The Role of Risk in Asset Allocation

by Jason Hsu, Ph.D.

A traditional asset allocation framework allocates to various asset classes with the goal of matching important risk exposures. In reality, many asset classes share exposures to common risk factors and thus are highly correlated, particularly with equities. This article explains how investors can achieve more intuitive and perhaps more sensible portfolios with an approach based on risk factors.

The traditional asset allocation framework, unsurprisingly, starts with assets. It is a tradition based on convenience and, perhaps, an implicit assumption that key asset classes match well to the important risk exposures. The more modern asset allocation and analytic framework anchors, instead, on "risks."[1] While the two frameworks may lead to similar outcomes, the risk-based approach can often offer greater simplicity and allow for more natural asset allocation intuition. In this article, I explain the benefits of the risk-based approach relative to the asset-based approach. Additionally, I introduce simplifying analogies, which facilitate building intuition on the differences between the two approaches. Toward the end of the article, I also offer three applications of the risk-based framework to demonstrate investment issues, which, otherwise, would not be apparent in an asset-based analytical framework. However, a complete description on how to implement a risk-based approach is outside of the scope of this article.

Asset Classes vs. Risk Exposures

In the asset-based framework, the allocation process involves assigning weights to the various asset classes available to the investor (e.g., equities, bonds, commodities, real estate, etc.). Asset classes are captured by their corresponding market indexes. Each specific major asset category is split across finer asset classes such as U.S., international, and emerging markets for equities, and U.S. Treasuries, sovereigns, and corporates for bonds. In this framework, assets are investment vehicles for "owning" risk exposures; so the "asset-based" approach is, essentially, an "investment product-based" approach.

The more modern analytical framework is a risk-based approach, which makes a strong distinction between investment vehicles and risk exposures. In this framework, the allocation process involves assigning weights to a set of risk exposures rather than assets. The allocation process first determines the "risks" that an investor wants to hold, taking into account how the risks interact with each other and the premia they generate. Then, the investor can construct his preferred combination of "assets" to achieve his desired risk exposures, taking into account the valuation levels attached to assets. Typically, the investor will have a preference for using "attractively priced" assets to access the desired risk exposure.[2]

The standard criticism of the traditional asset-based approach is that it leads to portfolios that are dominated by equity-like risk, even though portfolios appear to be well diversified.[3] This occurs, in part, because very different assets can often contain significant exposure to equity-like risk. Generally, most researchers agree that there are a few primary economic risk exposures: shocks to economic growth, shocks to inflation, and shocks to credit availability, among others. Many assets, if not most, contain multiple risk exposures. For example, corporate bonds are exposed to all three of the above risks. Similarly, high yielding stocks can also have significant exposure to all three risks. Therefore, adding high yield bonds to a portfolio of high yielding stocks wouldn't necessarily improve the portfolio's risk diversification, despite the increase in asset class diversification.

[1] The modern approach has grown out of the literature on APT (see Ross, 1976) and the subsequent refinement of the risk factors into meaningful economic risk exposure (see Chen, Roll, and Ross, 1986).

[2] Note that this "unbundling" of risk and valuation decision allows us to think carefully about what (beta) risks we are willing to take to earn returns and to examine how diversified our sources of "beta" risks are. The valuation question enters next. For many investors, who believe that assets can be mispriced relative to their risk exposures, this offers an opportunity for asset allocation "alpha" through selecting cheaper assets to gain the desired risk exposures.

[3] Note that the classic pension portfolio, structured from the 60/40 equity/bond construct, has 90% of its total portfolio variance driven by equity risk. See Bhansali, Davis, Hsu, Li, and Rennison (2012) for a review of the risk concentration issue commonly found in asset-based asset allocation approaches.

Nutrients are to Foods as Risks are to Assets

The risk-based approach, with its associated technical jargon such as "risk factor loadings," can seem unintuitive to many investors. I find the following food analogy to be very effective at illustrating the risk-based framework.[4] It is often convenient to think of risks as nutrients, assets as foods, and portfolios as meals. People need to consume a mix of nutrients, which vary by individual circumstances. Because nutrients come bundled in various foods—dairy, grains, meats, for example—people must combine foods to create a meal that supplies them with the desired nutrition. However, it is likely that many different meals would provide comparable nutrition. Thus, personal taste and food prices often dictate the preferred meal.[5]

In asset allocation language, individual asset classes contain different risk exposures. A desired combination of risks can be achieved with different asset allocation portfolios. Ultimately, prices, costs, and investment governance will dictate the preferred portfolio.

