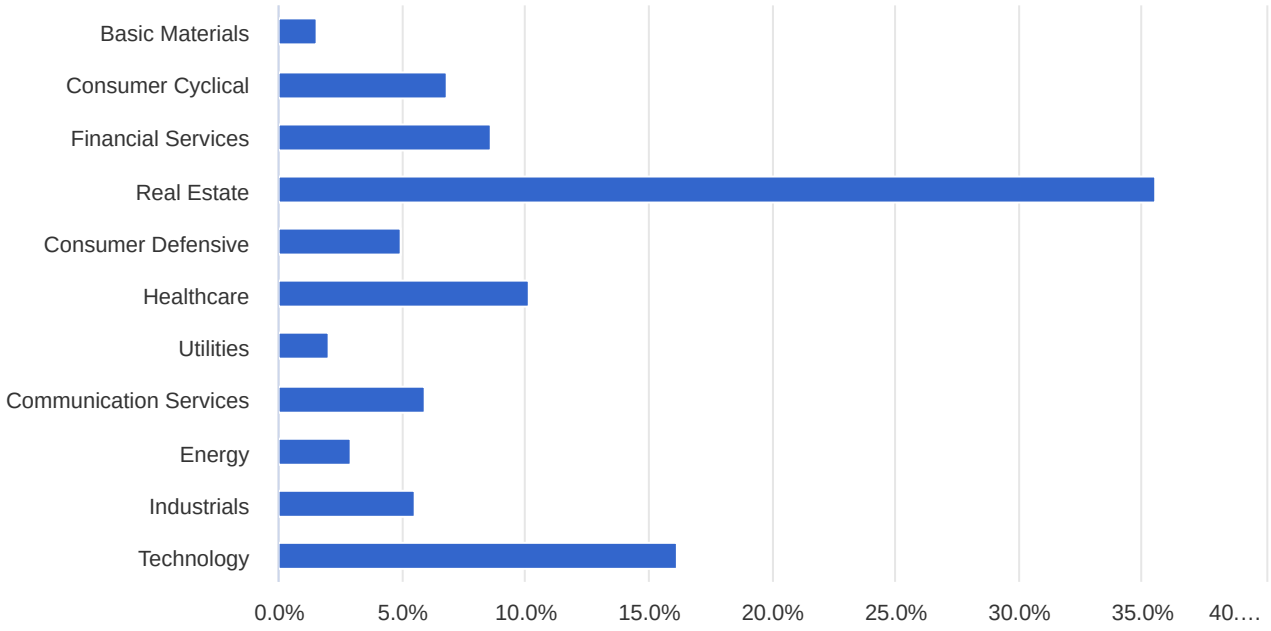
Asset Allocation



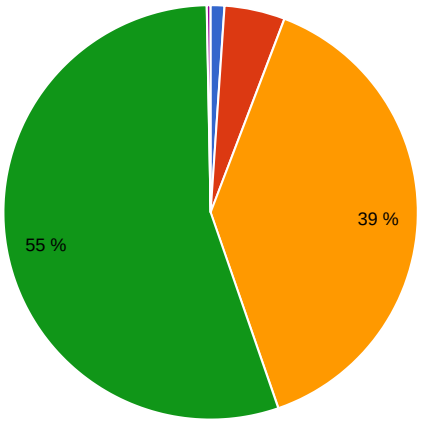
Equity Market Capitalization



Equity Sectors

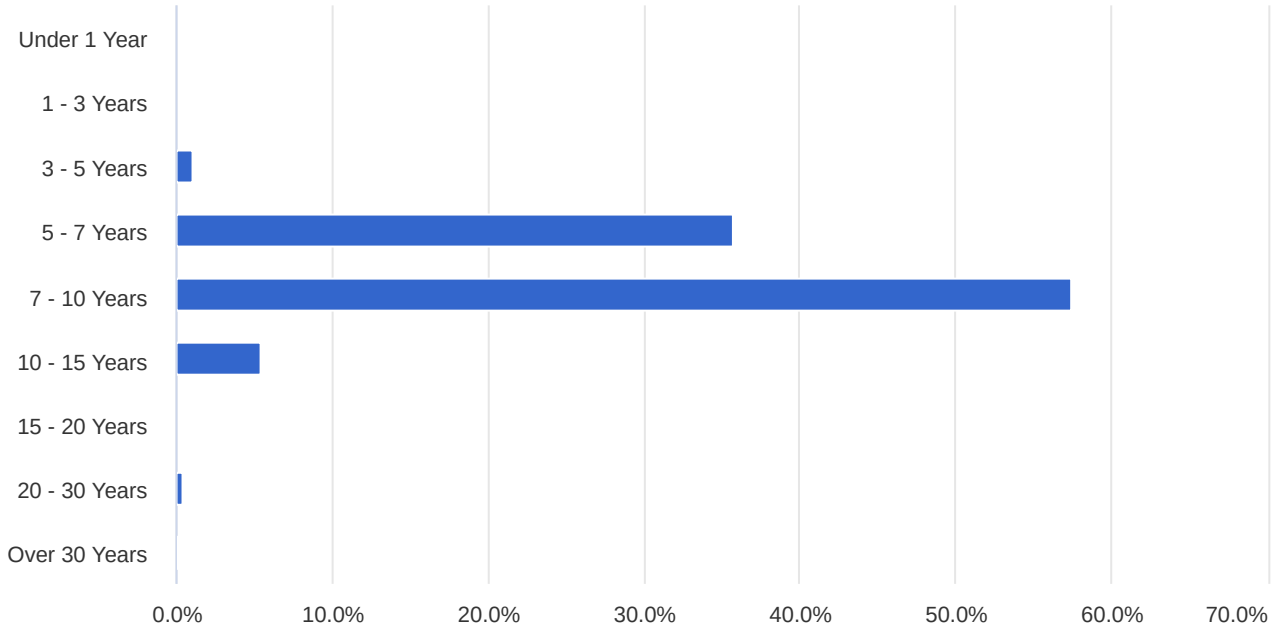


Fixed Income Credit Quality



- AAA
- AA
- A
- BBB
- Non-Investment Grade

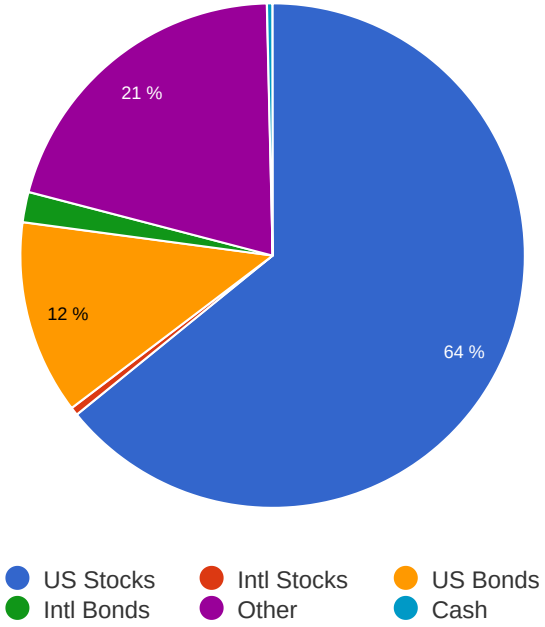
Fixed Income Maturity



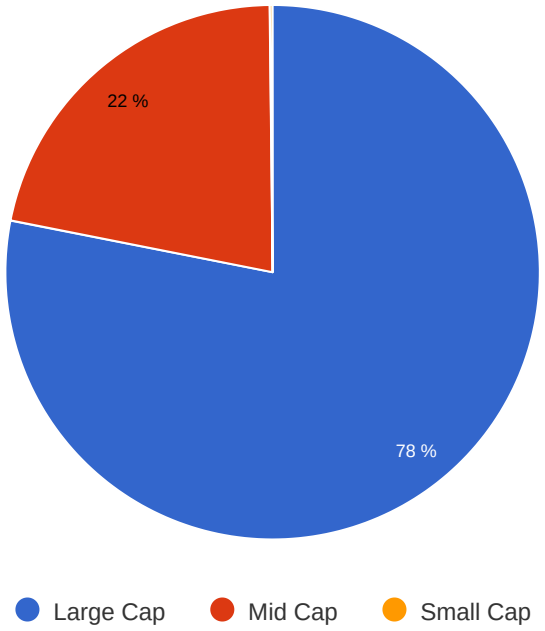
Holdings Based Style Analysis for Portfolio 2

				Yield		Expense Ratio				Contributi	
Ticker	**Name**	**Category**	**Weight**	**SEC**	**TTM**	**Net**	**Gross**	**P/E**	**Duration**	**Return**	
VOO	Vanguard S&P 500 ETF	Large Blend	50.00%	1.62%	1.63%	0.03%	0.03%	18.45		$4,846	60
XLRE	Real Estate Select Sector SPDR	Real Estate	15.00%	2.82%	3.10%	0.10%	0.10%	29.31		$1,105	16
VCIT	Vanguard Interm-Term Corp Bd ETF	Corporate Bond	15.00%	4.73%	2.61%	0.04%	0.04%		6.37	$130	4
PDBC	Invesco Optm Yd Dvrs Cdty Stra No K1 ETF	Commodities Broad Basket	20.00%	0.68%	39.64%	0.62%	0.64%			$2,706	19
			100.00%	**2.08%**	**9.60%**	**0.16%**	**0.16%**	**20.95**	**6.37**	**$8,786**	**100**

