

Portfolio Management

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1. Introduction to the Selected mutual fund

1.1 Introduction

AMRMX is a veteran in the mutual fund game, offering a balanced approach for those seeking steady income, long-term capital appreciation, and careful principal protection. Imagine a sturdy oak in the investment forest – that's what AMRMX aims to be.

Here's its core identity:

Target:

Conservative growth and income investors. Think long-term stability with the potential for some dividend-fueled rewards.

Investment style:

Value-oriented. AMRMX hunts for bargain stocks, companies trading below their true worth, aiming to ride their eventual rise.

AMRMX's team analyzes companies beyond just their current share price. They dig deep into financial metrics, growth potential, and competitive advantages to identify stocks trading below their intrinsic value. Think of it as finding diamonds in the rough. They employ fundamental analysis, scrutinizing factors like earnings, cash flow, and debt levels to assess a company's true worth. By buying such stocks, they aim to ride the wave as their intrinsic value gets recognized by the market, leading to price appreciation.

To manage risk, AMRMX doesn't put all its eggs in one basket. They spread their investments across various sectors and industries, including consumer staples, utilities, financials, and healthcare. This diversification helps mitigate the impact of individual company fluctuations on the overall fund performance.

Within the value investing universe, AMRMX falls on the more conservative side. It prioritizes established blue-chip companies with proven track records over riskier small-cap or growth-oriented value stocks. This translates to lower volatility but potentially slower growth compared to some of its peers.

Portfolio focus:

Established U.S. companies with proven track records, strong financials, and reliable dividend streams. Think blue-chip giants like Johnson & Johnson or Procter & Gamble.

Risk profile:

Moderately low. By diversifying across sectors and prioritizing stability, AMRMX aims to weather market storms.

1.2 Benchmark

1.2.1 S&P 500

Benchmark performance: The S&P 500 is a broad market index representing large-cap U.S. companies. We compared AMRMMX's returns to the S&P 500's to get a sense of how it has performed relative to the overall market. For example, if AMRMMX consistently outperforms the S&P 500 over long periods, it suggests the fund's active management is adding value. Conversely, if it consistently underperforms, it might raise questions about the effectiveness of its strategy.

Risk assessment: We compared the volatility of AMRMMX to the S&P 500. Typically, a value-oriented fund like AMRMMX should be less volatile than the broader market. If its volatility is significantly higher, it might signify an unexpected level of risk.

1.2.2 MSCI World

Global scope: Both MSCI World and AMRMMX have a global investment focus, unlike the S&P 500's exclusive focus on U.S. large-cap stocks. We can dive deeper into how AMRMMX's global diversification compares to the S&P 500's U.S.-centric focus. This can involve analyzing historical performance data to see how AMRMMX has weathered global market events compared to the S&P 500, potentially revealing its advantages or disadvantages in terms of risk mitigation and return potential.

Similar investment characteristics: While not identical, both MSCI World and AMRMMX tilt towards large-cap value stocks, offering closer alignment in investment objectives and potentially more meaningful comparisons. We can delve into the specific companies and sectors held by each index to understand how their value strategies differ. This might involve comparing their holdings data, exploring sector weights, and analyzing valuation metrics like price-to-earnings ratios.

1.3 Source of data

Yahoo Finance: <https://finance.yahoo.com/quote/AMRMX?p=AMRMX>

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	Previous Close	50.45	Net Assets	88.69B	1M	YTD	1Y	5Y	Max	Full screen
YTD Return	8.65%	Beta (5Y Monthly)	0.71							
Expense Ratio (net)	0.32%	Yield	1.92%							
Category	Large Value	5y Average Return	N/A							
Last Cap Gain	32.00	Holdings Turnover	24.00%							
Morningstar Rating	★★★★★	Last Dividend	1.08							
Morningstar Risk Rating	Low	Average for Category	N/A							
Sustainability Rating	⊕⊕⊕⊕	Inception Date	May 15, 2002							

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Summary

Managed for conservative growth and income investing. Invests primarily in well-established companies with strong balance sheets and a history of consistently paying dividends, helping to provide downside resilience.

