

This week the Deep Dives will cover quantitative strategies for portfolio management.

Concentrate exposure to alpha by hedging beta

Portfolio managers design factor models that tell them how to balance a portfolio to earn alpha. Because alpha is how managers get paid, they only want exposure to their factors. Beta hedging removes the part of returns driven by the market and leaves only the returns driven by the factors.

If this sounds complicated there's good news: You can hedge beta with the same linear regression you learned in Statistics 101. And you can do it with Python.

[BetaHedge.ipynb 246.02 KB](#)

The 3 steps to factor risk analysis

Quants use factors to target specific drivers of returns and manage risk. Diversification is great until the entire market declines in value. That's because the market influences all stocks. Factors can offset some of these risks by targeting drivers of return not influenced by the market.

Common factors are size (large-cap versus small-cap) and style (value versus growth). If you think small-cap stocks will outperform large-cap stocks, then you might want exposure to small-cap stocks. If you think value stocks will outperform growth stocks, then you might want exposure to value stocks. In either case, you want to measure the risk contribution of the factor.

[FactorAnalysis.ipynb 78.32 KB](#)

How to isolate alpha with principal component analysis

Principal component analysis (PCA) is used widely in data science. It's a way to reduce the number of dimensions in a data set.

In a stock portfolio, a dimension might be a column of returns for one of the stocks. In a portfolio of 100 stocks, there are 100 dimensions. PCA converts those 100 dimensions into the few that explain the most variance in the data. In other words, the dimensions hold the most information about the data.

[PortfolioPCA.ipynb 139.48 KB](#)

Build your own risk parity portfolio

Risk parity is a strategy that uses risk to find the allocations of an investment portfolio. It allocates money to stocks based on a target risk level – usually volatility.

In other words, instead of equal dollar weights, risk parity portfolios have equal risk weights.

[RiskParity.ipynb 313.55 KB](#)