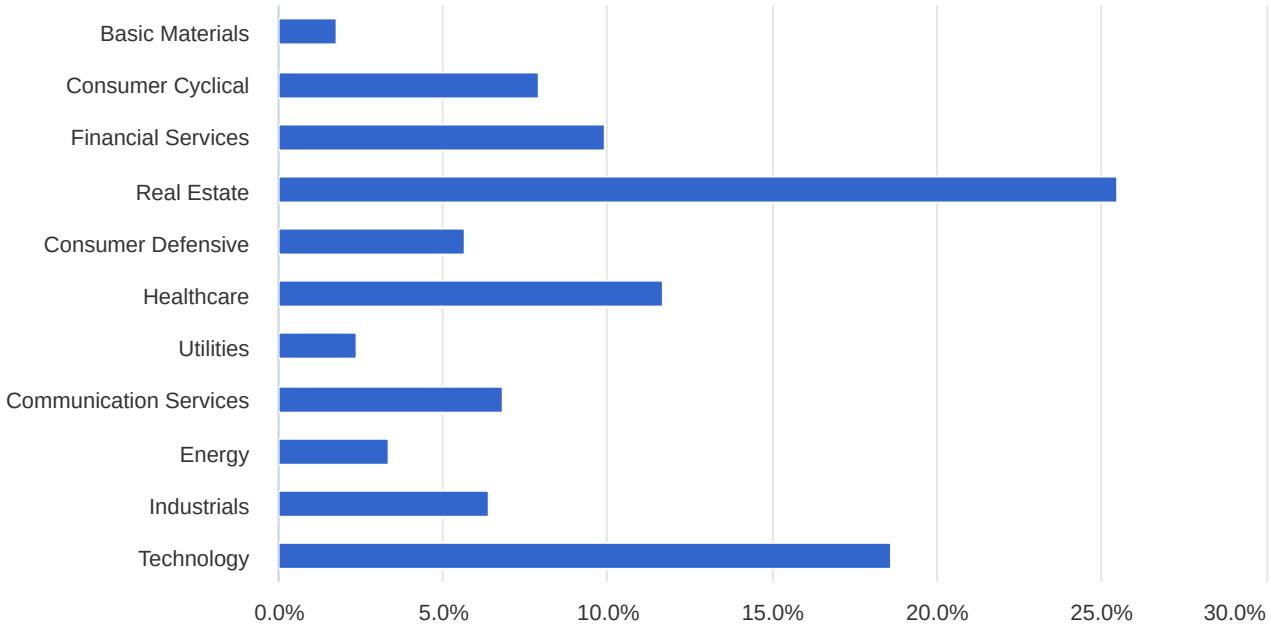
Asset Allocation



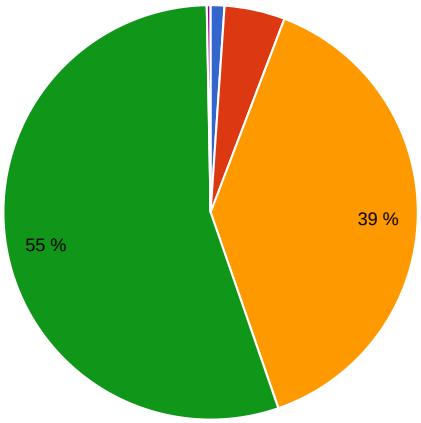
Equity Market Capitalization



Equity Sectors



Fixed Income Credit Quality



- AAA
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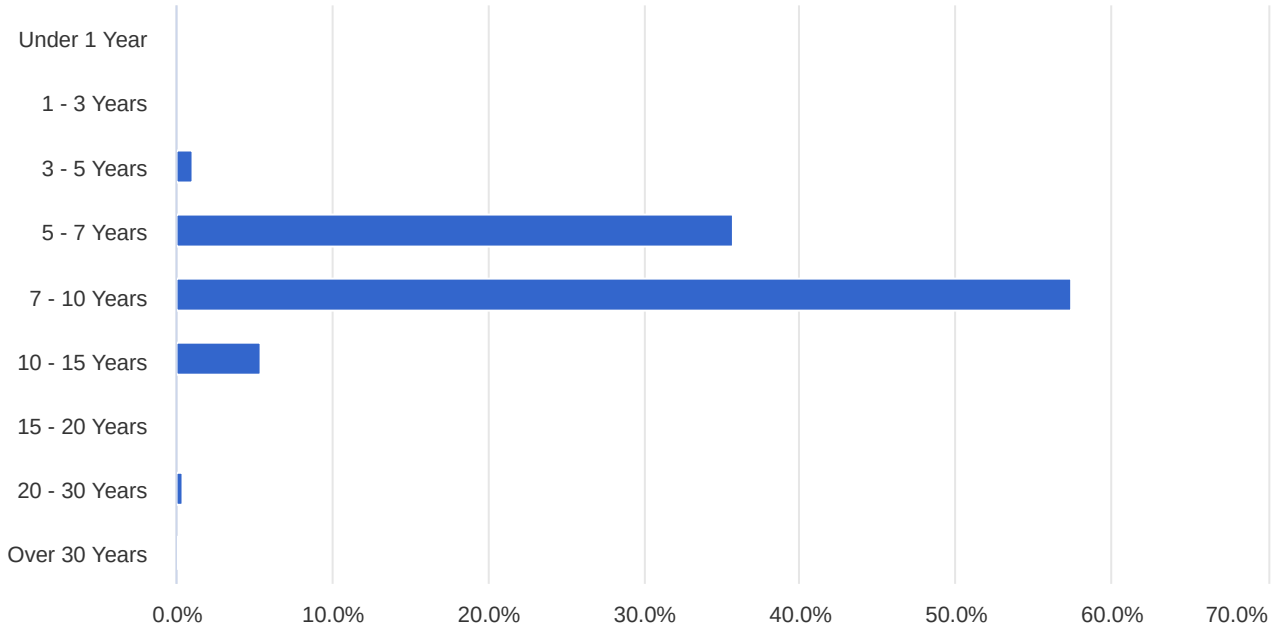
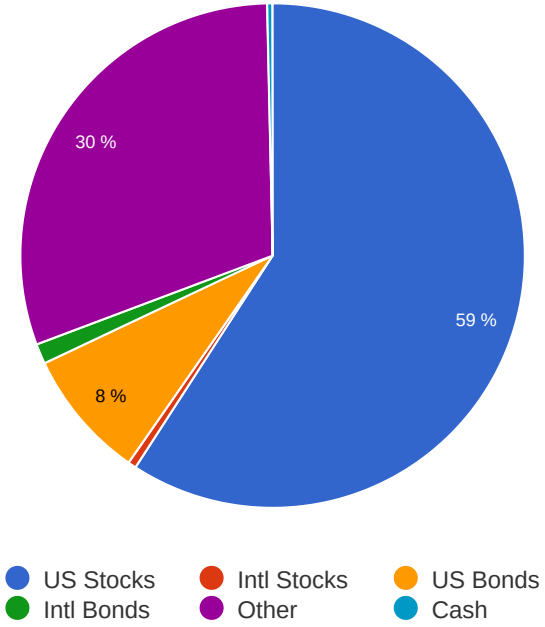
Fixed Income Maturity



