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Table of Contents

Overview 3

CLIENT REQUIREMENT (Assumed Mandate) 4

Investment Methodology and Research Framework 5

Data Collection and statistical sampling 5

Efficient Frontier & Optimization 5

Capital Market Expectations (CME) 9

SAA with CME 10

Back testing the SAA weights with minimum 10% on each asset classes 12

Scenario-Based Back testing of the SAA 13

Monte Carlo Simulation Results for each scenario 14

Tactical shifts during the crisis period 16

Performance Assessment for the 2023-2024 Evaluation Period 18

Benchmark Framework and Policy Construction 18

Assumed rebalancing policy 19

Portfolio Risk and Performance Analysis 19

Sortino Ratio (Downside risk) 19

Capture ratios and drawdown 20

TAA for every quarters (2023-2024) 22

Conclusion and Strategic Insights 22

Overview

The Ravenswood College Endowment Fund generated an **annualized portfolio return of 5.46% for the years 2023 and 2024. For FY2024, the portfolio achieved a 6.52% annual return**. The returns over both periods were consistent with the funds' **objective of earning a real return of 2% above the Higher Education Price Index (HEPI) rate of 3%, thereby exceeding the nominal 5% target marginally.** In addition, portfolio performance surpassed the custom-built benchmark, which reflects the asset classes and strategic asset allocation (SAA) policy weights.

The endowment's performance was supported by a 55/45 allocation mix across global equities, fixed income, and real estate. The primary performance driver was U.S. equities (SPY), followed by emerging market equities (EEM), developed markets ex-U.S. (EFA), real estate (IYR), investment-grade corporate bonds (LQD), and U.S. Treasuries (IEF). The highest volatility was observed in emerging markets due to policy uncertainties in China, followed by real estate and developed market equities. Meanwhile, U.S. Treasuries and U.S. equities contributed to stabilizing overall portfolio volatility.

The **Sharpe ratio and Sortino ratio for the two-year period stood at 0.20 and 0.59, respectively, improving to 0.36 and 0.96 for FY2024, reflecting stronger risk-adjusted performance. Overall volatility remained at 12.4%, within the acceptable IPS range of 10–15%.**

In retrospect, **the endowment met both its absolute and relative objectives**, sustaining purchasing power and supporting the College's 3% annual spending requirement. Portfolio risk was contained, liquidity exceeded the 50% threshold, and tactical asset allocation (TAA) adjustments were assumed too. These outcomes reaffirm the robustness of the endowment's investment framework and its continued alignment with the College's mission of long-term capital preservation and sustainable growth.

CLIENT REQUIREMENT (Assumed Mandate)

(Prepared by Vivekanandhan Palani, MFin, CFA L3 Pass)

The Ravenswood College Endowment Fund (Does not denote to any existing college, the name used is imaginary) engaged with the Investment consultant (Vivekanandhan Palani) to construct and implement a globally diversified multi-asset portfolio aligned with the college's perpetual investment objectives. The client's requirement was to achieve a minimum annual return of 2% above inflation, consistent with fund's annual spending policy of 3%. The endowment also emphasizes on capital preservation, income stability and sustainable growth for an intergenerational investment horizon to support scholarship, research and maintaining its campus infrastructure. The initial investment amount was $100 million.

The IPS specified a moderate risk tolerance, with a volatility range of 10-15% and demanded that at least 50% liquidity across its asset classes within a year. The performance results are presented in nominal terms, and the base currency is assumed to be USD. The benchmark was designed as a 60/40 blended index representing global equities and fixed income that are diversified across U.S., developed market ex U.S., emerging markets and real estate alternatives.

As a consultant, my mandate was to implement a strategic asset allocation design, tactical asset allocation recommendations, adherence monitoring relative to the IPS and performance evaluation. TAAs were assumed to capture short-term opportunities without breaching risk thresholds. When such opportunities emerged, deviations of up to ***±20 percentage points*** *from SAA weights were permitted. During stable markets, rebalancing was conducted quarterly or triggered when asset class weights drifted more than* ***±5 percentage points from their SAA targets****, in alignment with the fund's volatility mandate.*

The proposed allocation is backed through historical back testing for volatile periods such as Global financial crisis, European debt crisis and Covid 19 health crisis. The process also involved Monte Carlo simulation for 10,000 times. The evaluation period is from Jan 2023 to Dec 2024.

The numbers are based on publicly available ETFs that reflect each asset class benchmark. Past performance does not always reflect future performance.

Investment Methodology and Research Framework

This section outlines the quantitative framework and step-by-step process implemented to derive the SAA and TAA for the Ravenswood College Endowment Fund. The framework integrates historical return analysis, Mean Variance Optimization (MVO), simulations performed and scenario testing to assure evidence-based portfolio construction.

Data Collection and statistical sampling

The historical data was sourced from Yahoo Finance, for a period from Jan 2016 to Dec 2019. This window was chosen because it captures relatively stable macro conditions, moderate inflation, global market stability and a normalized monetary policy. This pre-pandemic cycle ensured the window is not too long to capture regime changes and not too short to compromise on statistical relevance. The window tries to strike a balance between recency and representativeness. The frequency of the data is daily.

Statistical summary of Asset Class Returns (2016-2019)

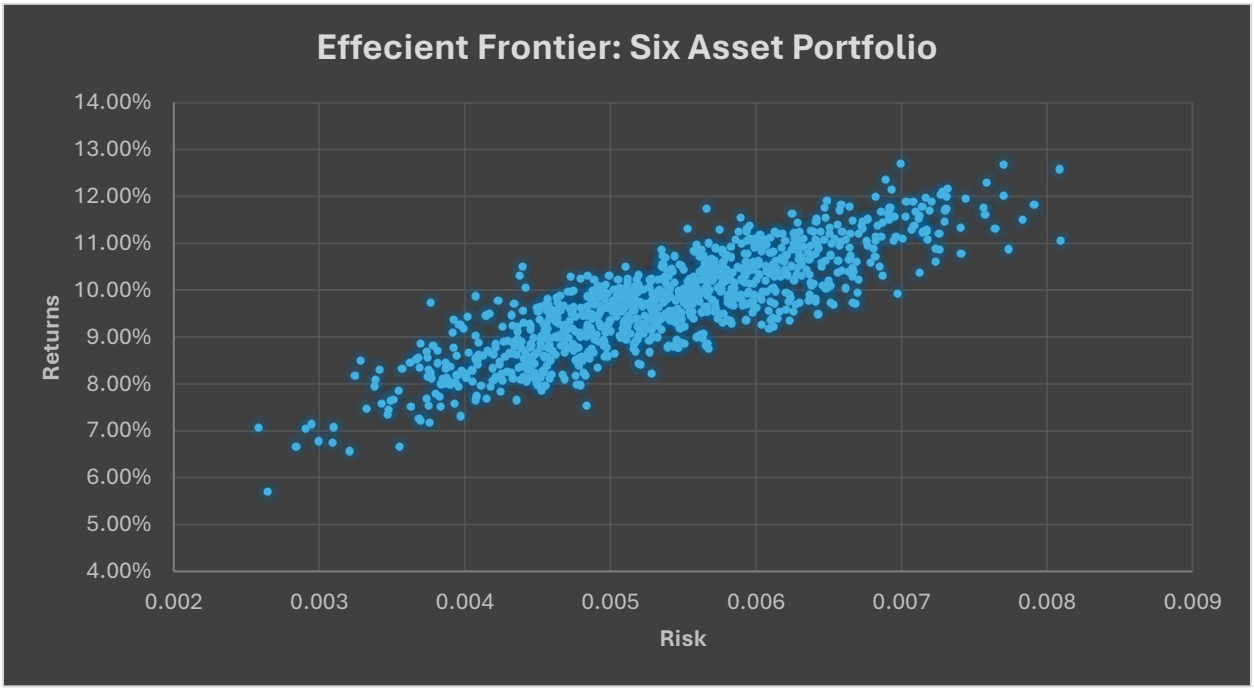
Metrics	U.S. Treasuries	North American Large Cap Eq	U.S. Investment Grade Bonds	Developed market Eq Ex U.S.	Real estate Alternatives	Emerging Market Eq
	IEF	SPY	LQD	EFA	IYR	EEM
AVERAGE	0.013%	0.058%	0.026%	0.034%	0.038%	0.051%
STANDARD DEVIATION	0.302%	0.811%	0.286%	0.846%	0.847%	1.140%
SKEWNESS	0.0184	-0.5533	-0.2870	-1.3600	-0.5154	-0.3823
KURTOSIS	1.2386	4.7220	0.7193	12.6829	1.8542	1.4517

U.S. equities (SPY) exhibited the highest average return, accompanied by elevated volatility, followed by emerging market equities (EEM). In contrast, Treasuries (IEF) and investment-grade bonds (LQD) delivered relatively stable but lower returns. The negative skewness observed across all asset classes except IEF indicates frequent small gains and occasional sharp losses. Furthermore, the higher kurtosis (>3) for SPY and EFA reflects greater tail risk and the presence of rare but extreme return movements.

