RISK PARITY IS NOT A HEDGE FUND STRATEGY & OTHER COMMON RISK PARITY MISPERCEPTIONS

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EXECUTIVE SUMMARY

- Risk parity, the approach of allocating risk not dollars, has become a component of many investment portfolios. Although widely used, its theoretical justifications and role within a portfolio are commonly misunderstood.
- Some people see risk parity as a (partial) hedge fund program substitute; however, their respective risk/return properties are completely different. Standard risk parity, a strategic asset allocation solution, is about static, long only, risk exposure to public market betas without an explicit expected return view. In contrast, hedge fund strategies are dynamic, more idiosyncratic, and lean heavily on proprietary expected return views.
- Many investors think risk parity is "optimal" in a classic Markowitz mean-variance sense as long as Sharpe Ratios (risk-adjusted returns) are identical across asset classes. However, most investors do not understand that correlations (diversification) matter too. If pairwise correlations are not identical, risk parity is not optimal even if Sharpe Ratios are identical.
- In practice, people have moved away from classic mean-variance optimization and toward approaches such as risk parity without a complete understanding of why this is happening or how the two techniques are linked. Risk parity is a "practical cousin" of classic mean-variance optimization. Classic mean-variance optimization requires "error free" expected return and risk (volatility, correlation) estimates, but expected returns are extremely difficult to estimate. Volatilities are much easier to estimate, so approaches not requiring explicit expected return inputs, such as risk parity, have gained traction.
- Key concepts in risk parity, such as risk balancing and leverage, are typically introduced as new or revolutionary. However, these concepts are core to the original 1950s Markowitz mean-variance work and are taught in introductory portfolio theory classes.
- Risk parity has large dollar allocations to low risk assets, such as fixed income, which in the current low interest rate environment has led to criticism of typical risk parity portfolios. However, by definition, strategic asset allocation (SAA) approaches, including risk parity, do not incorporate "current" or "tactical" views. Asset classes expected to underperform their SAA assumption should carry a reduced portfolio weight relative to the strategic recommendation, regardless of the strategic asset allocation approach used. This in no way disproves risk parity or any other SAA approach.

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INTRODUCTION

Over the past few years, risk parity has become a component of most investors' lexicon and, possibly, portfolios. Risk parity products have also become more common in many asset management firms' offerings. However, even with all of the attention on risk parity, there is still a significant amount of confusion surrounding it. This piece will examine some of the common risk parity misperceptions and provides an alternative, clarifying explanation.

WHAT IS RISK PARITY? A QUICK REVIEW

Before discussing some of the misperceptions, it's beneficial to briefly review the basic approach to risk parity asset allocation. While there are various versions of risk parity, the overall premise is to form a long only portfolio where each asset contributes the same amount of risk to the portfolio's total risk.[1] A portfolio with 50% stocks and 50% bonds is perfectly balanced from a dollar perspective, but it isn't balanced from a risk perspective. $1 of stocks is approximately four times as risky as $1 of bonds (assuming a 16% volatility for stocks and 4% volatility for bonds, 16%/4% = 4). To be exact, assuming a correlation of zero for simplicity, a 50/50 stock/bond portfolio has a total volatility of 8.25%. 94% of the risk comes from stocks and 6% of the risk comes from bonds.[2]

In the above two asset example, the dollar allocation to bonds would be four times that of stocks in a risk-balanced portfolio.[3] In other words, the unlevered risk parity portfolio would hold 80% bonds and 20% stocks.[4] This risk-diversified portfolio has a total volatility of 4.53%, with 50% of the risk from stocks and 50% of the risk from bonds. If an investor has a target total portfolio risk greater than that of the unlevered risk parity portfolio, leverage is used.[5] For example, a risk parity portfolio with a target risk of 10% would hold:

- 177% bonds (= unlevered weight*target risk/unlevered risk = 80%*10%/4.53%); and
- 44% stocks (= 20%*10%/4.53%)

Since the portfolio weights are scaled by the same factor, risk balancing is maintained while increasing overall portfolio risk to the target level. On the flipside, if an investor has a target total portfolio risk less than that of the unlevered risk parity portfolio, T-bills are used to "de-lever" the portfolio and achieve the target risk level. For example, a risk parity portfolio with a target risk of 3% would hold:

- 53% bonds (= 80%*3%/4.53%);
- 13% stocks (= 20%*3%/4.53%); and
- 34% T-bills

Again, since the portfolio weights are scaled by the same factor, risk balancing is maintained while decreasing overall portfolio risk (see Figure 1).