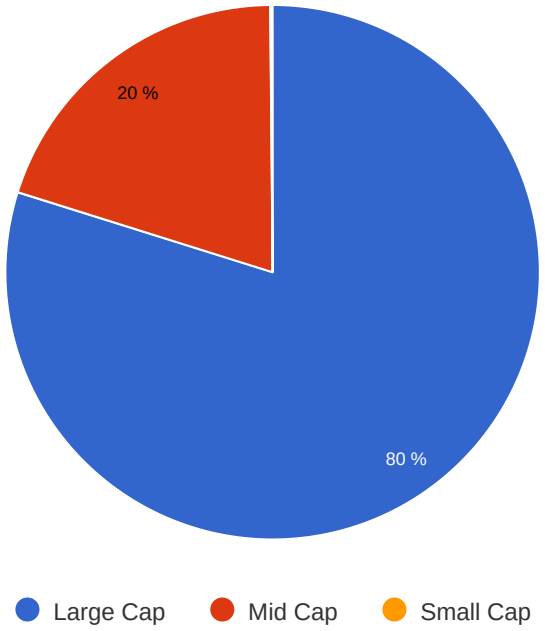
Holdings Based Style Analysis for Portfolio 3

				Yield		Expense Ratio				Contributi	
Ticker	Name	Category	Weight	SEC	TTM	Net	Gross	P/E	Duration	Return	
VOO	Vanguard S&P 500 ETF	Large Blend	50.00%	1.62%	1.63%	0.03%	0.03%	18.45		$4,723	56
XLRE	Real Estate Select Sector SPDR	Real Estate	10.00%	2.82%	3.10%	0.10%	0.10%	29.31		$724	9
VCIT	Vanguard Interm-Term Corp Bd ETF	Corporate Bond	10.00%	4.73%	2.61%	0.04%	0.04%		6.37	$76.29	2
PDBC	Invesco Optm Yd Dvrs Cdty Stra No K1 ETF	Commodities Broad Basket	30.00%	0.68%	39.64%	0.62%	0.64%			$4,022	31
			100.00%	**1.77%**	**13.28%**	**0.21%**	**0.22%**	**20.26**	**6.37**	**$9,545**	**100**