Efficient Frontier & Optimization

The progression from a two to six asset frontier confirms the incremental advantages of diversification. The two assets (SPY, IEF) frontier depict the classic equity-bond relationship, where the risk is lowered by treasuries. Third asset (LQD), when added improves the risk-adjusted returns. For a six asset portfolio the frontier shifts outward, highlighting cross-asset exposure across different asset classes thereby enhancing portfolio efficiency.

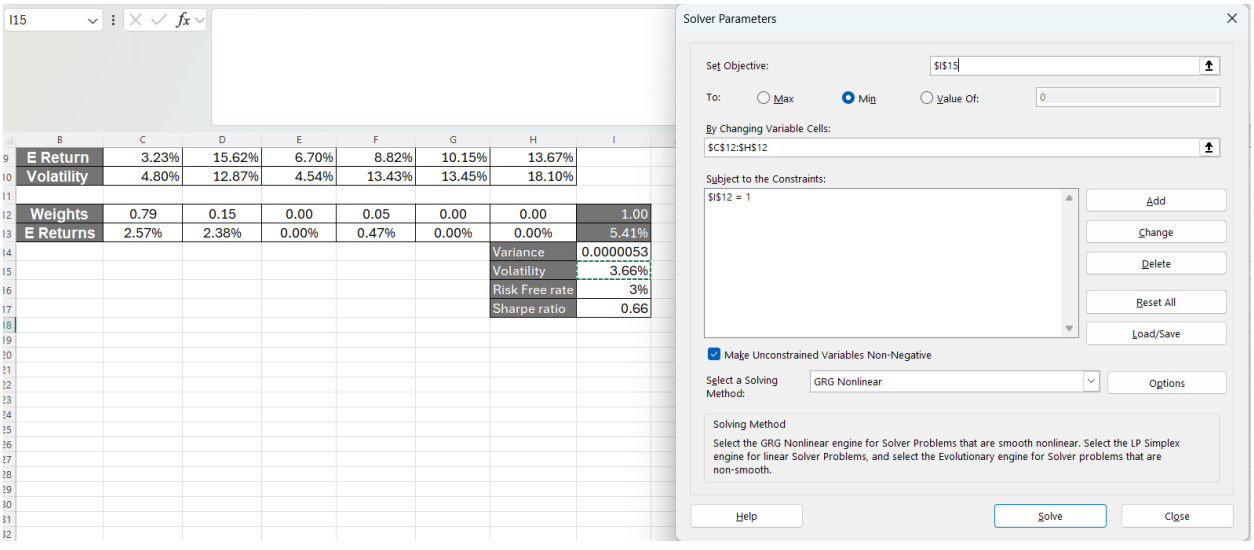
Efficient Frontier: Six Asset Portfolio



The Mean Variance Optimization was deployed using the solver function in excel to identify the portfolio allocations analogous to key optimal points – namely, The Minimum Variance Portfolio, The Maximum Returns Portfolio, The Maximum Returns Portfolio with risk constrained at 15% and the Portfolio with highest Sharpe Ratio.

The asset allocation output from the above mentioned constraints are as follows (Historical Optimization):

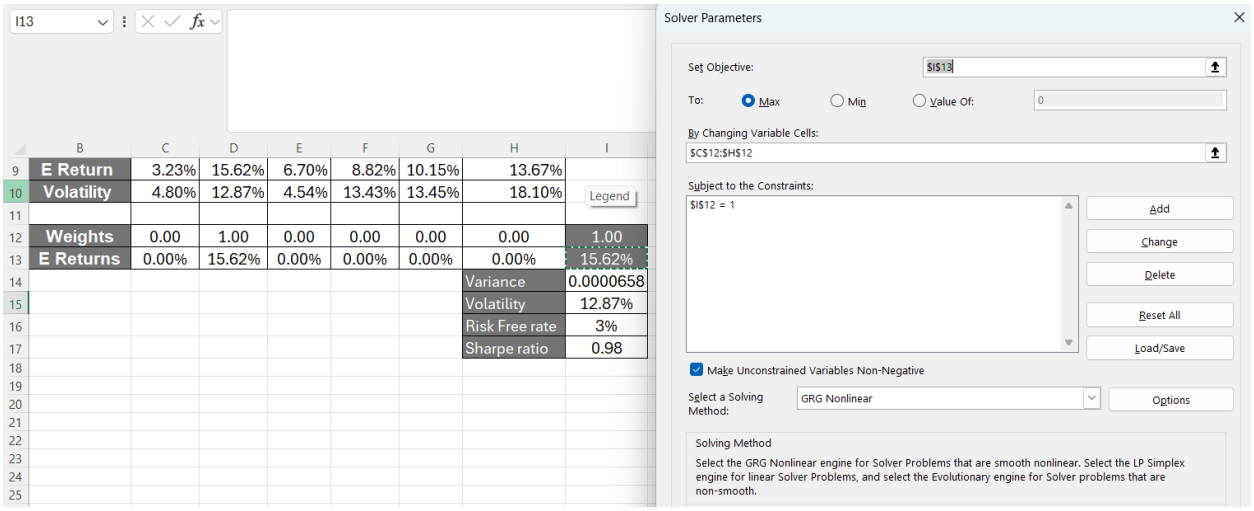
Asset allocation for Minimum Variance Portfolio



E Return	3.23%	15.62%	6.70%	8.82%	10.15%	13.67%	
Volatility	4.80%	12.87%	4.54%	13.43%	13.45%	18.10%	
Weights	0.79	0.15	0.00	0.05	0.00	0.00	1.00
E Returns	2.57%	2.38%	0.00%	0.47%	0.00%	0.00%	5.41%
						Variance	0.0000053
						Volatility	3.66%
						Risk Free rate	3%
						Sharpe ratio	0.66

The optimal allocation for this constraint was 79%, 15% and 5% for IEF, SPY and EFA with a volatility of 3.66%.

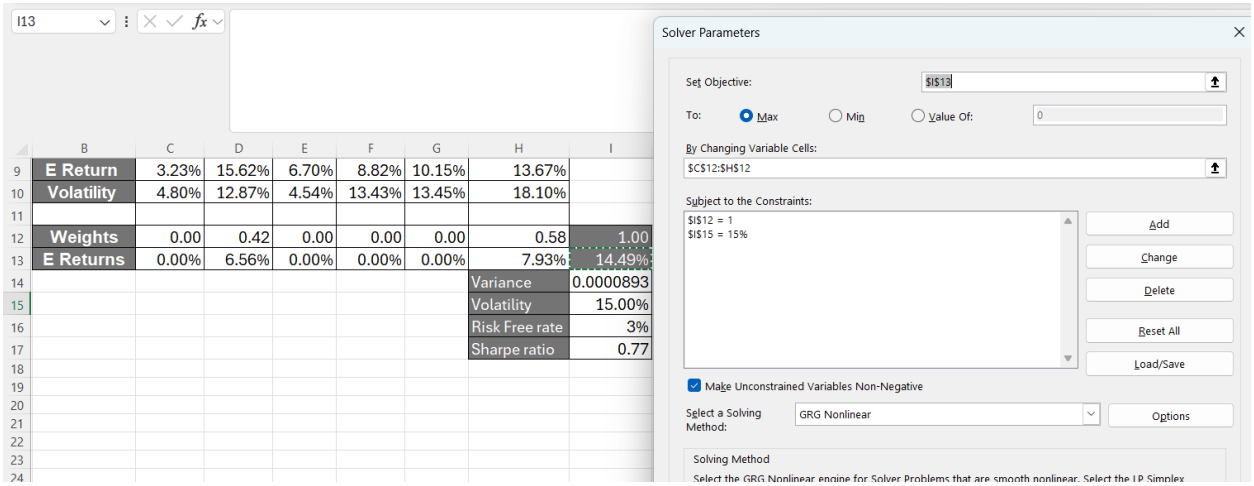
Asset Allocation for Maximum Return Portfolio



	B	C	D	E	F	G	H	I
9	E Return	3.23%	15.62%	6.70%	8.82%	10.15%	13.67%	
10	Volatility	4.80%	12.87%	4.54%	13.43%	13.45%	18.10%	
11								
12	Weights	0.00	1.00	0.00	0.00	0.00	0.00	1.00
13	E Returns	0.00%	15.62%	0.00%	0.00%	0.00%	0.00%	15.62%
14							Variance	0.0000658
15							Volatility	12.87%
16							Risk Free rate	3%
17							Sharpe ratio	0.98

With the only objective of maximizing returns, the allocation was only for SPY.