Even with all of the attention on risk parity, there is still a significant amount of confusion surrounding it.

1 Some risk parity approaches attempt to balance risk across different economic environments (e.g. growth and inflation) instead of across assets. However, in either approach, the focus is on balancing risk, not balancing dollar allocations.

2 Under the assumption of zero correlation, the proportion of risk from stocks equals $w_{stocks}^2 \frac{\sigma_{stocks}^2}{\sigma_{total\ portfolio}^2}$ while bonds equals $w_{bonds}^2 \frac{\sigma_{bonds}^2}{\sigma_{total\ portfolio}^2}$. In general when correlations are nonzero, the proportion of risk from stocks equals $w_{stocks} w_{bonds} \frac{\sigma_{stocks}\sigma_{bonds}\rho_{stocks,bonds}}{\sigma_{total\ portfolio}^2} + w_{stocks}^2 \frac{\sigma_{stocks}^2}{\sigma_{total\ portfolio}^2}$ while bonds equals $w_{stocks} w_{bonds} \frac{\sigma_{stocks}\sigma_{bonds}\rho_{stocks,bonds}}{\sigma_{total\ portfolio}^2} + w_{bonds}^2 \frac{\sigma_{bonds}^2}{\sigma_{total\ portfolio}^2}$, where $\rho_{stocks,bonds}$ is the correlation between stocks and bonds.

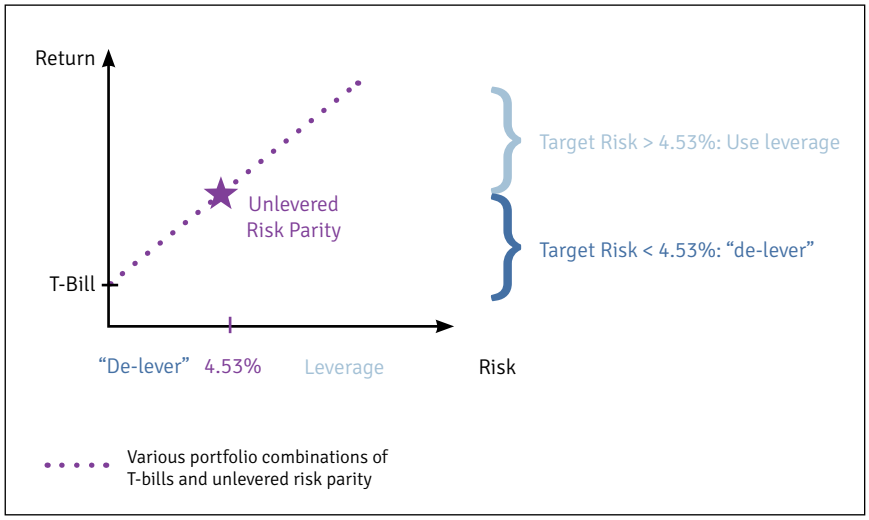
3 In general, expected correlations between assets are important for determining the risk parity relative allocations. However, in the two asset case, it can be shown that the correlation is irrelevant for determining the risk parity relative allocations.

4 In the two asset case, the unlevered risk parity weights are $w_{stocks} = \frac{\frac{1}{\sigma_{stocks}}}{\frac{1}{\sigma_{stocks}} + \frac{1}{\sigma_{bonds}}}$ and $w_{bonds} = \frac{\frac{1}{\sigma_{bonds}}}{\frac{1}{\sigma_{stocks}} + \frac{1}{\sigma_{bonds}}}$.

5 Horizons can differ across managers when defining and targeting risk. For example, some managers target short term risk while others focus on long run risk.