The food analogy is also helpful for understanding tactical asset allocation (TAA). For example, when food prices change, we can choose to consume the same nutrients at a lower cost by eating a different meal consisting of different food ingredients. In the risk framework, TAA can be understood as tactically rebalancing toward out-of-favor assets that provide "cheaper" access to a set of underlying economic risks and away from the "expensive" assets offering the same risk exposures.

Applications of the Risk-Based Framework

We illustrate the risk-based framework with the following three applications. These applications are meant to illustrate investment insights, which would not be available through the traditional asset-based analysis.

Application 1: Re-thinking "rebalancing and the strategic portfolio weights"

In the asset-based framework, the stocks (proxied by the S&P 500 Index) and bonds (proxied by the BarCap Agg Index) are viewed as fundamental portfolio building blocks. U.S. investors generally hold large (and often static) strategic allocations tied to the two benchmarks, with a 60% equity/40% bond strategic allocation as the traditional "norm."

It is dangerous, however, to assume that the S&P 500 or the BarCap Agg[6] are assets with static risk exposures over time. In 1995, technology stocks comprised 9.4% of the S&P 500. The index had a P/E ratio of 17.4 and a dividend yield of 2.2%. In 2000, technology stocks became 21.2% of the S&P 500, pushing the index volatility from its historical average of 15% to 24%, the P/E ratio to 24.4, and the dividend yield to 1.2%. Similarly, in 2000 the BarCap Agg had a 4.5 year duration, while yielding 6.4%. Today, the BarCap Agg has duration risk of 5 years, while yield fell to an abysmal 1.6%. Clearly, a disciplined rebalance back toward the 60/40 allocation over this period would have produced a portfolio with wildly fluctuating underlying risk exposures!

Using the food analogy again, it is instructive to think of the BarCap Agg as a hamburger. As America demanded more "manly" beef patties, fast food restaurants moved to double patties, often with bacon to boot. The proteins, not to mention the calories and fat, of today's gourmet burgers are significantly higher than the burgers of the past (333 calories for an average burger 20 years ago vs. 590 calories today). Given the Agg's significant increase in duration risk, not to mention the lower yield—is it wise to still insist on a hamburger combo meal? In fact, would it not be better to change our meal completely and source our proteins and calories from cheaper ingredients?

Application 2: Interpreting hedge fund performances

From the asset-based framework, hedge funds are particularly difficult to examine. Many hedge funds trade exotic and illiquid assets. The hedge funds, which hold conventional securities, would often apply complex strategies involving leverage and shorting. The complexity has sometimes led investors to treat hedge funds as a separate asset class, to which the cynics retort that the only shared characteristics for entrees in the asset class are opacity and high fees.

[4] The nutrient vs. food analogy is not original; it has been used previously by Professor John Cochrane at the University of Chicago and Professor Andrew Ang at Columbia University.

[5] Also important is that some assets provide access to a particular risk without introducing other unwanted risks. For example, chicken breasts provide protein more effectively than rib-eye steaks, which are both more expensive and contain more artery-clogging saturated fat.

[6] BarCap Agg is the Barclays Capital Aggregate Bond Index, which is one of the most commonly used bond indices. It contains almost all of the U.S. investment grade bonds, including Treasury, agency, mortgage, and corporate bonds; the weights are based on market capitalization of the bond issues. The index is generally dominated by Treasury bonds due to the issuance size of U.S. Treasuries relative to other bonds.

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Much of the black-box complexity can be unraveled in the risk-based space, providing some useful insights into hedge fund strategies. It turns out that many hedge fund strategies can be mimicked using more liquid and traditional assets. This is because many hedge funds, despite their exotic holdings and strategies, actually (probably unintentionally) end up owning fairly commonplace risk exposures. Further, for the average funds, there is often little evidence that accessing standard risks through more exotic assets or using complex trading strategies has led to superior returns.[7] To be fair, some hedge funds may provide exotic risk exposures that are not found in conventional assets or strategies. For example, earning returns from exposures to extreme economic shocks by writing options is an innovation that expands the investment frontier.