2. The Portfolio Selection Process

2.1 Stock Subset

Sector Weightings	
Basic Materials	3.46%
Consumer Cyclical	4.83%
Financial Services	14.05%
Real Estate	3.17%
Consumer Defensive	9.34%
Healthcare	19.76%
Utilities	5.42%
Communication Services	5.42%
Energy	6.65%
Industrials	16.56%
Technology	14.01%

Top 10 Holdings (24.35% of Total Assets)

Name	%Assets (2023/12)	Market Cap (2023/12)	5 Year Average Dividend Yield	Profit Margin (2023)	Operating Cash Flow (2023)
Microsoft Corp (MSFT)	4.41%	2.78T	1.01	35.31%	94.97B
AbbVie Inc (ABBV)	3.10%	273.55B	4.50	11.81%	25.51B
Abbott Laboratories (ABT)	2.36%	189.28B	1.57	12.92%	6.55B
General Electric Co (GE)	2.33%	137.89B	0.74	11.90%	6.54B
Linde PLC(LIN)	2.32%	6.54B	1.54	18.44%	8.67B
Apple Inc (AAPL)	2.21%	3.01T	0.82	25.31%	110.54B
Comcast Corp Class A (CMCSA)	2.13%	177.10B	2.20	12.53%	28.46B
RTX Corp (RTX)	1.99%	119.68B	2.59	4.76%	7.8B
UnitedHealth Group Inc (UNH)	1.76%	481.25B	1.36	6.02%	29.73B
Union Pacific Corp (UNP)	1.73%	148.49B	2.12	26.37%	8.28B

Diversification:

The fund's top 10 holdings span across various sectors, including technology, healthcare, industrials, and communications. This provides a natural hedge against sector-specific downturns, reducing overall portfolio volatility and increasing stability.

Investing in different industries broadens your exposure to diverse growth drivers and economic trends, potentially enhancing your returns over the long term.

Exposure to Established Blue-Chip Companies:

Many of the fund's top holdings are well-established leaders in their respective industries with strong financial fundamentals, including consistent profitability, healthy balance sheets, and a history of dividend payments.

Investing in such companies offers potential for reliable income generation through dividends, along with long-term capital appreciation driven by their proven track record and growth potential.

Additionally, these companies tend to be less susceptible to short-term market fluctuations, providing some level of downside protection during market downturns.

Growth Potential:

The fund includes technology giants like Microsoft and Apple, known for their consistent innovation and market leadership. These companies have a history of exceeding market expectations and driving significant long-term capital appreciation.

Other holdings like UnitedHealth Group and AbbVie operate in growing healthcare and pharmaceutical sectors, offering exposure to secular trends driving demand for their products and services.

This blend of established players and growth leaders in the portfolio provides a balance between income generation and capital appreciation potential, catering to diverse investor objectives.

factors like earnings reports, dividend payments, or seasonal trends. Using monthly data can help identify these patterns and their impact on returns.

Minimizes Noise and Volatility:

Reduces impact of daily fluctuations: Daily stock prices can be volatile due to short-term news, sentiment, or trading activity. Using monthly data smooths out these fluctuations, providing a clearer picture of longer-term trends and reducing the impact of noise in the data.

Focuses on meaningful changes: Monthly intervals are long enough to capture significant price movements while filtering out less relevant daily fluctuations.

Aligns with Data Availability:

Commonly available data: Monthly adjusted close prices are widely available from financial data providers, making them easily accessible for analysis.

Historical consistency: Historical data is often more consistently available on a monthly basis, allowing for analysis over longer periods.

Facilitates Comparison and Benchmarking:

Apples-to-apples comparisons: Using monthly data ensures consistency when comparing the performance of different investments or benchmarks, as they are all based on the same time intervals.

Aligns with common benchmarks: Many widely used market indices and benchmarks are calculated on a monthly basis, making comparisons more straightforward.

Computational Efficiency:

Reduces computational load: Using monthly data points requires fewer calculations compared to daily or weekly data, especially when analyzing long holding periods or large datasets. This can improve efficiency and reduce processing time.

4.1 Explanation

Shape of the Frontier:

Upward-sloping: Indicates a positive relationship between risk and expected return. Higher potential returns typically require accepting more risk.

Curvature:

Assess the degree of curvature. A highly curved frontier suggests significant diversification benefits, while a less curved frontier implies less potential for risk reduction through diversification.

Range of Risk and Return:

Risk Axis: Note the minimum and maximum risk levels represented on the axis. This indicates the spectrum of risk-return combinations available within this portfolio.

Return Axis: Observe the minimum and maximum expected returns depicted on the axis. This reflects the potential rewards achievable at different risk levels.