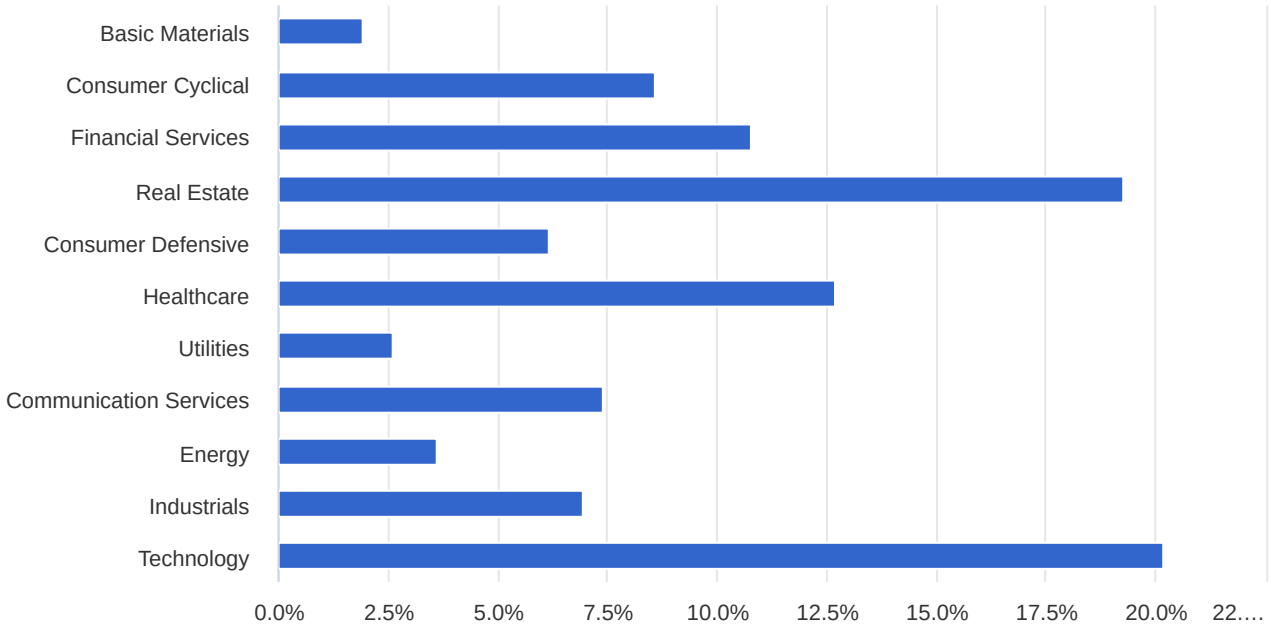
Asset Allocation



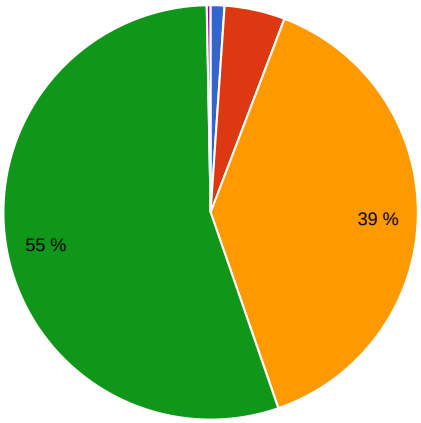
Equity Market Capitalization



Equity Sectors



Fixed Income Credit Quality



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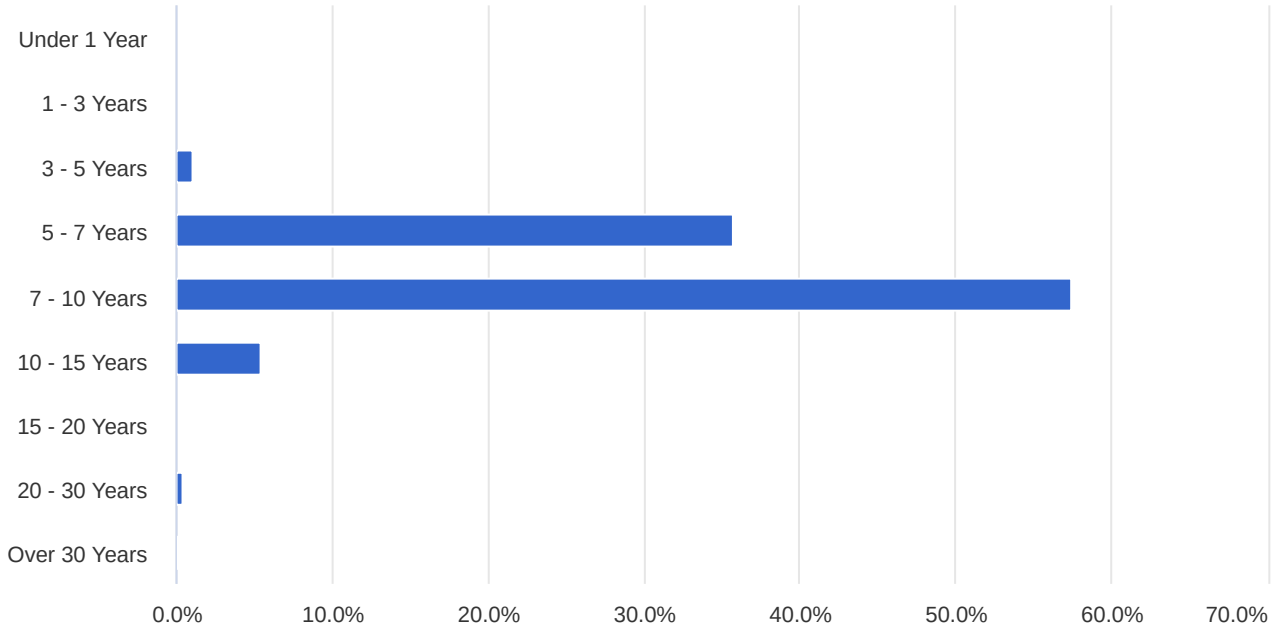
Fixed Income Maturity



Fund fundamentals data as of 07/22/2022. (c) 2022 Morningstar. All Rights Reserved. The fund fundamentals information contained herein: (1) is proprietary to Morningstar and/or its content providers; (2) may not be copied or distributed; and (3) is not warranted to be accurate, complete or timely. Neither Morningstar nor its content providers are responsible for any damages or losses arising from any use of this information.