Using our nutrient analogy, hedge fund providers argue that their products provide exclusive nutritional compounds in the form of "alphas" and rare nutrients in the form of "exotic betas." Hard-to-get nutrients and exclusive health compounds are necessarily expensive. We now know that the average hedge fund actually provides nutrients that can be found, readily, in standard assets; only a small fraction of hedge funds truly provide the hard-to-get "exotic betas" and even fewer provide proprietary "alpha." In this context, most hedge funds are more like foo-foo health foods, such as bird nest and shark fin, which, at hundreds to thousands of dollars per pound, are advertised to combat aging and cancer, but actually contain nothing more than garden variety vitamins and proteins.

Application 3: Risk parity

Risk parity is an asset allocation portfolio heuristic that attempts to provide a diversified portfolio of risk exposures. Specifically, it seeks to overcome the heavy dependence on equities in the conventional 60/40 allocation portfolio. The implementation of the concept is often in the "asset" space. This means there would be parity in the assets' contribution to the overall portfolio volatility, but no parity in the underlying economic risk exposures.

The popular and standard risk parity solution is based on volatility weighting of "distinct" asset classes. As with a naïve reliance on the 60/40 allocation, a naïve asset-based approach to risk parity is also sub-optimal, because asset classes can often appear distinct but actually contain similar risks.[8] A seemingly diversified risk parity portfolio, constructed from equities, commodities, high yield credit, real estate, and bonds, is like a mixed grill of beef, pork, lamb, and chicken with a small side salad—i.e., not a balanced meal nutritionally. This risk parity portfolio probably provides no better diversification than a simple 60/40 equity/bond portfolio.

Conclusion

When investors analyze choices in the asset-based framework, the large variety of different yet related assets can make the analysis extremely complex; naïve investors can often mistake the asset diversity in their portfolios for adequate risk diversification. Further, because assets contain both risks and valuation in the same bundle, it would lead to easier analyses if we unbundle the two components. The risk-based approach to asset allocation allows us to separate the two, leading to more intuitive and perhaps more sensible portfolio solutions. Despite the technical jargon and the seemingly more abstract framework, the risk-based approach has a lot to offer investors—particularly in a world where investment options and strategies are becoming exponentially more complex.

References

Agarwal, Vikas, and Narayan Y. Naik. 2000. "Multi-Period Performance Persistence Analysis of Hedge Funds." Journal of Financial and Quantitative Analysis, vol. 35, no. 3 (September):327–342.

Bhansali, Vineer, Josh Davis, Graham Rennison, Jason Hsu, and Feifei Li. 2012. "The Risk in Risk Parity: A Factor-Based Analysis of Asset-Based Risk Parity." Journal of Investing, vol. 21, no. 3 (Fall):102–110.

Chaves, Denis, Jason Hsu, Feifei Li, and Omid Shakernia. 2012."Efficient Algorithms for Computing Risk Parity Portfolio Weights." Journal of Investing, vol. 21, no. 3 (Fall):150–163.

Chen, Nai-Fu, Richard Roll, and Stephen Ross. 1986. "Economic Forces and the Stock Market." Journal of Business, vol. 59, no. 3 (July):383–403.

[7]See Fung and Hsieh (1997a,b, 2004), Aggrawal and Naik (2000), Ennis and Sebastian (2003), and Hasanhodzic and Lo (2007). For a comprehensive survey review of the literature on hedge fund performance, see Eling (2008).

[8]See Chaves, Hsu, Li, and Shakernia (2012) and Bhansali, Davis, Hsu, Li, and Rennison (2012).

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Eling, Martin. 2008. "Does Hedge Fund Performance Persist? Overview and New Empirical Evidence." Working Paper No. 37, University of St. Gallen Law & Economics.

Ennis, Richard M., and Michael D. Sebastian. 2003. "A Critical Look at the Case for Hedge Funds." Journal of Portfolio Management, vol. 29, no. 4 (Summer):103–112.

Fung, William, and David A. Hsieh. 1997a. "Empirical Characteristics of Dynamic Trading Strategies: The Case of Hedge Funds." Review of Financial Studies, vol. 10, no. 2 (Summer):275–302.

———. 1997b. "Survivorship Bias and Investment Style in the Returns of CTAs." Journal of Portfolio Management, vol. 24, no. 1 (Fall):30–41.

Fung, W. and Hsieh, D. (2004) 'Hedge fund benchmarks: A risk based approach', Financial Analyst Journal, 60(5), 65-80.

———. 2004. "Hedge Fund Benchmarks: A Risk-Based Approach." Financial Analysts Journal, vol. 60, no. 5 (September/October):65–80.

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