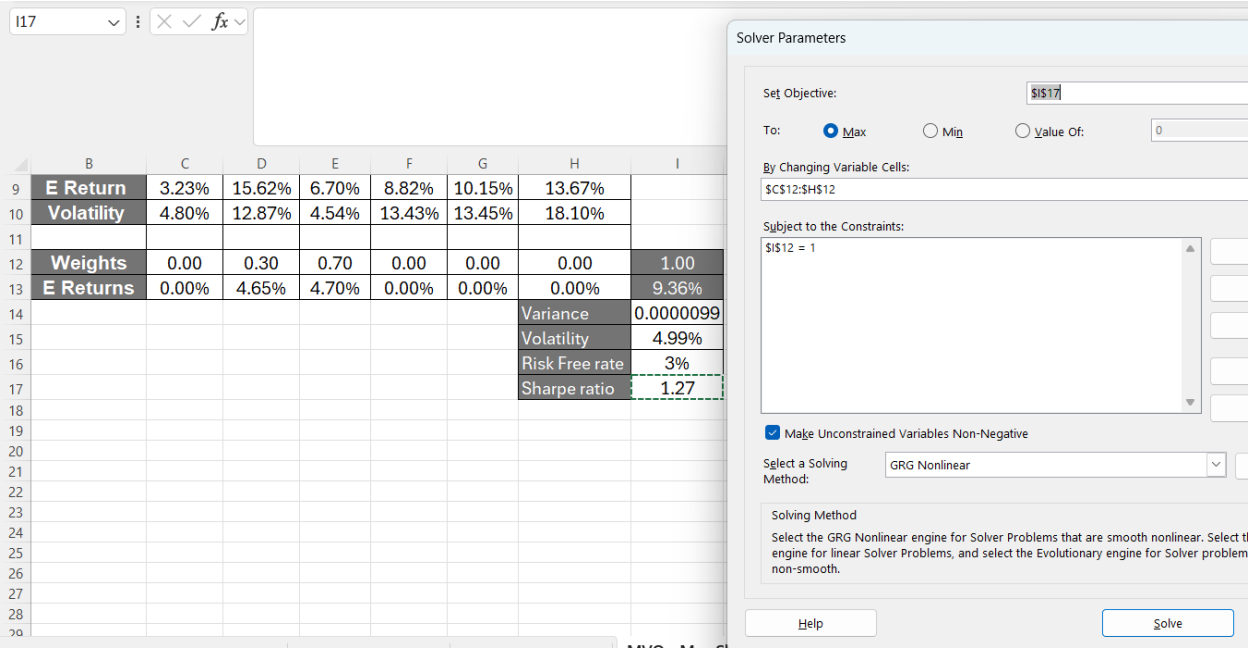
Asset Allocation for Maximizing returns at 15% volatility



	B	C	D	E	F	G	H	I
9	E Return	3.23%	15.62%	6.70%	8.82%	10.15%	13.67%	
10	Volatility	4.80%	12.87%	4.54%	13.43%	13.45%	18.10%	
11								
12	Weights	0.00	0.42	0.00	0.00	0.00	0.58	1.00
13	E Returns	0.00%	6.56%	0.00%	0.00%	0.00%	7.93%	14.49%
14							Variance	0.0000893
15							Volatility	15.00%
16							Risk Free rate	3%
17							Sharpe ratio	0.77

The optimal asset weights for 15% volatility were 42% and 58% for SPY and EEM. The returns attained using this allocation is 14.49%

Asset Allocation to achieve maximum Sharpe ratio



	B	C	D	E	F	G	H	I
9	E Return	3.23%	15.62%	6.70%	8.82%	10.15%	13.67%	
10	Volatility	4.80%	12.87%	4.54%	13.43%	13.45%	18.10%	
11								
12	Weights	0.00	0.30	0.70	0.00	0.00	0.00	1.00
13	E Returns	0.00%	4.65%	4.70%	0.00%	0.00%	0.00%	9.36%
14							Variance	0.0000099
15							Volatility	4.99%
16							Risk Free rate	3%
17							Sharpe ratio	1.27

For maximizing the Sharpe ratio, the optimal allocation was achieved with 30% and 70% allocation to SPY and LQD. This allocation gave a return of 9.36%.

Summary Weights

Scenrios	IEF	SPY	LQD	EFA	IYR	EEM
Weights for Min Variance	79%	15%	0%	5%	0%	0%
Weights for Max Returns	0%	100%	0%	0%	0%	0%
Weights for Max Returns @ 15% Volatility	0%	42%	0%	0%	0%	58%
Weights for Max Sharpe Ratio	0%	30%	70%	0%	0%	0%
Weights for Max Sharpe Ratio, Long Short	-152%	78%	245%	-63%	-12%	4%

Overall, these historical MVO renders the various risk-return spectrum, allowing investors to select a portfolio that aligns with their investment objectives and risk tolerance.

Note: The above weights were derived as a part of historical optimization and are not forward-looking.

Capital Market Expectations (CME)

To entrench forward-looking inputs, Capital Market Expectations were obtained using data sourced from five institutional fund houses such as J.P. Morgan, Invesco, Nuveen, Cowen & Steers and Veerus. The expectations from these fund houses were for 10 years. Leveraging these sources ensured that the forecast inculcated a balanced view of long term asset class risk and return dynamics, while alleviating house specific inclinations.

Throughout the framework, a conservative outlook has been maintained. Hence, the final expected return were calculated as the average of these fund-house estimated expected return scaled down by 10% (×0.9), while the corresponding volatilities were computed as average of the fund-houses scaled up by 20% (×1.2). The correlation matrix were computed as a simple average of individual matrices published by these houses.

This approach renders a pragmatic and institutionally aligned foundation for the forward-looking optimal weights for setting SAA.

In-House CME, derived from other fund houses

	Expected Returns						Expected Volatility					
	JPM	C&S	Invesco	Verus	Nuveen	In House	JPM	C&S	Invesco	Verus	Nuveen	In House
U.S. Long Treasuries	5.20%	4.10%	3.90%	4.90%	4.62%	**4.09%**	5.07%	10.20%	4.60%	13.40%	8.03%	**9.91%**
U.S. Large Cap	7.00%	7.00%	6.30%	6.40%	6.44%	**5.97%**	7.91%	14.70%	16.70%	15.50%	17.59%	**17.38%**
U.S. Inv Grade Corporate Bonds	5.80%	4.70%	5.80%	4.90%	4.82%	**4.68%**	5.25%	5.10%	7.80%	8.40%	6.61%	**7.96%**
EAFE Equity	9.20%	7.10%	8.40%	8.70%	6.94%	**7.26%**	9.49%	15.50%	18.60%	19.30%	17.54%	**19.30%**
U.S. REITs	8.20%	8.00%	9.00%	8.80%	5.05%	**7.03%**	9.33%	17.00%	19.00%	19.20%	19.51%	**20.17%**
Emerging Markets Equity	8.80%	6.60%	11.70%	9.60%	8.29%	**8.10%**	9.18%	20.10%	24.50%	24.20%	21.29%	**23.82%**

In-House Correlation Matrix

	IEF	SPY	LQD	EFA	IYR	EEM
IEF	1.00	-0.07	0.76	0.00	0.28	0.12
SPY	-0.07	1.00	0.32	0.88	0.71	0.72
LQD	0.76	0.32	1.00	0.41	0.48	0.41
EFA	0.00	0.88	0.41	1.00	0.70	0.84
IYR	0.28	0.71	0.48	0.70	1.00	0.59
EEM	0.12	0.72	0.41	0.84	0.59	1.00

The above table consolidates the 10-year Capital Market Expectations from major fund houses across key asset classes. The averaged estimates were adjusted downward for returns and upward for volatility to incorporate conservatism and account for forecast uncertainty, consistent with prudent portfolio construction. Moreover, as previously mentioned, the In-house correlation matrix is simply the average of matrices developed by other fund houses.