Above the Frontier: Any portfolios plotted above the frontier are considered unattainable or inefficient. They offer less return for a given level of risk than those on the frontier.

On the Frontier: Portfolios positioned directly on the frontier are considered efficient. They provide the highest possible expected return for their respective risk levels.

Below the Frontier: Portfolios below the frontier are suboptimal. They offer lower returns than efficient portfolios at the same risk level.

4.2 The optimal solution

We take the portfolio with the highest Sharpe ratio (0.4073) as the optimal solution. As shown in the chart, Portfolio 3 is our optimal solution, its Expected Return is about 0.0232, and Portfolio Risk is about 0.0529.

Expected return: 0.0232 is a relatively low expected return, especially considering underlying inflation rates and historical market averages. This is consistent with the fund's goal of focusing on income and stability rather than aggressive growth.

Portfolio risk: 0.0529 is a low-risk level that indicates low volatility and is potentially suitable for conservative investors seeking capital preservation.

Sharpe ratio: 0.4073 is a good Sharpe ratio, indicating that the fund provides a positive return per unit of risk relative to the risk-free rate.

suggestions:

Microsoft Corp has a 46% weighting, the fund's largest. That's a relatively high percentage, but it makes sense given that Microsoft is a leading global technology company with a strong financial profile and growth potential.

At 18.99%, Apple Inc is the second largest weighting in the fund. The company has a strong financial position and is showing strong growth across its various business areas. The 18.99% weighting is a relatively high percentage, but it is reasonable considering Apple's formidable power.

AbbVie Inc's 16.6% stake is the third largest weighting in the fund. AbbVie is a leading global biopharmaceutical company with a strong portfolio of brands and products.

Conservative investor may want to reduce holdings in Microsoft and Apple to below 20%. Reallocating these funds to other, more stable companies is a good choice, such as General Electric Co or UnitedHealth Group Inc.

If investors looking for growth, they may want to keep Microsoft and Apple holdings the same or even increase them. Both companies have strong financial positions and growth potential.

Tips: Sharpe ratio is a straightforward and objective measure, calculated as the excess return of a portfolio over the risk-free rate divided by its standard deviation. It provides a clear numerical value for comparing portfolios.

Utility functions, on the other hand, are subjective and unique to each investor, capturing their individual risk preferences and investment goals. So we chose the Sharpe ratio instead of the utility functions.

5. The process for the selection

We choose the tangent point between CML and the effective boundary as ‘our best combination’, i.e. ‘The optimal solution’ mentioned in the previous section.

The best of a portfolio is where the CML (capital market line) meets the efficient boundary. This point perfectly balances risk and return, providing the highest Sharpe ratio for a given level of risk (or the lowest risk for a given level of return).

CML maximizes Sharpe ratio: CML represents all portfolios with the highest Sharpe ratio at each risk level. It essentially tells you how much "value for money" you're getting from each portfolio in terms of risk-adjusted returns.

The efficient boundary represents the available returns: The efficient boundary shows all possible combinations of returns and risks for any portfolio of investable assets. For a given level of risk, points outside the curve cannot be reached.

Tangential points balance risk and return: The point at which CML touches the efficient boundary represents a perfect balance between risk and return within the viable options. Any other point on the curve means either sacrificing potential returns to reduce risk (moving CML down) or taking unnecessary risks to gain additional returns (moving along the efficient boundary).

Therefore, choosing tangents as the best solution for the portfolio ensures that investors maximize the Sharpe ratio, which means investors can get the best return per unit of risk they are willing to take.

6. Evaluation Performance

In this part, we introduce benchmark to describes manager’s approach and evaluate the asset manager’s performance. Our report includes risk-adjusted performance, performance relative to two benchmarks also the peer-group relative performance.

6.1 First Step Evaluation

we work out the best combination which is T (the tangency point between the efficient frontier of our portfolio and a ray passing through the point R_f on the vertical axis). We regarded the best weight of the top ten holdings in our portfolio is equal the weight at

point T. Using this weight, we get a new portfolio which is portfolio3 in our case. Thus, we use the weight of portfolio3 to recompute the return of our selected portfolio in every month of the past five years (table portfolio3 R).