Metric	Portfolio 1	Portfolio 2	Portfolio 3	SPDR S&P 500 ETF Trust
Arithmetic Mean (monthly)	0.82%	0.87%	0.93%	1.04%
Arithmetic Mean (annualized)	10.25%	11.00%	11.74%	13.24%
Geometric Mean (monthly)	0.76%	0.81%	0.86%	0.94%
Geometric Mean (annualized)	9.52%	10.19%	10.86%	11.94%
Standard Deviation (monthly)	3.33%	3.51%	3.64%	4.42%
Standard Deviation (annualized)	11.54%	12.15%	12.60%	15.33%

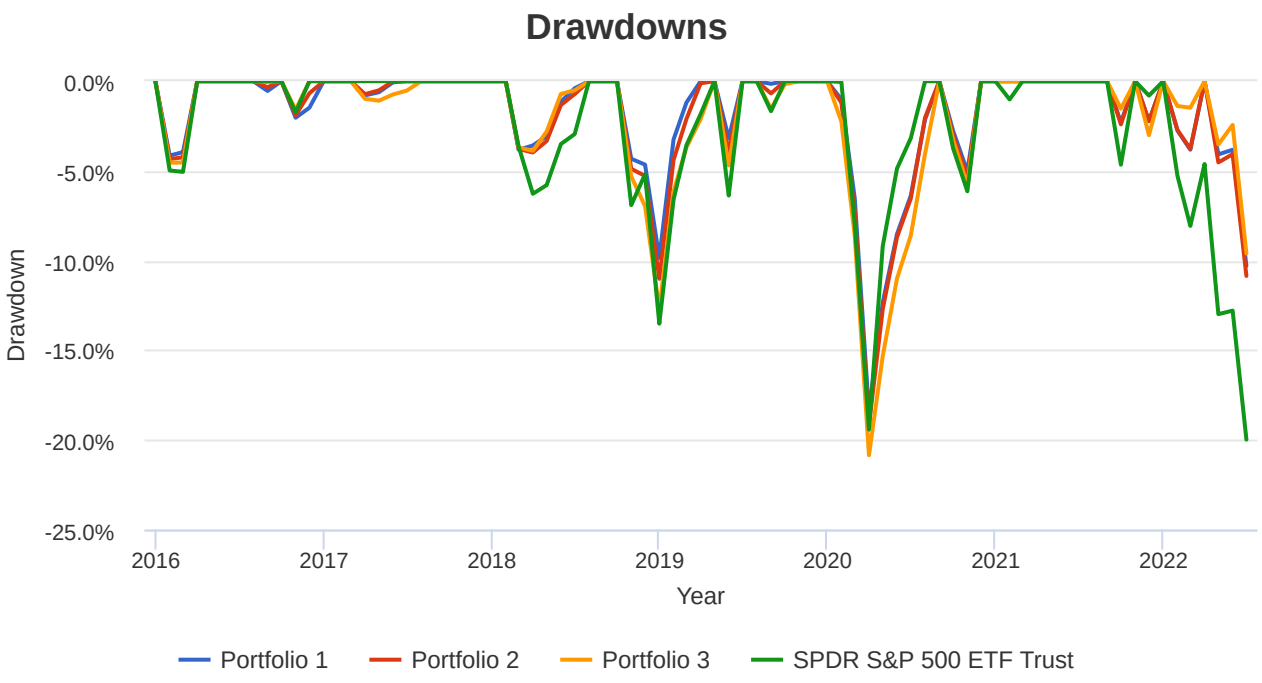
* SPDR S&P 500 ETF Trust is used as the benchmark for calculations. Value-at-risk metrics are based on monthly values.