There are a few important takeaways from the above example. First, risk parity portfolios do not necessarily use leverage. Leverage is used only when the target risk is greater than that of the unlevered risk parity portfolio. Secondly, explicit asset class expected returns are irrelevant when forming a basic risk parity portfolio.

Figure 1



RISK PARITY IS A PUBLIC MARKET STRATEGIC ASSET ALLOCATION SOLUTION, NOT A HEDGE FUND STRATEGY

It is not uncommon for investors to view risk parity as a partial replacement for, or supplement to, a hedge fund/absolute return program. Let me be frank here: this makes absolutely no sense to me. It's like comparing apples and oranges, as they say. Perhaps part of the confusion is driven by the fact that some traditional hedge fund managers offer risk parity products. Nonetheless, the goals and risk/return properties for standard risk parity approaches are completely different than hedge fund or absolute return strategies. Standard risk parity is about delivering long only, static, risk-balanced exposure to various traditional betas without incorporating explicit expected return views.[6] In my opinion, this approach sounds exactly like a public market strategic asset allocation solution.

In contrast, most hedge fund strategies aim to deliver an ample amount of idiosyncratic alpha and non-traditional beta in their return streams utilizing dynamic, proprietary expected return views. Since most hedge fund strategies have large idiosyncratic risk components, utilize short selling, and/or are partially hedged, they have a better chance of delivering more consistent returns across various market environments when compared to risk parity or other long only, public market portfolios.[7] This is not a criticism of risk parity or long only, public market portfolios. A long only, public market, traditional beta portfolio can only do so much from a risk/return perspective. Risk parity might be more consistent than a 60/40 stock/bond portfolio over the long run, but it can't avoid the standard risk problems associated with long only, public market, traditional beta portfolios.

In sum, one should think of standard risk parity as competition for other long only, public market, strategic asset allocation approaches (e.g. standard mean-variance optimization), NOT a component of one's hedge fund/absolute return program.

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6 Some second generation risk parity products offer a tactical tilt based on expected return views. Usually, most of the risk of these products still comes from the standard risk parity allocation. This piece does not explicitly address these "tactical" risk parity products.

7 Assumes the hedge fund manager has skill, which is limited in supply and hard to identify ex ante.

RISK PARITY IS "OPTIMAL" ONLY WHEN SHARPE RATIOS ARE IDENTICAL AND CORRELATIONS ARE IDENTICAL

Risk parity has gained traction based on the belief that, when implemented, it can deliver a long only portfolio with a higher risk-adjusted return over the long run, even without an explicit stance on expected returns. However, standard investment textbooks and classes emphasize the importance of both expected risk and return assumptions in the formation of an optimal portfolio. As a result, it has been natural for investors to ask about and seek to understand the set of assumptions in which risk parity coincides with the textbook optimal portfolio solution. Typical risk parity expositions offer indirect, incomplete, and/or incorrect answers on this issue.

Before discussing the optimality of risk parity, we need to clearly define what we mean by "optimal." For this discussion, we will define optimal as a portfolio that maximizes expected excess return (in excess of the risk free rate) for a given level of volatility (risk). In other words, a portfolio is optimal if it has the highest Sharpe Ratio.[8] In general, risk parity does NOT deliver an optimal portfolio with the highest Sharpe Ratio. Risk parity only coincides with an optimal portfolio if each asset has an identical Sharpe Ratio and each asset has identical pairwise correlations.[9] The identical Sharpe Ratio assumption makes intuitive sense. If each asset has the same return per unit risk (Sharpe Ratio), then it makes sense to allocate equal risk to each asset, although the second requirement, identical correlations, is still critical. Correlation is a measure of diversification benefit. If each asset has the same return per unit risk AND the same diversification benefit, then it is logical that the optimal portfolio would allocate equal risk to each asset. Many explanations of risk parity ignore the importance of the equal correlation assumption or incorrectly state that correlations must be zero, which is a special case of the equal correlation assumption.

Risk parity only coincides with an optimal portfolio if each asset has an identical Sharpe Ratio and each asset has identical pairwise correlations.