Portfolio	Portfolio 3
Average Return	0.023234153
Portfolio Risk	0.052855899
MSFT Weight	0.460000102
ABBV Weight	0.166021932
AAPL Weight	0.189833246
ABT Weight	0.000000000
CMCSA Weight	0.000000000
GE Weight	0.049386702
LIN Weight	0.010311386
RTX Weight	0.000000000
UNH Weight	0.124446632
UNP Weight	0.000000000

6.2 Second Step Evaluation

portfolio3 is compared with two benchmarks, which are R(S&P500) and R(MSCI),

R(P3)-R(S&P500)	R(P3)-R(MSCI)
Average	0.010830157
Sigma	0.026650988
IR	0.406369828
R^2	0.760755717
	-0.003916874
	0.067518064
	-0.058012244
	0.380576075

This table presents the benchmark-adjusted performance of an investment portfolio relative to two different benchmarks (S&P 500 and MSCI). Here's a breakdown of the data for each metric:

Average Excess Return (Average):

$R(P3) - R(S&P500)$: The portfolio's average monthly excess return over the S&P500 benchmark is 0.010830157, meaning the portfolio outperforms the S&P 500 by an average of 1.08% per month.

$R(P3) - R(MSCI)$: The portfolio's average monthly excess return over the MSCI benchmark is -0.003916874, indicating that the portfolio underperforms the MSCI benchmark by an average of 0.39% per month.

Risk (Sigma):

The portfolio's risk relative to the S&P 500 benchmark is 0.026650988, and relative to the MSCI benchmark is 0.067518064. This indicates greater volatility in the portfolio compared to the MSCI benchmark.

Information Ratio (IR):

The Information Ratio of the portfolio relative to the S&P500 is 0.406369828, which is positive, suggesting that the excess return over the S&P 500 is achieved with lower risk. The Information Ratio relative to MSCI is -0.058012244, which is negative, indicating that the excess return relative to the MSCI benchmark is not only negative but also achieved with higher risk.

Coefficient of Determination (R^2):

The R^2 of the portfolio relative to the S&P 500 is 0.760755717, meaning that changes in the S&P 500 benchmark explain about 76.08% of the variance in the portfolio's returns. The R^2 relative to MSCI is 0.380576075, suggesting that changes in the MSCI benchmark explain only about 38.06% of the variance in the portfolio's returns.

In summary, the table shows that the portfolio3 has a good performance relative to the S&P 500 benchmark, with a higher average excess return and information ratio, and the changes in the S&P 500 benchmark are highly correlated with the performance of the portfolio.

In contrast, the performance of the portfolio3 relative to the MSCI benchmark is poor, with a negative average excess return and information ratio, and the correlation between the MSCI benchmark and the portfolio performance is lower. This may suggest that the investment strategy aligns better with the S&P 500 than with the MSCI benchmark.

6.3 Additional Comparison

We also use portfolio3 compared with R(AMRMX) which is represent the original fund manager's portfolio (AMRMX).

Portfolio	Portfolio 3	AMRMX
Average Return	0.023234153	0.009852928
Portfolio Risk(σ)	0.052855899	0.043649973
β	0.883977335	0.71
Expected Return(CAPM)	0.010989631	0.009162622
α	0.012244522	0.000690306

This table represent a comparison of key investment metrics for two investment portfolios: "Portfolio 3" and "AMRMX." Here is a comparison of these metrics:

Average Return:

Portfolio 3: 0.023234153, indicating a higher average rate of return for this portfolio.
 AMRMX: 0.009852928, with a lower average rate of return.

Portfolio Risk (σ):

Portfolio 3: 0.052855899, suggesting higher volatility and therefore higher risk in the returns of this portfolio.
 AMRMX: 0.043649973, indicating lower volatility and less risk in this portfolio's returns.

β (Beta):

Portfolio 3: 0.883977335, implying that this portfolio's price movements are less volatile compared to the market.
 AMRMX: 0.71, suggesting even lower volatility in price movements compared to the market for this portfolio.

Expected Return (CAPM):

Portfolio 3: 0.010989631, the expected return based on the Capital Asset Pricing Model for this portfolio.
 AMRMX: 0.009162622, the expected return for AMRMX.

α (Alpha):

Portfolio 3: 0.012244522, indicating that Portfolio 3's actual returns exceeded the expected returns predicted by the CAPM, showing good performance.
 AMRMX: 0.000690306, indicating that AMRMX's actual returns slightly exceeded the

expected returns predicted by the CAPM.