Metric	Portfolio 1	Portfolio 2	Portfolio 3	SPDR S&P 500 ETF Trust
Downside Deviation (monthly)	2.22%	2.33%	2.42%	2.91%
Maximum Drawdown	-18.43%	-19.18%	-20.85%	-19.98%
Stock Market Correlation	0.94	0.96	0.93	1.00
Beta(*)	0.71	0.76	0.76	1.00
Alpha (annualized)	0.94%	1.00%	1.62%	0.00%
R^2	88.49%	91.48%	85.92%	100.00%
Sharpe Ratio	0.77	0.78	0.81	0.75
Sortino Ratio	1.14	1.17	1.20	1.13
Treynor Ratio (%)	12.55	12.62	13.44	11.59
Calmar Ratio	0.53	0.55	0.59	0.53
Active Return	-2.42%	-1.75%	-1.08%	N/A
Tracking Error	5.95%	5.13%	5.97%	N/A
Information Ratio	-0.41	-0.34	-0.18	N/A
Skewness	-0.91	-0.86	-0.92	-0.55
Excess Kurtosis	2.95	2.50	2.48	1.13
Historical Value-at-Risk (5%)	-4.50%	-5.06%	-5.44%	-7.97%
Analytical Value-at-Risk (5%)	-4.63%	-4.86%	-5.02%	-6.24%
Conditional Value-at-Risk (5%)	-7.62%	-8.03%	-8.35%	-9.57%
Upside Capture Ratio (%)	71.32	77.13	80.29	100.00

* SPDR S&P 500 ETF Trust is used as the benchmark for calculations. Value-at-risk metrics are based on monthly values.

Metric	Portfolio 1	Portfolio 2	Portfolio 3	SPDR S&P 500 ETF Trust
Downside Capture Ratio (%)	70.57	75.85	76.89	100.00
Safe Withdrawal Rate	21.31%	21.80%	21.77%	24.23%
Perpetual Withdrawal Rate	5.91%	6.53%	7.14%	8.11%
Positive Periods	57 out of 78 (73.08%)	56 out of 78 (71.79%)	55 out of 78 (70.51%)	57 out of 78 (73.08%)
Gain/Loss Ratio	0.71	0.76	0.82	0.68

* SPDR S&P 500 ETF Trust is used as the benchmark for calculations. Value-at-risk metrics are based on monthly values.



Drawdowns for Historical Market Stress Periods

Stress Period	Start	End	Portfolio 1	Portfolio 2	Portfolio 3	SPDR S&P 500 ETF Trust
COVID-19 Start	Jan 2020	Mar 2020	-18.43%	-19.18%	-20.85%	-19.43%

Drawdowns for Portfolio 1

Rank	Start	End	Length	Recovery By	Recovery Time	Underwater Period	Drawdown
1	Jan 2020	Mar 2020	3 months	Aug 2020	5 months	8 months	-18.43%
2	Apr 2022	Jun 2022	3 months				-10.30%
3	Oct 2018	Dec 2018	3 months	Mar 2019	3 months	6 months	-9.86%
4	Sep 2020	Oct 2020	2 months	Nov 2020	1 month	3 months	-5.03%
5	Jan 2016	Jan 2016	1 month	Mar 2016	2 months	3 months	-4.15%
6	Feb 2018	Feb 2018	1 month	Jul 2018	5 months	6 months	-3.82%
7	Jan 2022	Feb 2022	2 months	Mar 2022	1 month	3 months	-3.82%
8	May 2019	May 2019	1 month	Jun 2019	1 month	2 months	-3.19%
9	Sep 2021	Sep 2021	1 month	Oct 2021	1 month	2 months	-2.31%
10	Nov 2021	Nov 2021	1 month	Dec 2021	1 month	2 months	-2.22%

Worst 10 drawdowns included above

Drawdowns for Portfolio 2

Rank	Start	End	Length	Recovery By	Recovery Time	Underwater Period	Drawdown
1	Jan 2020	Mar 2020	3 months	Aug 2020	5 months	8 months	-19.18%
2	Oct 2018	Dec 2018	3 months	Apr 2019	4 months	7 months	-11.02%
3	Apr 2022	Jun 2022	3 months				-10.86%
4	Sep 2020	Oct 2020	2 months	Nov 2020	1 month	3 months	-5.36%
5	Jan 2016	Jan 2016	1 month	Mar 2016	2 months	3 months	-4.34%
6	Feb 2018	Mar 2018	2 months	Jul 2018	4 months	6 months	-3.97%
7	May 2019	May 2019	1 month	Jun 2019	1 month	2 months	-3.96%
8	Jan 2022	Feb 2022	2 months	Mar 2022	1 month	3 months	-3.77%
9	Sep 2021	Sep 2021	1 month	Oct 2021	1 month	2 months	-2.41%
10	Nov 2021	Nov 2021	1 month	Dec 2021	1 month	2 months	-2.23%

Worst 10 drawdowns included above

Drawdowns for Portfolio 3

Rank	Start	End	Length	Recovery By	Recovery Time	Underwater Period	Drawdown
1	Jan 2020	Mar 2020	3 months	Aug 2020	5 months	8 months	-20.85%
2	Oct 2018	Dec 2018	3 months	Apr 2019	4 months	7 months	-12.70%
3	Apr 2022	Jun 2022	3 months				-9.61%
4	Sep 2020	Oct 2020	2 months	Nov 2020	1 month	3 months	-5.76%
5	May 2019	May 2019	1 month	Jun 2019	1 month	2 months	-4.70%
6	Jan 2016	Jan 2016	1 month	Mar 2016	2 months	3 months	-4.55%
7	Feb 2018	Mar 2018	2 months	Jul 2018	4 months	6 months	-3.88%
8	Nov 2021	Nov 2021	1 month	Dec 2021	1 month	2 months	-3.01%
9	Oct 2016	Oct 2016	1 month	Nov 2016	1 month	2 months	-1.59%
10	Aug 2019	Aug 2019	1 month	Oct 2019	2 months	3 months	-1.54%