SAA with CME

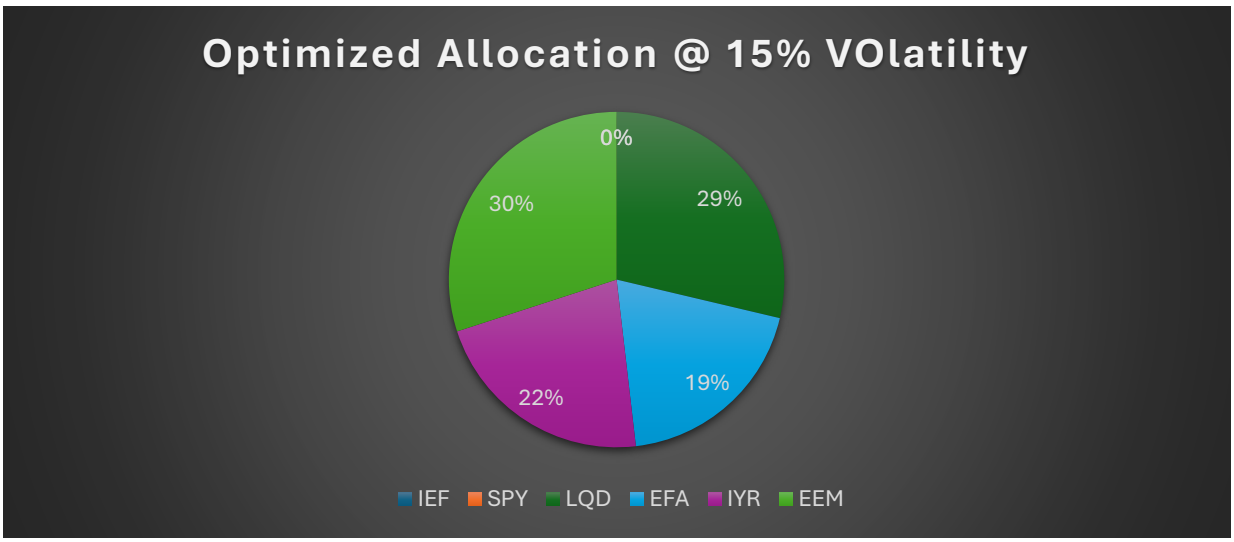
Using the CME inputs, a Mean–Variance Optimization (MVO) was conducted to derive the optimal strategic weights. The primary objective was to obtain portfolio allocations consistent with the endowment's overall risk–return expectations. The optimization was executed in Excel using the Solver function.

Two key constraints were incorporated based on the endowment's investment mandate: (1) to **maximize returns while maintaining a mid-level risk** (target volatility between 10–15%)

(2) to **maximize returns with a minimum allocation of 10% to each asset class**.

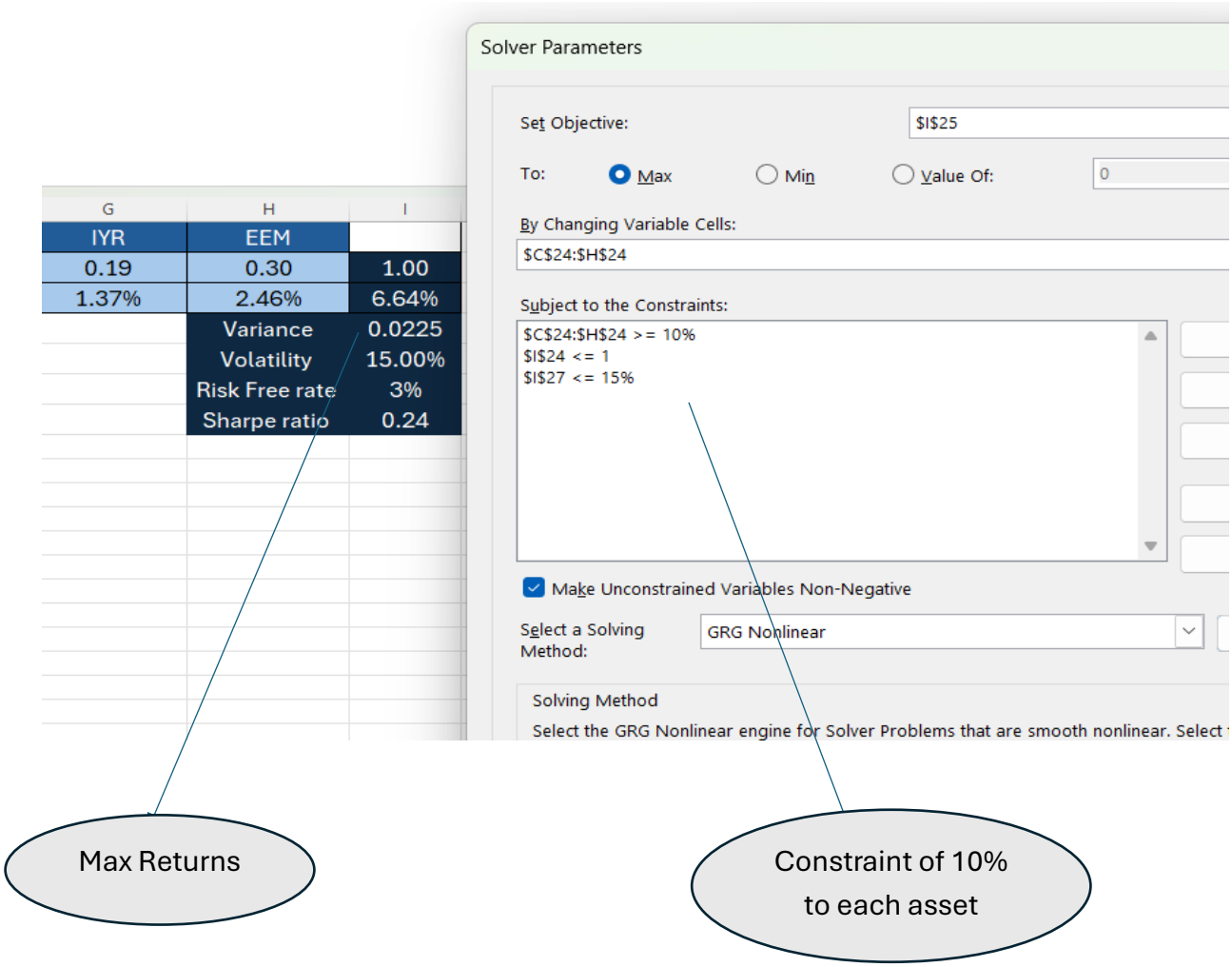
Applying the first constraint (risk-based), the following optimal weights were derived.

Max returns at 15% Volatility

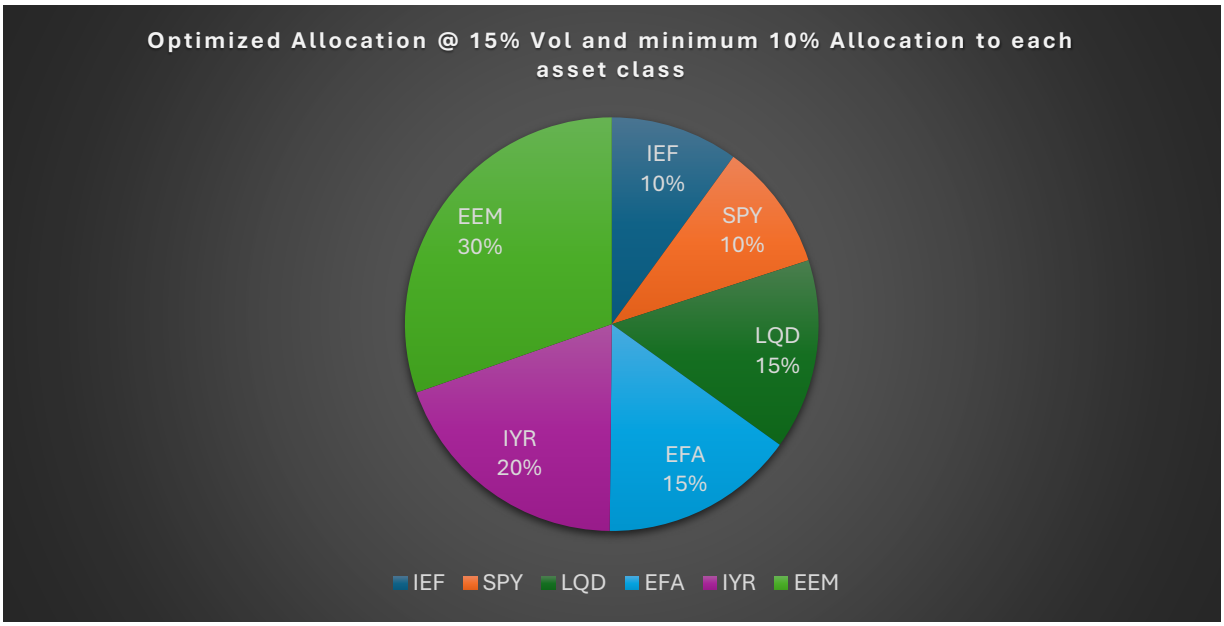


The Maximum returns obtained from this allocation was 6.72% and with a Risk-Free rate of 3% the resulting Sharpe ratio was 0.25.

Under the second optimization approach, which imposed an additional constraint of 10% on each asset class for diversification reasons, the portfolio achieved a similar expected return of 6.64% and marginally lower Sharpe ratio of 0.24.