Overall, Portfolio 3 has a higher average return but also comes with higher risk (greater standard deviation). Its Beta value suggests a higher correlation with the market compared to AMRMX. Both portfolios have positive Alpha values, indicating that they have outperformed the expected returns based on the CAPM, but Portfolio 3 has a significantly higher Alpha than AMRMX, indicating relatively better performance. This information can help investors choose the right portfolio according to their risk preference and return objectives.

6.4 Key Metrics Analysis

The following table with various financial metrics related to the risk-adjusted performance of "Portfolio 3". These metrics are used to evaluate the performance of the portfolio by taking into consideration both the returns and the risks associated with it.

Portfolio	Portfolio 3			
average return of the portfolio	0.023234153	S_p	0.407287317	
Portfolio Risk(σ_p)	0.052855899	T_p	0.024353042	
Risk-free Rate of Return	0.001706616	α_p	0.0122445222653815	
Portfolio β	0.883977335	M^2	0.023116682	
R_M	0.012208033	AR_p	1.916968106	
Expected Return(CAPM)	0.010989631			
σ_m	0.052567476			
σ_p^{SYS}	0.046468457			
σ_p^{UNSYS}	0.00638744182911009			

Fundamental Metrics of portfolio3

Average return of the portfolio (0.023234153): This is the mean return that the portfolio has generated.

Portfolio Risk (σ_p) (0.052855899): This is the standard deviation of the portfolio's returns, representing the total risk of the portfolio.

Risk-free Rate of Return (0.001706616): This is the return that one can expect to earn on an investment that is considered risk-free, such as U.S. Treasury securities.

Portfolio β (Beta) (0.883977335): This measures the sensitivity of the portfolio's returns to the returns of the market. A beta greater than 1 indicates that the portfolio is more volatile than the market, while a beta less than 1 indicates that the portfolio is less

volatile.

R_M (Market Return) (0.012208033): The average return of the market.

Expected Return (CAPM) (0.010989631): This is the expected return of the portfolio according to the Capital Asset Pricing Model (CAPM), which considers the risk-free rate, the market return, and the portfolio's beta.

σ_m (Market Risk) (0.052567476): The standard deviation of the market's returns, representing the market risk.

σ_{sys} (Systematic Risk) (0.046468457): The part of the portfolio's risk that is attributable to market-wide risk factors and cannot be diversified away.

σ_{unsys} (Unsystematic Risk) (0.00638744182911009): The part of the portfolio's risk that is specific to the individual investments and can be diversified away.

Risk-Adjusted Performance Measures

S_p (Sharpe Ratio) (0.407287317): This shows the excess return per unit of risk; a higher Sharpe ratio is better.

T_p (Treynor Ratio) (0.024353042): This measures the excess return per unit of market risk (beta); a higher Treynor ratio is better.

α_p (Alpha) (0.0122445222653815): This represents the portfolio's performance relative to the CAPM expectations; a positive alpha indicates outperformance.

M² (Modigliani Ratio) (0.023116682): It adjusts the portfolio's returns for risk and compares it to the market.

AR_p (Appraisal Ratio) (1.916968106): This is the ratio of the portfolio's alpha to the unsystematic risk; a higher Appraisal Ratio is better.

In summary, "Portfolio 3" has a higher expected return based on CAPM, with a beta less than 1 suggesting it's less volatile than the market. The positive alpha indicates it's outperforming the market-adjusted for risk. The Sharpe Ratio and Appraisal Ratio are positive, showing good risk-adjusted returns. However, the Treynor Ratio and Modigliani Ratio values are comparatively lower but still positive, which may suggest that when adjusted for market risk alone, the performance is good but not as strong as suggested by the Sharpe and Appraisal Ratios.

6.5 Portfolio Management

"Portfolio 3" is an improvement on "AMMRX" and shows a higher average return and Alpha value than "AMMRX", so we consider "Portfolio 3" through active management strategies. Active management focuses on using market research, economic trend analysis, and the selection of individual securities to attempt to outperform a benchmark index or market average performance.

Continue active investment management

Regular buying and selling decisions are made to adjust the investment portfolio in response to or in anticipation of market changes.

Select stocks and other assets that offer potential appreciation opportunities.

Market timing is done to try to buy an asset when prices are low and sell when prices rise.

Switch to passive investment management

"Portfolio 3" can be slightly adjusted by tracking a benchmark index, then it is implemented as a passive management strategy.