Worst 10 drawdowns included above

Drawdowns for SPDR S&P 500 ETF Trust

Rank	Start	End	Length	Recovery By	Recovery Time	Underwater Period	Drawdown
1	Jan 2022	Jun 2022	6 months				-19.98%
2	Jan 2020	Mar 2020	3 months	Jul 2020	4 months	7 months	-19.43%
3	Oct 2018	Dec 2018	3 months	Apr 2019	4 months	7 months	-13.52%
4	May 2019	May 2019	1 month	Jun 2019	1 month	2 months	-6.38%
5	Feb 2018	Mar 2018	2 months	Jul 2018	4 months	6 months	-6.28%
6	Sep 2020	Oct 2020	2 months	Nov 2020	1 month	3 months	-6.14%
7	Jan 2016	Feb 2016	2 months	Mar 2016	1 month	3 months	-5.06%
8	Sep 2021	Sep 2021	1 month	Oct 2021	1 month	2 months	-4.66%
9	Oct 2016	Oct 2016	1 month	Nov 2016	1 month	2 months	-1.73%
10	Aug 2019	Aug 2019	1 month	Sep 2019	1 month	2 months	-1.67%

Worst 10 drawdowns included above

Portfolio Assets

Ticker	Name	CAGR	Stdev	Best Year	Worst Year	Max Drawdown	Sharpe Ratio	Sortino Ratio	Market Correlation
VOO	Vanguard S&P 500 ETF	12.00%	15.35%	31.35%	-19.95%	-19.95%	0.76	1.14	1.00

XLRE	Real Estate Select Sector SPDR	7.84%	16.29%	46.08%	-20.05%	-20.35%	0.49	0.75	0.74
VCIT	Vanguard Interm-Term Corp Bd ETF	2.38%	6.06%	14.10%	-12.83%	-14.37%	0.27	0.36	0.52
PDBC	Invesco Optm Yd Dvrs Cdty Stra No K1 ETF	11.43%	17.57%	41.86%	-12.77%	-37.58%	0.65	0.97	0.48

Portfolio Asset Performance

	Total Return			Annualized Return		Expense Ratio	
Name	**3 Month**	**Year To Date**	**1 year**	**3 year**	**5 year**	**Net**	**Gross**
Vanguard S&P 500 ETF	-16.11%	-19.95%	-10.59%	10.60%	11.28%	0.03%	0.03%
Real Estate Select Sector SPDR	-14.77%	-20.05%	-5.23%	6.95%	8.39%	0.10%	0.10%
Vanguard Interm-Term Corp Bd ETF	-6.37%	-12.83%	-13.30%	-0.95%	1.35%	0.04%	0.04%
Invesco Optm Yd Dvrs Cdty Stra No K1 ETF	2.27%	28.31%	38.25%	19.83%	13.40%	0.62%	0.64%

Trailing returns as of last calendar month ending June 2022

Monthly Correlations

Ticker	Name	VOO	XLRE	VCIT	PDBC	Portfolio 1	Portfolio 2	Portfolio 3	SPDR S&P 500 ETF Trust
VOO	Vanguard S&P 500 ETF	1.00	0.75	0.52	0.47	0.94	0.96	0.93	1.00
XLRE	Real Estate Select Sector SPDR	0.75	1.00	0.55	0.33	0.84	0.81	0.75	0.75
VCIT	Vanguard Interm-Term Corp Bd ETF	0.52	0.55	1.00	0.13	0.58	0.55	0.49	0.52
PDBC	Invesco Optm Yd Dvrs Cdty Stra No K1 ETF	0.47	0.33	0.13	1.00	0.66	0.66	0.75	0.47

Portfolio Return Decomposition

Ticker	Name	Portfolio 1	Portfolio 2	Portfolio 3
VOO	Vanguard S&P 500 ETF	$3,826	$4,846	$4,723
XLRE	Real Estate Select Sector SPDR	$1,438	$1,105	$724
VCIT	Vanguard Interm-Term Corp Bd ETF	$186	$130	$76.29
PDBC	Invesco Optm Yd Dvrs Cdty Stra No K1 ETF	$2,609	$2,706	$4,022