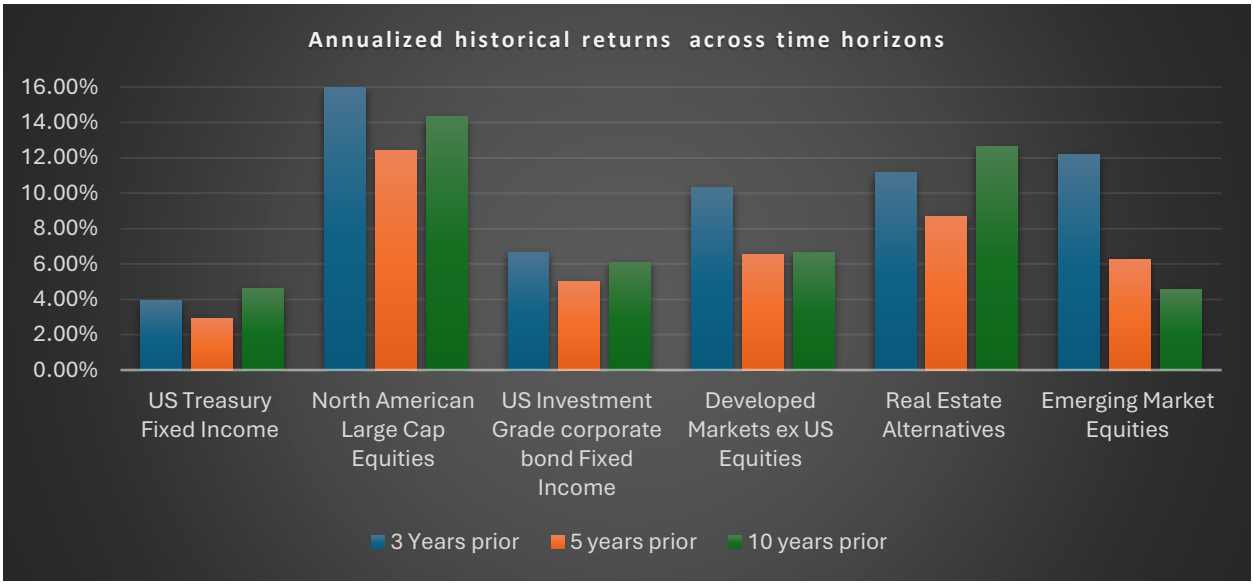


Max Returns 15% Vol and minimum 10% allocation to each asset classes

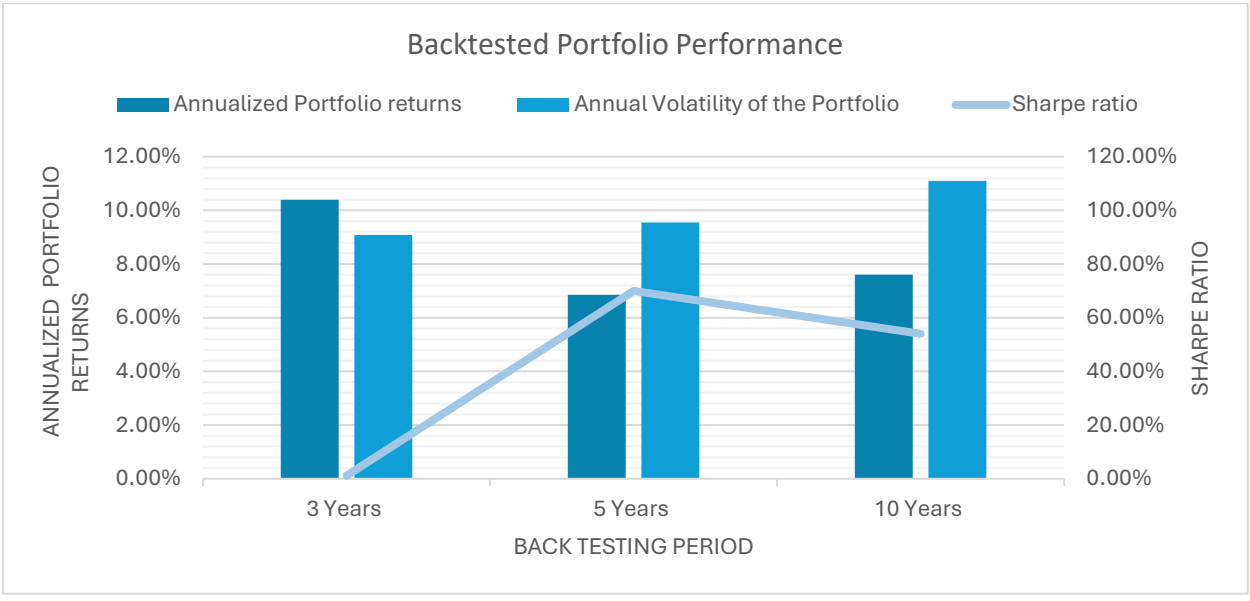


Back testing the SAA weights with minimum 10% on each asset classes

To validate the robustness of the asset classes, back testing was performed for periods 3 years, 5 years and 10 years prior to the period ending December 2019. The tested returns are plotted below.



Building on the historical performance analysis of the asset classes, the next step involved assessing how the Strategic weights when applied to the respective asset class returns would have performed over different time period. The period involved the same 3, 5 and 10 years prior to dec 2019. This exercise helped assess how the strategic mix would have behaved under varying market conditions, highlighting the portfolio's resilience, return consistency, and risk diversification benefits.



As seen in the chart, the portfolio generated a strong risk-adjusted performance for the 3 year horizon with a Sharpe ratio of 1.13, also witnessing double digit returns and a moderate volatility. For the 5 and 10 year horizon, the Sharpe ratio declined to 0.7 and 0.54 reflecting the effects of mean reversion and higher volatility. However, the portfolio for these periods maintained a stable absolute annualized returns of over 6%, underpinning the resilience of the SAA over multiple regimes.

Scenario-Based Back testing of the SAA

Proceeding further, the SAA was tested across different stress conditions to assess its persistence during major market downturns. While the earlier analysis evaluated performance over different time horizons, this section focuses on event-driven periods, capturing portfolio behavior over extreme market conditions.

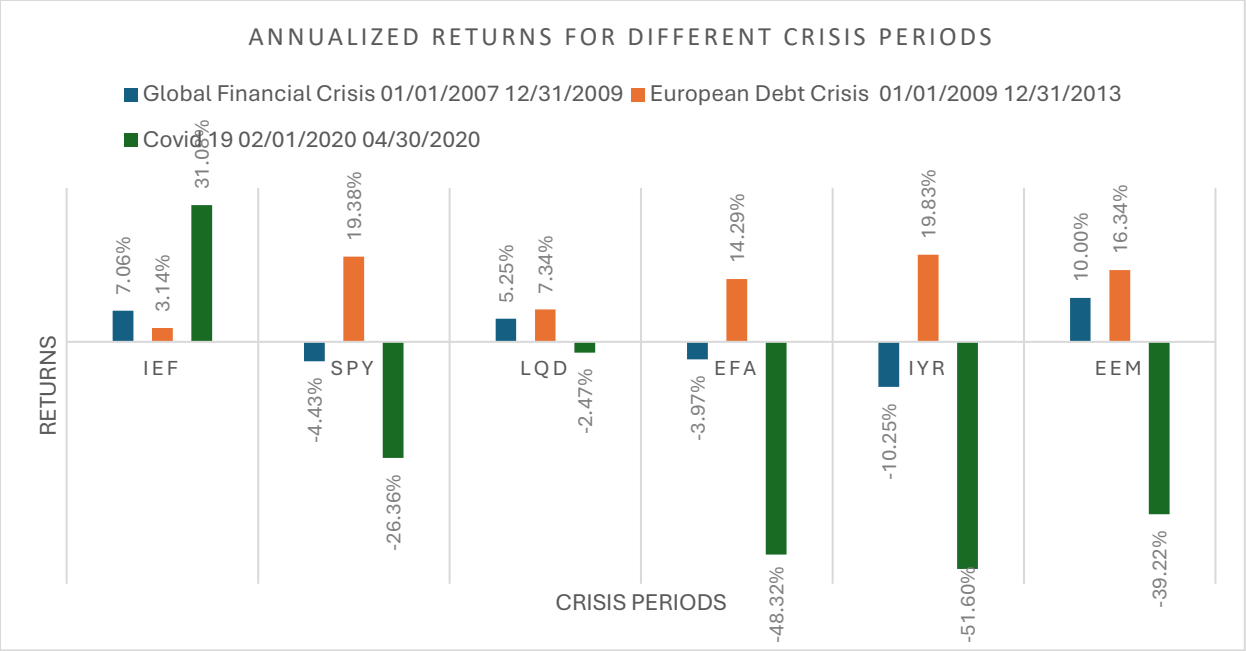
Three crisis periods were selected for back testing:

- Global Financial Crisis – Characterized by severe equity drawdowns.
- European Debt Crisis – Sovereign credit concerns and bond yield compression.
- COVID 19 Pandemic – Extreme volatility, Equity market crash followed by swift recovery.

