



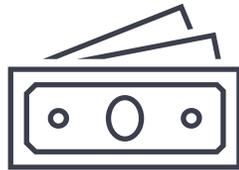
PORTFOLIO ANALYTICS

Multi-faceted Portfolio Analysis At Your Fingertips



Risk-Return Analysis

A Comprehensive List



Wealth Index

And Constituent Functionalities



Portfolio Optimisation

And Simulation Functions

Things That **MarketXLS** Does For You In The Background With Just A Set Of Assets And Weights

Portfolio Volatility Calculation

$$\sigma_p = \sqrt{\sum_{i=1}^N w_i^2 \sigma_i^2(k_i) + \sum_{i=1}^N \sum_{i \neq j}^N w_i w_j Cov(k_i k_j)}$$

or

$$\sigma_p = \begin{bmatrix} Var(a) & Covar(b, a) & Covar(c, a) & Covar(d, a) & Covar(e, a) \\ Covar(a, b) & Var(b) & Covar(c, b) & Covar(d, b) & Covar(e, b) \\ Covar(a, c) & Covar(b, c) & Var(c) & Covar(d, c) & Covar(e, c) \\ Covar(a, d) & Covar(b, d) & Covar(c, d) & Var(d) & Covar(e, d) \\ Covar(a, e) & Covar(b, e) & Covar(c, e) & Covar(d, e) & Var(e) \end{bmatrix} \times \begin{bmatrix} w_a \\ w_b \\ w_c \\ w_d \\ w_e \end{bmatrix}$$

(For a 5 asset portfolio, scalable as size increases)

Cornish Fisher Z-score Adjustment for VaR

$$Z_{Ad} = z + (z^2 - 1) \frac{S}{6} + (z^3 - 3z) \frac{K}{24} - (2z^3 - 5z) \frac{S^2}{36}$$

SQP volatility optimization in the efficient frontier

Weighted Return Calculation

$$R_p = W_a R_a \times W_b R_b \times \dots \times W_n R_n$$

Dynamic Beta Calculation

$$\beta = \frac{Covar(r_m, r_p)}{Var(r_m)} \quad r_m, r_p = \text{Dynamic to Periods Under Query}$$

Automated Data Fetching and Returns Calculation

GBM implementations in the Monte-Carlo Simulation

This is just the tip of the iceberg...

The extent of your troubles for all this and more?

	A	B	C	D	E	F
1						
2		TSLA	0.2			
3		AAPL	0.2			
4		MSFT	0.2			
5		ORCL	0.2			
6		ENPH	0.1			
7		GS	0.1			
8						
9						
10						

List of Functions:

- Periodic Returns
- Dynamic Portfolio Beta
- Portfolio Volatility (periodic and annualized)
- Portfolio Mean Returns (periodic and annualized)
- Sharpe, Sortino, Treynor ratios
- 4 Value-at-Risk Metrics
- Wealth Index
- Portfolio CAGR
- Drawdowns
- Skewness, Kurtosis
- Efficient Frontier Data and Visualization
- Monte Carlo Simulation



Risk-Return Analysis

Basic Analysis Metrics

=MonthlyReturns(Portfolio, Periods)
=PortfolioBeta(Portfolio, Periods)
=PortfolioVolatility(Portfolio, Periods, [Periodicity])
=PortfolioMeanReturns(Portfolio, Periods, [Periodicity])

Monthly Returns:

Calculate historical monthly returns for dynamically adjustable periods through the most accurate price data.

Mean Returns:

MarketXLS calculates arithmetic means returns for adjustable time periods and allows the user the option to obtain monthly or annualised data for maximum comparability.

Portfolio Beta:

Get the Beta for your portfolio against the SPY index adjustable against dynamic time periods.

$$\beta = \frac{\text{Covar}(r_m, r_p)}{\text{Var}(r_m)}$$

Portfolio Volatility:

The most accurate portfolio volatility calculation as follows, similarly adjusted against dynamic periods as determined by the user.

$$\sigma_p = \sqrt{\sum_{i=1}^N w_i^2 \sigma_i^2(k_i) + \sum_{i=1}^N \sum_{i \neq j} w_i w_j \text{Cov}(k_i k_j)}$$

Risk-Reward Ratios

=SharpeRatio(Portfolio, Periods, Risk-Free-Rate, [Variation])

=SortinoRatio(Portfolio, Periods, Risk-Free-Rate)

=TreynorRatio(Portfolio, Periods, Risk-Free-Rate)

Variations of Sharpe-Ratio: Ex-Ante/Ex-Post

Sharpe Ratio

Measures Reward per unit risk for standard deviation of the portfolio. MarketXLS calculates both, ex-post and ex-ante variations and considers annualised value of historical returns for expected returns

Sortino Ratio

Measures Reward per unit risk for downside deviation (beyond the risk-free-rate) of the portfolio thus analysing rewards only for harmful deviations instead of all.

Treynor Ratio

Treynor ratio measure rewards compared to systematic risks (portfolio beta) instead of idiosyncratic risks (portfolio volatility), beta's are dynamic as per period under consideration and calculated as per the period queried.

Value-at-Risk

=VaR(Portfolio, Periods, Level of Significance, [Variation])

Variations:

- Historical
- Gaussian
- Conditional
- Cornish-Fisher

Default Level of Significance: 5%

Historical VaR:

This metric evaluates value-at-risk on a percentile basis using the historical returns of your portfolio. A 5% level indicates the lowest 5th percentile of returns.

