Hi...
Satisfying the Prudent Man—Quantifying and Defending Risk

SCOTT M. JUDS

Introduction

Although investment risk decisions made by professionals are aggressively audited by regulators, the suitable and prudent fiduciary standards by which they are judged provide excess room for interpretation. Strikingly absent from the Financial Industry Regulatory Authority (FINRA) Rules, the Employee Retirement Income Security Act of 1974 (ERISA), the Securities and Exchange Commission (SEC) Investment Advisers Act of 1940, and the Uniform Prudent Investor Act (UPIA) is (a) any practical definition of risk or how it is quantitatively measured; (b) any guidance for determining how much diversification is required; and (c) any mention of the risk categories (conservative, moderate and aggressive) financial professionals most commonly discuss and employ.

While regulators have given financial professionals wide latitude, they’ve provided no quantitative means for professionals to defend their investment advice as suitable and prudent. Fortunately, we can look to the traditional risk-classification model portfolios used by respected industry leaders that have long stood the test of time with regulators. Together, they form a consensus set of industry-standard definitions that enable risk category portfolios to be modeled, quantified, and used as reference standards in assessing the relative risk performance of other investment portfolios.

Defining and Measuring Risk

To credibly judge the level of risk associated with an investment portfolio, the term “risk” first must be defined in a manner that can be quantifiably measured. However, a review of the rules, regulations, and standards of FINRA, ERISA, UPIA and the SEC reveals they are either silent or nebulous about risk’s definition. The term “loss of value” is occasionally found but without thresholds, and other definitions, such as standard deviation, are nowhere to be found. However, with the advent of Behavioral Economics, academia today clearly prefers downside deviation as the measure of risk, and FINRA 2111.03(c) is satisfied so long as it is “based on generally accepted investment theory.” Thus, the underlying measure of risk used herein will be the Quarterly Downside Deviation, which is calculated as the root mean square of negative quarterly returns, sampled daily over the portfolio’s data span. More specifically:

\[
\text{Quarterly Downside Deviation} = \sqrt{\frac{\text{Total Days}}{\text{Total Days} - 3\text{mo}}} \left[ \min \left( \frac{p(i)}{p(i - 3\text{mo}) - 1, 0} \right) \right]^2
\]

Where:
- Total Days = the number of market days in the evaluation period.
- 3mo = one quarter of a year, typically 63 market days.
- \(p(i)\) = the equity curve value on day \(i\).

Relative Risk, however, provides a better perspective and will be used in the comparative performance charts that follow. It is the ratio of the Quarterly Downside Deviation (QDD) of the test portfolio to the QDD of the Consensus Aggressive Portfolio of Figure 1. Thus, the Consensus Aggressive Portfolio is the reference standard, and by definition has a Relative Risk of 100%.

\[
\text{Relative Risk} = \frac{\text{QDD of Test Portfolio}}{\text{QDD of Consensus Aggressive Portfolio}}
\]

Consensus Risk Category Portfolios

With the measure of risk resolved, the matter of “acceptable risk” must still be resolved if one is to satisfy the regulatory prudent and suitability rules. While a review of the rules, regulations, and standards again reveals only silence on the matter, financial institutions have long been given the freedom to define their own range of risk category portfolios, such as conservative, moderate, and aggressive, as illustrated by the examples of Appendix A. Although the number of risk categories and the asset class allocation weights vary from one institution to another, together they can be used to form the consensus set of industry-standard risk category portfolios illustrated in Figure 1. Vanguard mutual funds VFINX, VTRIX, VBMFX, and VWSTX (Figure 2) were selected as proxies to represent the four asset classes (Domestic Equity, International Equity, Fixed Income, and Short-Term Funds) because of their excellent asset class matches, long data history, and broad industry respect. There are numerous equally suitable virtual clones of these funds available from other companies that will produce like results.

Regulators have indirectly approved the Consensus Portfolio definitions of Figure 1 by default through their decades-long acceptance of the financial industry’s risk category portfolios. As such, these Consensus Portfolio definitions form a regulatory accepted set of standardized risk category portfolios that can be statistically quantified and used to set reference standards for the risk and return statistics typical of the Stable Income, Conservative, Moderate, Growth, and Aggressive portfolios typically offered within the industry.

continued on page 16
Risk Category Portfolio Performance

The 24-year risk/return performance for the five consensus risk category portfolios is plotted in Figure 3. Return is simply measured as the compound annual growth rate (CAGR). Risk is measured as the Quarterly Downside Deviation and is an absolute negative volatility measure not scaled by return in the manner employed by the Sharpe and Sortino ratios. As should be expected, portfolios [1] through [5] line up evenly distributed just beneath MPTs efficient frontier stretching between the domestic equity fund and the fixed income fund. The five portfolios lie just beneath the efficient frontier because their asset class allocations actually are slightly sub-optimal, as can be demonstrated with this Efficient Frontier online analysis tool. The horizontal axis of Figure 4 has been rescaled from Figure 3 to instead indicate Relative Risk. The Consensus Aggressive Portfolio [5] is designated as the primary reference portfolio and thus, by definition, has a Relative Risk value of 100%. The Relative Risk for the Stable Income, Conservative, Moderate, and Growth Consensus Portfolios are 28%, 45%, 63%, and 82%, respectively. These five Consensus Risk Category Portfolios actually are the de facto reference standards against which all other investment portfolios can be judged.

Risk Category Mutual Fund Performance

Investment companies have not only proposed risk category models, but actually offer corresponding sets of mutual funds that implement them – as exemplified by Fidelity’s Asset Manager, Vanguard’s LifeStrategy, BlackRock’s LifeCycle, Russell’s LifePoints, and other such series of funds. The Fidelity’s Asset Manager family of funds plotted in Fig. 5 aligns well with consensus risk category portfolios [1] through [5], as do the similar funds offered by others. Not surprisingly, even the portfolios recommended by the Robo Advisors Betterment, Wealthfront, and FutureAdvisor cluster around consensus risk category portfolios [4] and [5].

New Tools Change Old Rules

Fortunately, there have been numerous advances in investment theory since MPT’s 1952 debut, including: (2) Momentum in market data was formally found, confirmed, and practiced; (1) Matched Filter Theory and differential signal processing were developed to improve signal-to-noise ratio, which determines the probability of making a good investment decision; and (3) Kahneman and Tversky redefined risk through behavioral economics.

A Tactical Rotation strategy employing these new tools in accordance with the methods of the 2016 NAAIM white paper “Automated Polymorphic Momentum,” achieves the performance illustrated in Figure 6. While a traditional MPT portfolio holds a fixed allocation of every one of its funds, this strategy holds only the trend leader among them at any given time; switching between VFINX and VTRIX in bull markets, and to VBMFX in bear markets. Tactical Rotation produced twice the return with half the risk of a traditional moderate risk MPT portfolio, and is performance that is quantitatively defensible.

Scott Juds is a Founder and Chief Science Officer of AlphaDroid Strategies of San Luis Obispo, CA, and Founder and CEO of SunGrowth Strategies of Seattle, WA. He holds an MSEE from Stanford University, a BSEE from the University of Wisconsin – Madison. He is the named inventor on over 40 U.S. and foreign patents.