Portfolio Performance in different scenarios

Crisis Period	Annual Portfolio Return	Annual Volatility of Portfolio	Sharpe ratio
Systemactic Financial Crisis 2007-2009	1.19%	22.18%	-0.0206
Soverign Debt Crisis 2009-2013	14.23%	16.29%	0.772
COVID 19 2020 (Feb-April)	-32.72%	34.79%	-0.9879

The SAA exhibited resilience during the financial crisis with modest positive returns despite increased volatility. The performance among the three scenarios came during the debt crisis where the returns elevated to 14.23% at a volatility of 16.29%. The Sharpe ratio exhibits better risk-adjusted performance. The health crisis however, showed the worst returns which were negative, accompanied by high volatility and an extremely negative Sharpe ratio. The Annualized performances of different asset classes are depicted in the following chart.

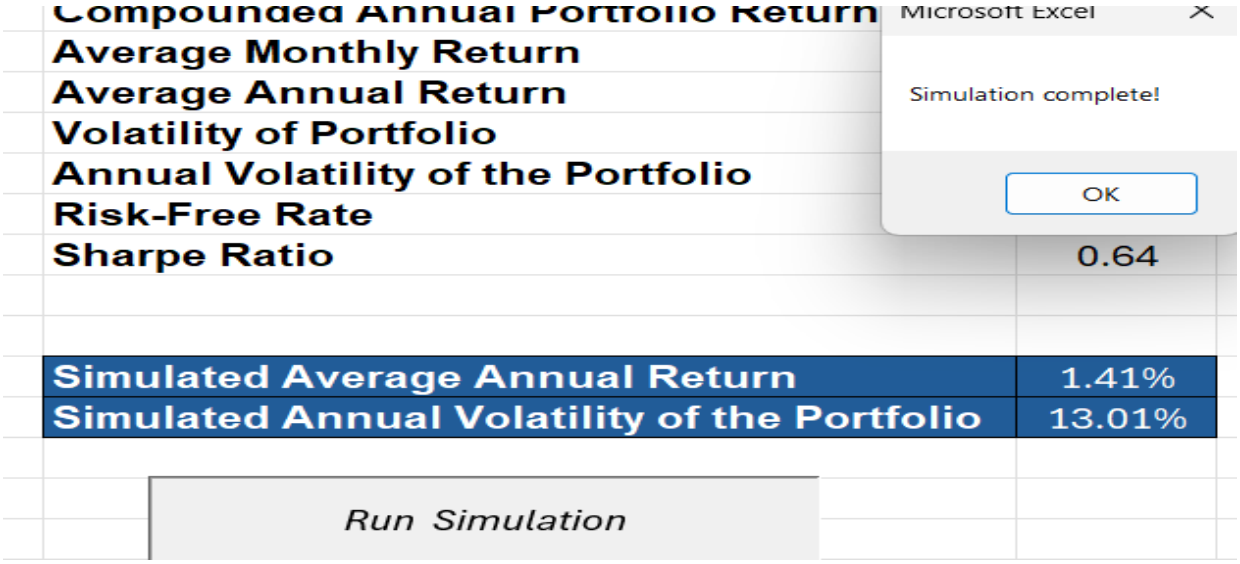


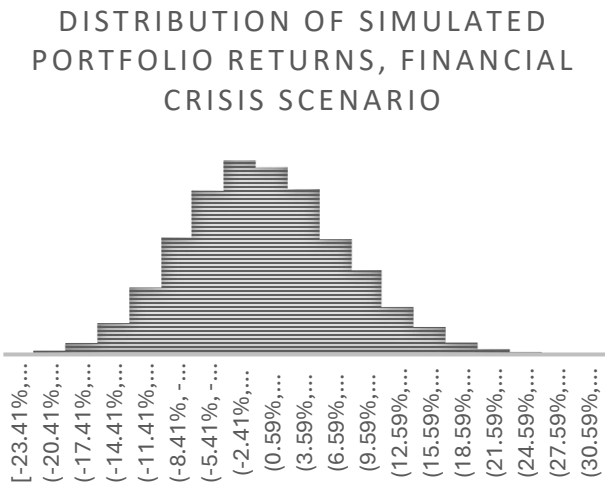
Monte Carlo Simulation Results for each scenario

The process involved generating 10,000 simulations for each scenarios that generated 10,000 possible portfolio returns based on portfolio's risk and correlation assumptions. The portfolio performance for specific scenarios are presented below.

Global Financial Crisis (2007-2009)

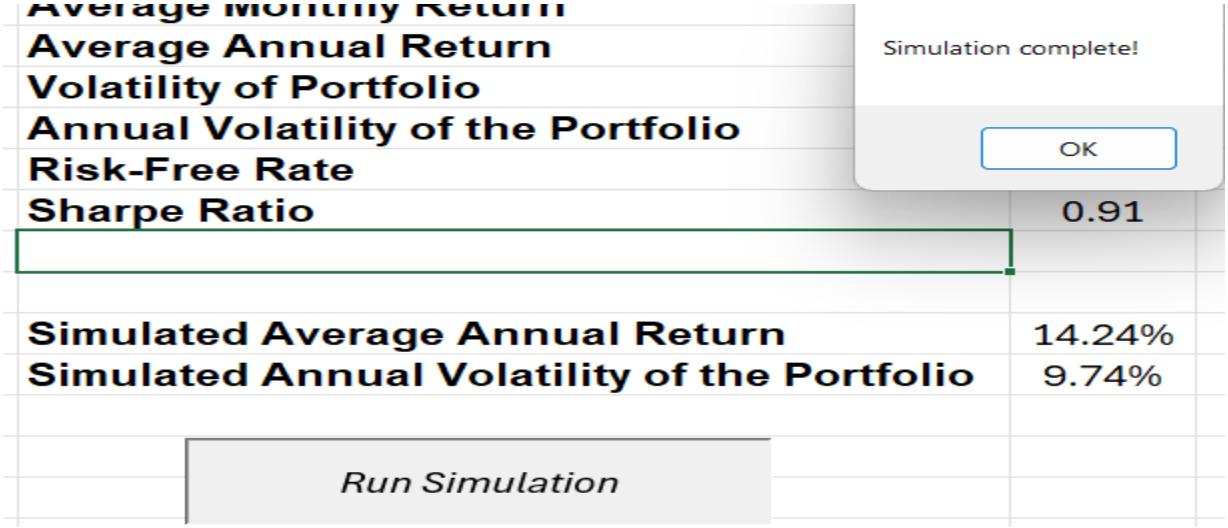
The Simulated Average Annualized Return was 1.41% and an Annualized Volatility of 13%.

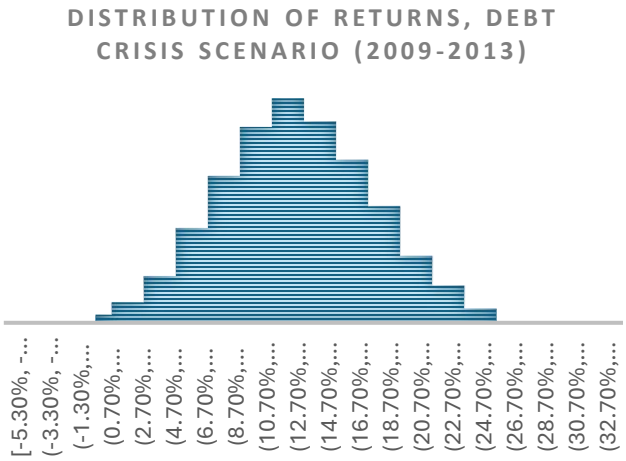




The histogram of 10,000 simulated outcomes shows a near normal distribution with a slightly favorable tilt towards positive outcomes (Skewness of 0.22) and a very low kurtosis of 0.12 denoting thinner tails. Together, these profiles depict a moderate resilience of the portfolio during one of the most turbulent market conditions.

European Debt Crisis (2009-2013)

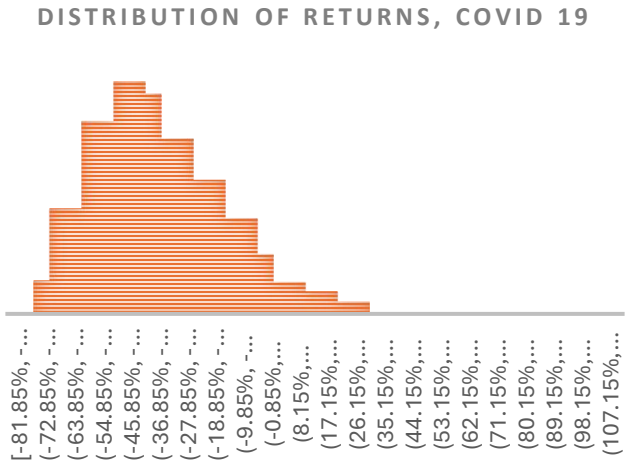




The simulated annualized average return for debt crisis scenario was 14.24% with a volatility of 9.74% indicating a strong risk-adjusted return for the SAA under this condition.

