Portfolio Return Analysis: Bootstrapping

Turtle Street Capital

Introduction

Forecasting future portfolio performance is a delicate topic, often not discussed in detail, more often it is quickly followed by a disclaimer - "past performance may not be indicative of future results".

But, no matter the process historical performance of stocks, bonds, and other assets is a required input for forecasts. History repeats. So, is there a better way to evaluate historical performance?

One common pitfall is an assumption that returns are normally distributed. Unfortunately, unlikely events that negatively impact the markets and our portfolios happen all too often. The other naivety is that the relationship amongst asset class returns are constant. In reality, there is tendency for assets to move together in times of crisis. For example, in 2008 the S&P 500, DAX, S&P/TSX Composite, and Nikkei all lost in excess 30%, in local currency terms.

For a more accurate representation of what future portfolio returns may, or may not be, we employ a statistical technique that relies on random sampling with replacement – commonly referred to as bootstrapping. The backbone of this approach is to use raw historical data, without the assumption of normally distributed returns or linear co-variance. Historical returns are then simulated several thousand times and from here average portfolio performance is established.

Portfolio Optimization Results

Optimization Period

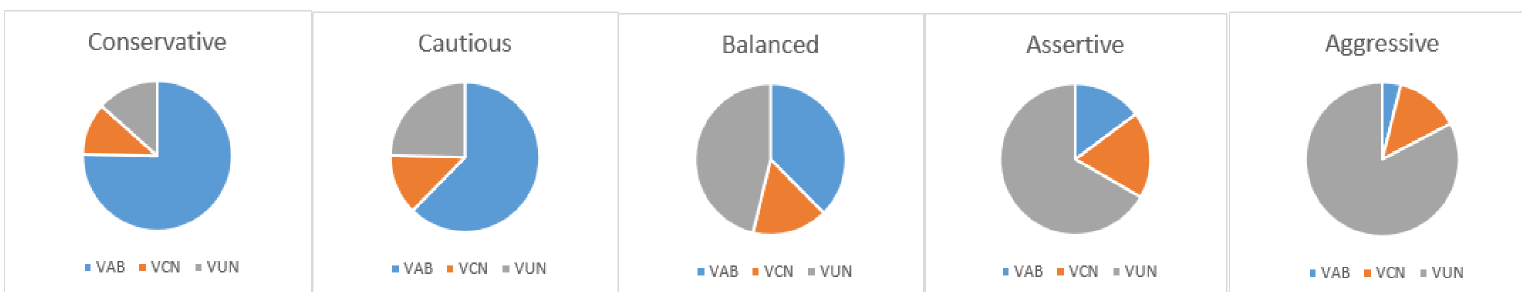
Jan 2014 to Oct 2016

The Portfolio

VAB	Vanguard Canadian Aggregate Bond Index ETF
VCN	Vanguard FTSE Canada All Cap Index ETF
VUN	Vanguard U.S. Total Market Index ETF

Optimal Allocation

Ticker/Portfolio	Conservative	Cautious	Balanced	Assertive	Aggressive
VAB	75.35	62.38	37.54	14.81	3.92
VCN	11.23	13.02	16.19	18.51	13.46
VUN	13.42	24.60	46.27	66.68	82.62



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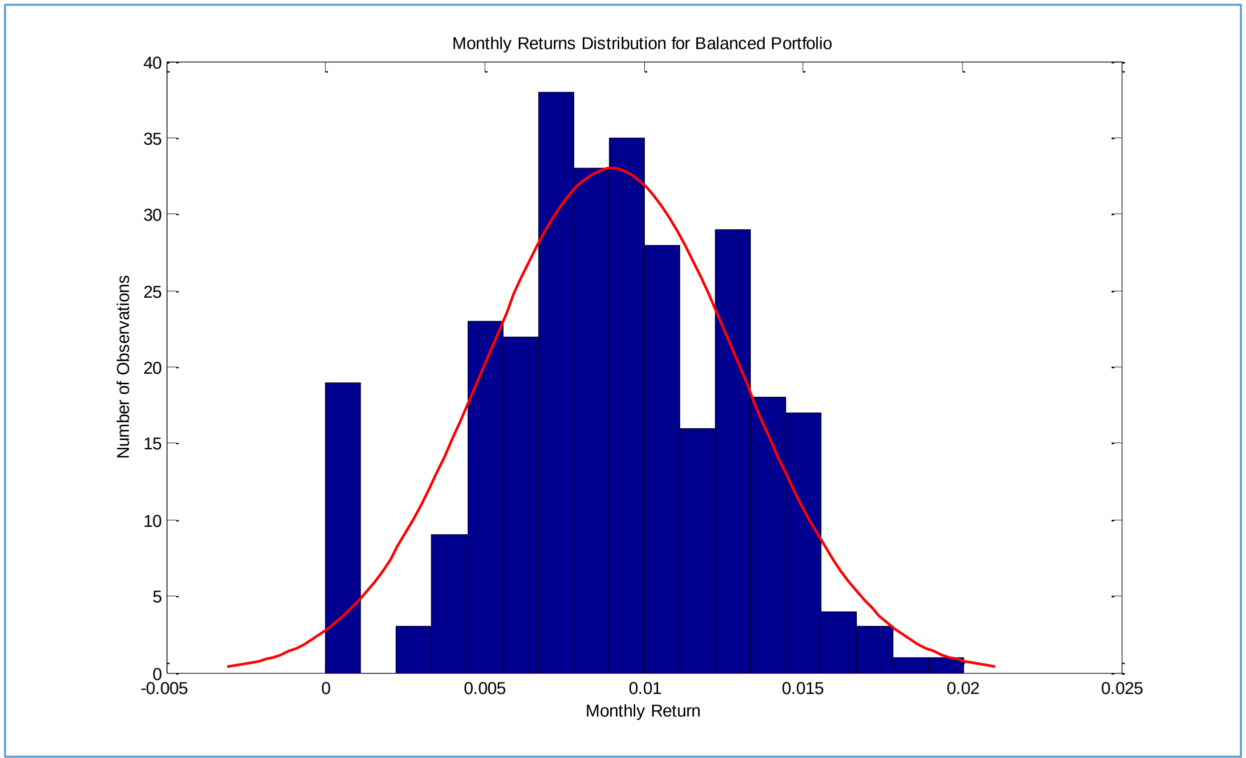
Distribution of Historical Returns for Balanced Portfolio



The blue bars indicate the distribution of monthly returns for the optimized balanced portfolio. The red line indicates a normal distribution which approximates the histogram. The mean monthly return is 0.9%, or 10.8% annually, and the standard deviation of returns is 0.4% monthly, or 4.8% annually.

It is apparent that most monthly returns for the balanced portfolio fall within +0.4% to +1.6%. That’s anywhere from 4.8% and 19.2% on an annual basis.

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