RISK PARITY IS JUST A PRACTICAL IMPLEMENTATION OF CLASSIC MEAN-VARIANCE OPTIMIZATION[10]

As discussed in the last section, risk parity only coincides with the optimal portfolio under a set of restrictive assumptions: identical Sharpe Ratios and identical pairwise correlations. Thus, when the prospective risk and return parameters are known, classic Markowitz mean-variance optimization will, in general, outperform risk parity on a risk-adjusted basis – a point that is missed or underappreciated in typical risk parity communications. However, in practice, risk and return parameters are not known. They must be estimated, and they are estimated with error. Unfortunately, it's very difficult to estimate expected returns with any precision. Thus, using a mean-variance portfolio optimizer with "noisy" expected return inputs can lead to the classic "garbage in, garbage out" problem. In contrast to expected returns, public market volatilities generally can be estimated with more precision. As a result, people began to think of ways to form "reasonable" portfolios that relied on volatilities, not on explicit expected return assumptions. Risk parity does just that since it requires no expected return estimates. Additionally, although theory does not necessarily predict this, people felt comfortable believing that assets offer similar Sharpe Ratios over the long term (see Figure 2).

This belief about long-run Sharpe Ratios gave people comfort that risk parity portfolios were somehow "quasi optimal" from a strategic asset allocation perspective. Naturally, people thought, "Why would I want more risk in one asset over another if all assets offer the same return per unit risk?" Note, however, as mentioned

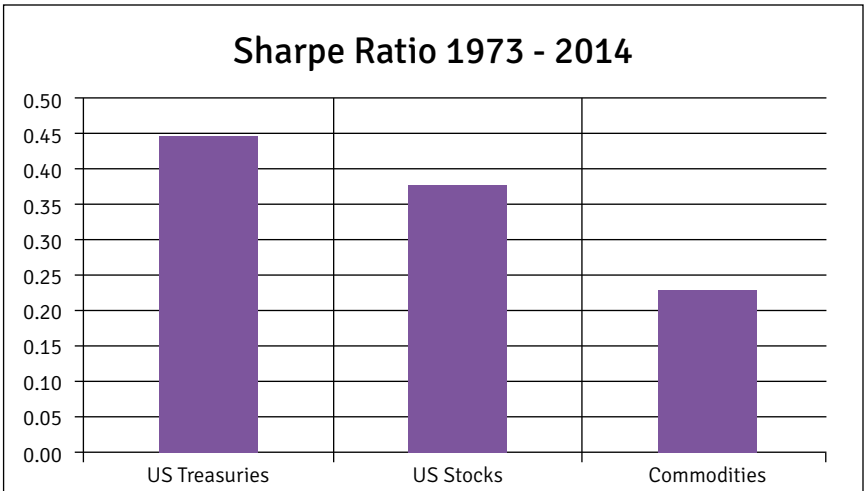
8 This is just standard Markowitz mean-variance portfolio theory when a risk free asset exists.

9 The identical pairwise correlation assumption is necessary only when there are more than two assets. In the special case of two assets, there is only one correlation.

10 Mean-variance optimization is an analytical technique that solves for the portfolio weights that minimize portfolio volatility (risk) for a given target portfolio expected return. Expected return, correlation, and volatility estimates are key inputs to the mean-variance optimization problem.

before, risk parity portfolios are not theoretically optimal unless correlations are identical too (diversification matters!). In sum, although theoretically inferior to mean-variance optimization, once estimation error/implementation risk is taken into consideration, risk parity is a reasonable "starting point" for an investor's public market, strategic asset allocation. To the extent that an investor is confident in his or her expected return assumptions, the mean-variance framework still offers a superior way to incorporate that information into a model portfolio.

Figure 2



The Sharpe Ratio bar chart uses the following three indices: Barclays US Treasury Index (US Treasuries), S&P 500® (US Stocks), and S&P GSCI® (Commodities). 1973 is the first available year for the Barclays US Treasury Index.