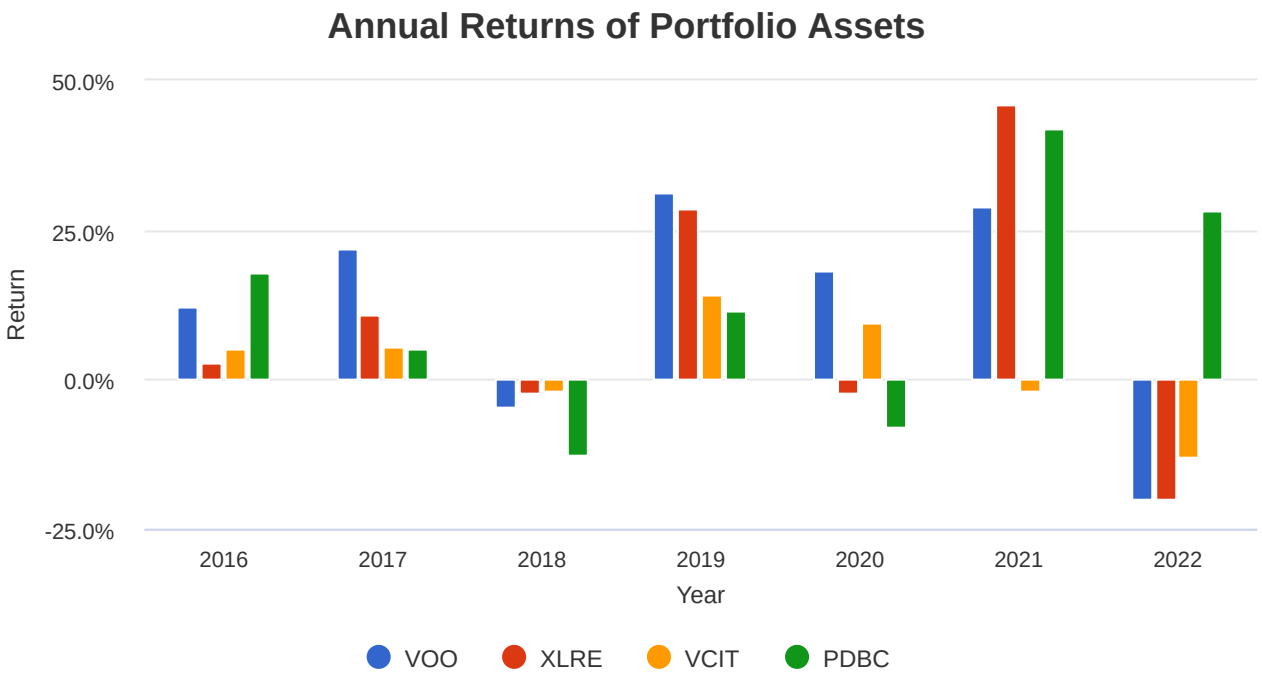
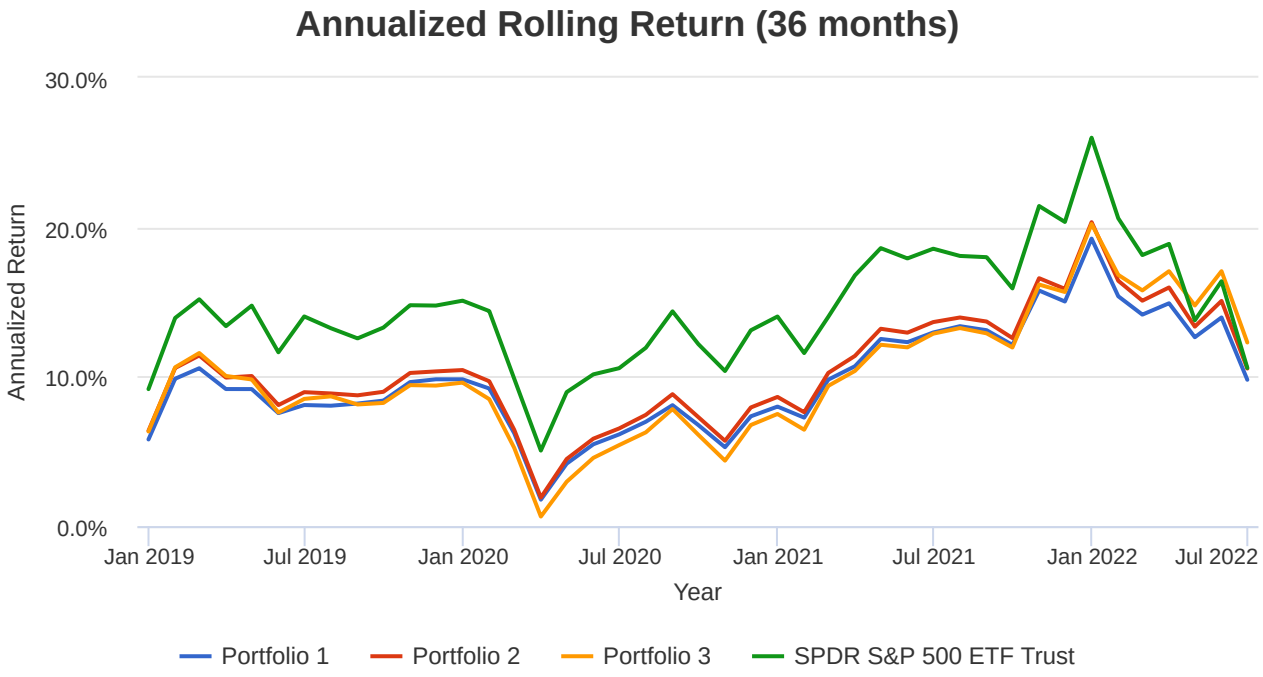
Return attribution decomposes portfolio gains into its constituent parts and identifies the contribution to returns by each of the assets.

Portfolio Risk Decomposition

Ticker	Name	Portfolio 1	Portfolio 2	Portfolio 3
VOO	Vanguard S&P 500 ETF	50.10%	60.45%	56.47%
XLRE	Real Estate Select Sector SPDR	23.72%	16.32%	9.70%
VCIT	Vanguard Interm-Term Corp Bd ETF	6.06%	4.12%	2.35%
PDBC	Invesco Optm Yd Dvrs Cdty Stra No K1 ETF	20.11%	19.11%	31.47%

Risk attribution decomposes portfolio risk into its constituent parts and identifies the contribution to overall volatility by each of the assets.

Annual Asset Returns



Roll Period	Portfolio 1			Portfolio 2			Portfolio 3			SPDR S&
	Average	High	Low	Average	High	Low	Average	High	Low	Average
1 year	12.05%	39.58%	-10.15%	12.99%	43.24%	-10.46%	13.39%	46.05%	-12.98%	16.89%
3 years	9.88%	19.24%	1.77%	10.52%	20.34%	1.91%	10.03%	20.22%	0.64%	14.56%
5 years	11.25%	12.78%	9.40%	12.11%	13.78%	10.18%	12.12%	13.68%	9.75%	16.25%