Gaussian VaR:

This method operates on the assumption that returns are normally distributed, and takes the expected or average returns and volatility to plot a distribution curve. Utilizing the z-score to arrive at the value at risk.

Conditional VaR:

Calculates the worst case scenario at a given level from the historical basis by taking average of the extreme losses beyond the level of significance

Cornish-Fisher VaR:

The Cornish Fisher calculates Value-at-Risk by transforming a standard Gaussian random variable z into a non-Gaussian Z random variable.

$$Z_{Ad} = z + (z^2 - 1) \frac{S}{6} + (z^3 - 3z) \frac{K}{24} - (2z^3 - 5z) \frac{S^2}{36}$$



Wealth Indices

(And Related Functionalities)

Wealth Indices

And Related Functionalities

=WealthIndex(Portfolio, Periods, Initial Investment)

=Drawdowns(Portfolio, Periods)

=MaxDrawdowns(Portfolio, Periods)

=CAGR(portfolio, periods)

Wealth Index

Get a data table that gives you the worth of your portfolio at different points in time corresponding to the returns generated by it.

Drawdowns/ Max Drawdown

Get a data series that allows you to visualise the downside of your portfolio historically, if you're only interested in the historical worst case, you may just opt for the max-drawdown function.

CAGR

Calculate the compounded annual growth rate of your portfolio for the time period of your convenience as a direct result of the wealth index functionalities.



Optimisation & Simulation

Efficient Portfolio Frontier

=EfficientFrontierData(Portfolio, Periods, Risk-Free-Rate)
=EfficientFrontierChart(Portfolio, Periods, Risk-Free-Rate)

MarketXLS uses SQP optimization techniques to calculate the Efficient Frontier which represents the set of efficient portfolios that will give the highest return at each level of risk or the lowest risk for each level of return.

This frontier is formed by plotting the expected return on the y-axis and the standard deviation as a measure of risk on the x-axis.

Get Raw Data:

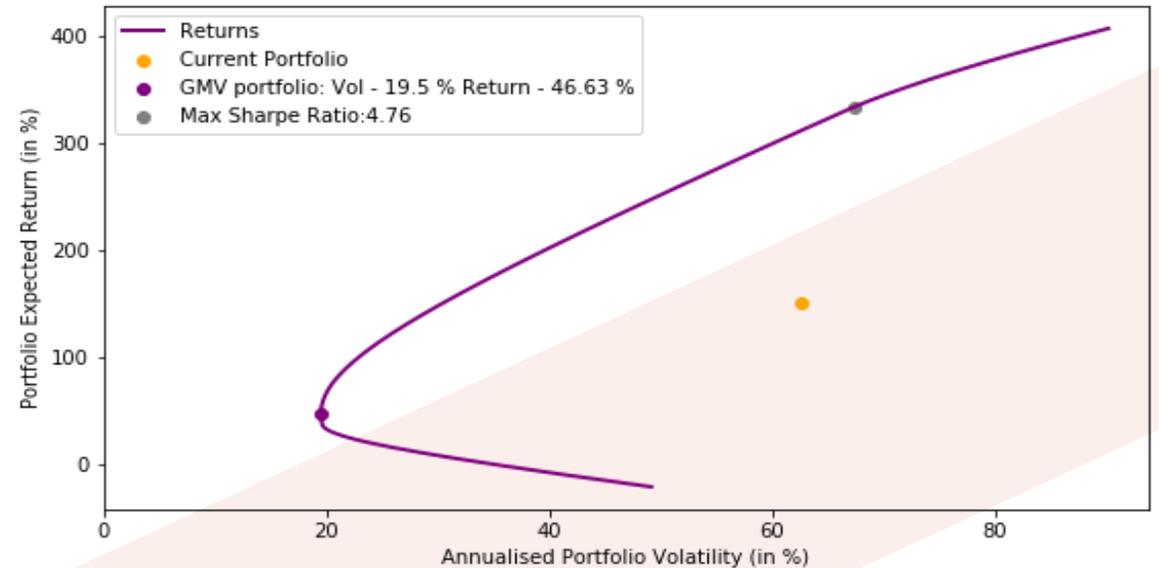
Get a table 100 optimised portfolios for the least risk at each level of return possible for your portfolio. Visualise or interpret as suits your needs

OR

Get Chart:

If you want to skip the work of visualising within excel, simply use the chart function and let MarketXLS do the work for you.

Efficient Frontier



Monte Carlo Simulation

=MonteCarloSimulation(Portfolio, Periods)

A Brief Overview:

The Monte Carlo approach is a computer-based method that uses statistical sampling to build a model of a possible range of results (a probability distribution) for those factors that have an element of uncertainty.

Output:

MarketXLS expected return and volatility for your portfolio through annualization of outputs from historical returns. This data is put through 1000 different simulations over a 5 year future period and returns mean and median of the resultant simulation.

$$S(\Delta t) = S(0) \exp \left[\left(\mu - \frac{\sigma^2}{2} \right) \Delta t + (\sigma \sqrt{\Delta t}) \varepsilon \right]$$

(Implemented 1000 iterations for 60 future months)

Monte Carlo Simulation