KEY RISK PARITY CONCEPTS, SUCH AS RISK BALANCING AND LEVERAGE, ARE NOT NEW – IT'S JUST 1950s FINANCE

I still remember the first time I sat through a risk parity pitch with a well-known asset management firm. Although the presentation had an innovative tone when discussing concepts such as risk balancing, leverage, return per unit risk, etc., I remember feeling like I was sitting in week two of Eugene Fama's first year Theory of Financial Decisions class.[11] When the presentation was over, I asked, "Isn't this just repackaged 1950s finance?"

Risk parity approaches might lead to a different portfolio relative to the standard 60/40 stock/bond portfolio, but the underlying concepts are far from new. Classic 1950s mean-variance portfolio theory entails (1) identifying the highest Sharpe Ratio portfolio (also known as the "tangency portfolio") and (2) using leverage (or T-bills) to hit a target return or risk level. The highest Sharpe Ratio portfolio is identified using a form of risk balancing in order to achieve the lowest possible volatility for a given level of expected excess return. In fact, by definition, the highest Sharpe Ratio portfolio has implemented risk balancing optimally. The highest Sharpe Ratio portfolio might produce different weights than risk parity, but, as discussed before, that is because the highest Sharpe Ratio portfolio will also take into consideration explicit expected return assumptions.

A natural question arises: if risk parity concepts are not new, how did we end up with the 60/40 stock/bond portfolio – a portfolio with approximately 90% of its risk in stocks? The answer is that many investors are unwilling to use leverage. Thus, if an investor has a high target expected return (e.g. 8%), risk balancing is sacrificed by having concentrated positions in higher returning asset classes (e.g. equities). Under the constraint of no leverage, the high target expected return could not be achieved without sacrificing risk balance.

Risk parity approaches might lead to a different portfolio relative to the standard 60/40 stock/bond portfolio, but the underlying concepts are far from new.

11 Eugene Fama is a Finance Professor at the University of Chicago.

DO NOT CRITICIZE A STRATEGIC ASSET ALLOCATION SOLUTION FOR "TACTICAL" REASONS

Risk parity portfolios tend to have large dollar allocations to low risk assets, such as fixed income. Given the current historically low interest rate environment, this property of typical risk parity portfolios has been criticized heavily by many in the investment community. In my opinion, this critique of risk parity is misguided. As discussed before, risk parity is a strategic asset allocation solution that is "quasi optimal" when Sharpe Ratios are identical across assets. If one believes interest rates are going to unexpectedly rise, then the Sharpe Ratio for bonds is going to be negative or low relative to other asset classes. With this tactical view, one would hold fewer bonds than the strategic asset allocation implied by the risk parity portfolio. This in no way disproves risk parity. Again, think of risk parity as a "starting point" for one's strategic asset allocation. If one has a tactical view (i.e. current risk/return view is different than the equal Sharpe Ratio assumption implicit in the strategic asset allocation), then adjust the risk parity portfolio weights accordingly. This applies to any strategic asset allocation approach, whether it is risk parity, constrained mean-variance optimization, or some other alternative.

CONCLUSION

Risk parity approaches to asset allocation have become a component of most practitioners' investment toolboxes. However, the theoretical and practical uses as well as the advantages and disadvantages of risk parity relative to alternative approaches are commonly misunderstood. This short piece has tried to provide additional clarity on some of the more important risk parity topics.

Risk parity portfolios tend to have large allocations to fixed income. Given the current low interest rate environment, this property of risk parity portfolios has been criticized heavily. In my opinion, this critique of risk parity is misguided.

ABOUT THE AUTHOR

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EVANSTON CAPITAL MANAGEMENT

Founded in 2002, Evanston Capital Management, LLC (ECM) is an alternative investment firm with approximately $4.9 billion in assets under management. ECM has extensive experience in hedge fund selection, portfolio construction, operations and risk management. The principals collectively have more than 75 years of hedge fund investing experience, and the firm has had no turnover in senior or mid-level investment professionals since inception. ECM strives to produce superior risk-adjusted returns by constructing relatively concentrated portfolios of carefully selected and monitored hedge fund investments.

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