The Distribution is near normal with a slight right skew (0.09) and a very low kurtosis (0.046) and a limited tail risk. Overall, the portfolio was strong and resilient under this scenario.

COVID 19 Health Crisis (March 2020-May 2023)



For this scenario, the annualized average return was -29.5% with a volatility of 16.41%. The distribution is right-skewed, suggesting a small probability of outsized positive returns. The kurtosis of 1.63 indicated fat tails, which is a greater likelihood of extreme outcomes. This pattern remained consistent with the real market behaviour during the pandemic. This simulation emphasised on defensive exposure and maintaining liquidity.

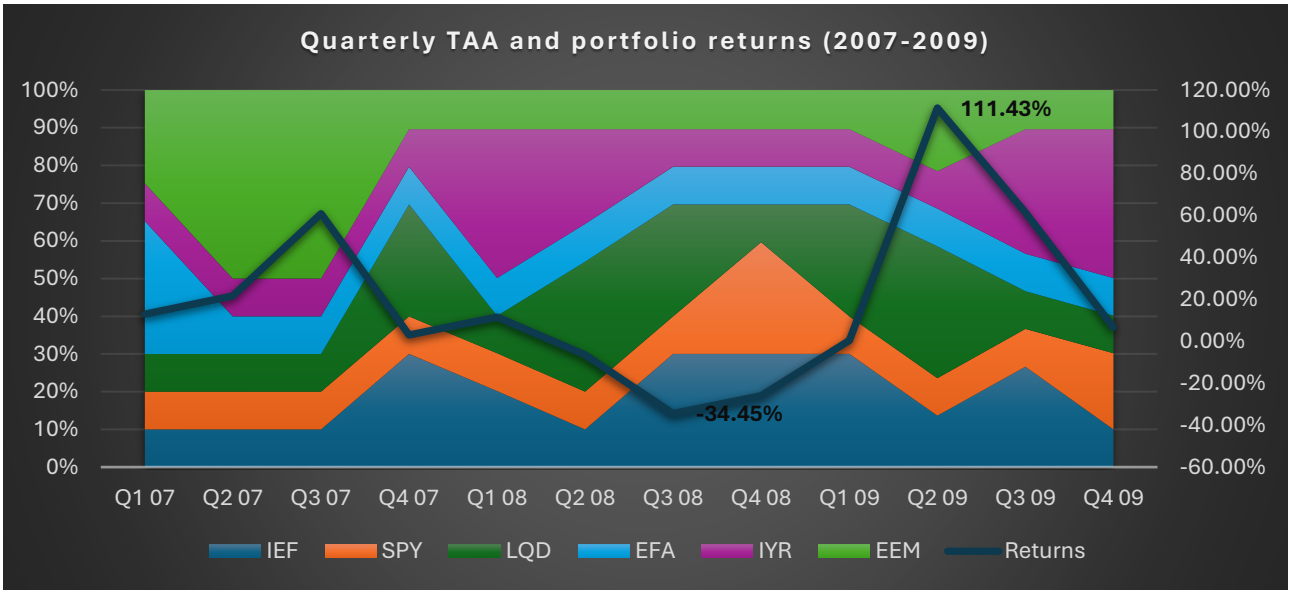
Overall, the simulations highlight that while the SAA remained resilient during typical crises periods, it remained vulnerable to correlation-driven selloffs such as the pandemic, highlighting the importance of dynamic rebalancing and liquidity buffers during market stress periods.

Tactical shifts during the crisis period

Following the analysis of SAA under various stress scenarios, the next steps involved assessing how the tactical shifts (TAA) would have fared during the same periods. Unlike SAA, which maintains same weights, the TAA seeks to exploit short term market expectations by dynamically adjusting the weights. These weights were adjusted in line with the constraints.

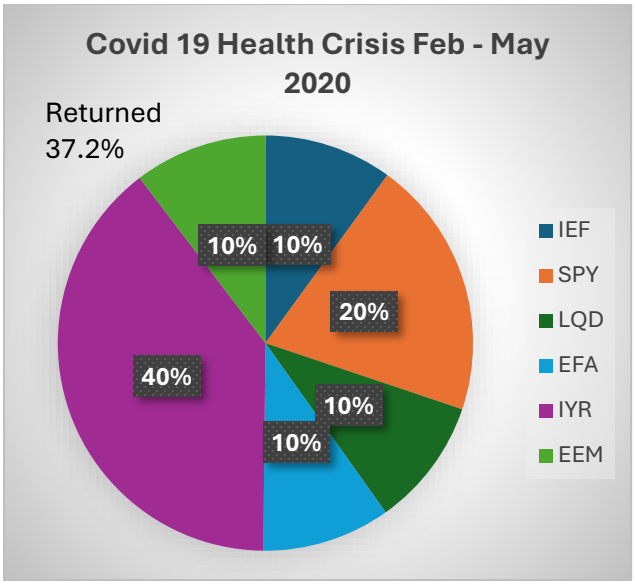
Optimization Constraints: Total Portfolio weights must sum to 100%, Minimum allocation of 10% to each asset class, Maximize Portfolio Return, Maximum risk of 15%, Maximum weight deviation of ±20% of SAA.

Dynamic asset allocations and corresponding returns (2007-2009)



The chart illustrates the tactical shifts during the global financial crisis and corresponding returns. Each quarter represents weight distribution across asset classes, and the line follows the returns. Although the market fell by 57%, with these dynamic allocations, the losses would be reduced.

Dynamic asset allocations during COVID 19 crisis.



During the Covid 19 crisis, the TAA tilter heavily towards real estate 40% followed by U.S. Equities 20% but maintained minimum exposure to other asset classes. This dynamic position allowed the portfolio to capture the rebound following the sell off, which resulted in a return of 37.2% for the period.

The strong performance highlights the effectiveness of tactical flexibility in capturing short term expectations.

Performance Assessment for the 2023-2024 Evaluation Period

Having established the portfolio's performance over previous stress periods, the next step involved evaluating its performance under current market conditions. The evaluation window was chosen from Jan 2023 to Dec 2024. This period was primarily selected because it captures post-pandemic normalization and a restrictive monetary policy. The same asset class returns for the evaluation window were applied to the SAA and TAA framework previously developed. This process provides insights into how the portfolio would evolve in a real world market setting characterized by interest rate volatility and consistent inflation pressures.

Benchmark Framework and Policy Construction

The policy Benchmark serves as the reference portfolio against which the funds long term performance will be evaluated. To evaluate portfolio performance for a period, a customized policy benchmark was constructed with SAA weights applied on it.

Each asset class was assigned a representative index. For example: S&P 500 total return index was used for SPY and Bloomberg U.S. treasury 7-10 year index for IEF were used. The Benchmark return was calculated as the weighted average of the individual asset-class benchmark returns using the SAA weights as of Jan 2023.

Mathematically,

$$R_{BM} = \sum_{i=1}^{n} \omega_i \, x \, R_i \tau$$

Where

- R_{BM} = Portfolio BM return
- ω_i = SAA weights of asset class i
- $R_i \tau$ = Return of the BM index for asset class i

Asset Class	Index Name	Policy Weights
IEF	U.S. Treasury	10%
SPY	GSPC	10%
LQD	LCRP	15%
EFA	MSCI EAFE tracks EFA 1:1	15%
IYR	FNAR	19%
EEM	EEM Mirrors EEM perfectly	30%

Assumed rebalancing policy

The custom benchmark will be rebalanced quarterly to the SAA weights to ensure that deviations arising from differential asset class performance do not materially distort BM risk exposures. Rebalancing ranges will be constantly reviewed and will remain consistent with the fund's investment objectives and risk tolerance stated in the IPS.

The performance against the benchmark will be measured on an annualized basis over the 2023-2024 period.

Portfolio Risk and Performance Analysis

The following metrics evaluates the portfolio's performance over 1 and 2 year periods ending Dec 2024 relative to the custom benchmark. The Minimum Acceptable Return (MAR) was assumed as a 10 year HEPI average of 3%.

Risk Assessment and Performance Metrics	2 Years as of 2024		1 Year as of 2024	
	Portfolio	Benchmark	Portfolio	Benchmark
Annual Portfolio Return	5.46%	4.20%	6.52%	6.03%
Compounded Annual Portfolio Return	4.71%	3.59%	6.06%	5.67%
Annual Volatility of Portfolio	12.04%	11.11%	9.78%	8.58%
Risk-Free Rate	3.00%		3.00%	
Sharpe Ratio	0.2046	0.1082	0.3602	0.3528

The portfolio delivered an annual portfolio return of 5.46% exceeding the benchmark return of 4.20% over the two year evaluation period. Volatility for the same period was slightly above the benchmark. The Sharpe ratio was 0.20 vs 0.10 demonstrating superior risk efficiency.

For the year 2024, the numbers were even attractive. The annual returns were 6.52% vs the benchmark's 6.03%. Volatility was again higher than the benchmark. The Sharpe ratio was slightly higher than the benchmark emphasizing better risk adjusted returns. Overall, the returns met both the spending requirement and the objective of earning a real rate of 2% over the HEPI rate.

Sortino Ratio (Downside risk)

Risk Assessment and Performance Metrics	2 Years as of 2024		1 Year as of 2024	
Minimum Acceptable Return (MAR)	3.00%		3.00%	
Target Semi-Standard Deviation	4.15%	3.99%	3.66%	3.45%
Sortino Ratio	0.594	0.301	0.963	0.877

Focusing only on the negative volatility, the Sortino ratio measures the portfolio returns relative to the downside risk. The portfolio achieved a higher Sortino ratio compared to the benchmark. This denotes the portfolio achieved 0.59 units of excess return per unit of downside risk. The ratio was even higher for the year 2024, showing the portfolio earned 0.96 units of excess return per unit of downside risk.

Capture ratios and drawdown

Capture Ratios and Drawdowns	2 Years as of 2024		1 Year as of 2024	
	Portfolio	Benchmark	Portfolio	Benchmark
Upside Geometric Average	2.89%	2.53%	2.29%	2.03%
Downside Geometric Average	-3.40%	-3.09%	-3.02%	-2.60%
Upside Capture	114%		113%	
Downside Capture	110%		116%	
Capture Ratio	104%		98%	
Maximum Drawdown	-10.80%		-6.67%	

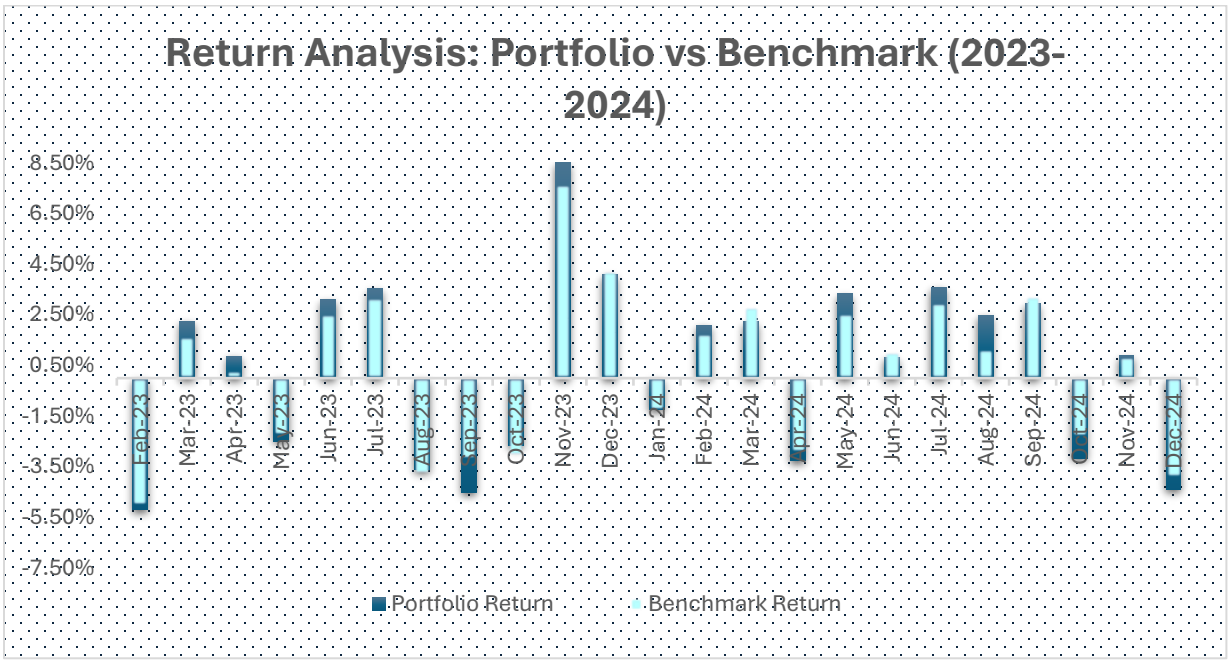
The upside capture for one and two year period stands well above 100%, denoting the portfolio gains more than the benchmark in a rising market. The downside capture, on the other hand, also is above 100% for both one and two periods, denoting the portfolio underperforms the benchmark in a falling market. However, the capture ratio is 104% for the two period framework, denoting the portfolio has positive asymmetric returns. i.e. the portfolio participates more in rallies than suffering in a drawdown. Contrastingly, for 2024 alone, the capture ratio is less than 100% (98%) signifying negative asymmetric returns. i.e. the portfolio suffers more in down market than gains in an upmarket.

The maximum drawdown was -10.8% over the two year period. The drawdown period lasted from Oct 2023 till Dec 2023, indicating better loss containment and swift recovery during market correction.

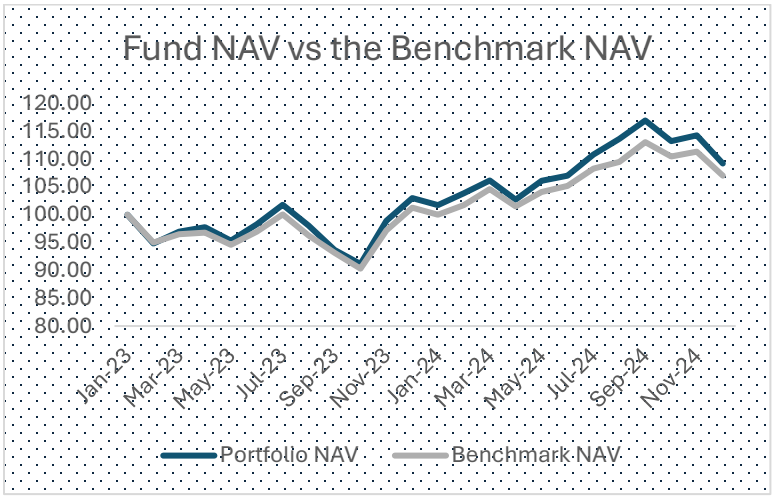
The distribution of portfolio returns for the respective periods were near normal with slight left-skewness (0.10), implying less frequent but marginally deeper losses. The kurtosis was negative at -0.41, denoting thinner tails which resonates with consistent performance.

To summarize, the portfolio exhibited stable performance, marginal alpha generation, and improved downside efficiency in the recent period. Risk-return metrics suggest a balanced approach.

Portfolio vs Benchmark



Fund NAV vs The Benchmark NAV



The portfolio NAV initially followed the benchmark NAV. The fund however, outperformed the benchmark NAV by the start of 2024, reaching a peak NAV of 115. Overall, the portfolio shows a strong upward trajectory relative to the benchmark, with an ending value of $109.22 mil vs the benchmark value of $107 mil

TAA for every quarters (2023-2024)

Over the two year period, the TAA demonstrated effective responsiveness to changing market conditions. By dynamically adjusting the weights of the asset classes, the TAA approach would have achieved attractive cumulative gains. If the TAA adjustments were implemented successfully over this two year period, the CAGR would be about 37% per year.

TAA weights and corresponding returns for each quarter

Period	IEF	SPY	LQD	EFA	IYR	EEM	Expected return for the Quarter	A dollar invested now
TAA Q1 2023	0.10	0.24	0.10	0.35	0.10	0.10	2.33%	1.02
TAA Q2 2023	0.10	0.30	0.10	0.10	0.10	0.30	22.93%	1.26
TAA Q3 2023	0.10	0.30	0.10	0.30	0.10	0.10	-17.47%	1.04
TAA Q4 2023	0.30	0.10	0.30	0.10	0.10	0.10	31.20%	1.36
TAA Q1 2024	0.10	0.30	0.10	0.10	0.10	0.30	6.85%	1.46
TAA Q2 2024	0.10	0.21	0.10	0.10	0.39	0.10	16.78%	1.70
TAA Q3 2024	0.10	0.10	0.10	0.10	0.39	0.21	26.66%	2.15
TAA Q4 2024	0.10	0.30	0.30	0.10	0.10	0.10	-12.50%	1.88

Optimization Constraints: Total Portfolio weights must sum to 100%, Minimum allocation of 10% to each asset class, Maximize Portfolio Return, Maximum risk of 15%, Maximum weight deviation of ±20 percentage points of SAA (to maximize the market opportunity).

Conclusion and Strategic Insights

Overall, the TAA framework generated a superior risk adjusted return compared to the SAA weights, improving the overall risk adjusted metrics. The SAA, on the other hand, provided a steady base, ensuring the objectives of the endowment were met at the defined level of risk tolerance. Through this, without pursuing any active opportunities, the fund with its SAA weights alone is able to meet the endowment's objective and also surpassed the benchmark. The optimized weights, additionally, has been quite resilient in extreme scenarios too, signifying its suitability to the endowment.