Overview

A risk-parity portfolio will beat actively or passively managed portfolios more than 50% of the time, according to this research. The authors explain how a risk-parity asset allocation strategy—which ignores expected returns and correlations—actually works, and under what conditions. They present their theoretical framework, explain their reasoning and provide empirical support using the returns of stocks and bonds.

Practical Applications

• **It outperforms.** A risk-parity portfolio will outperform an equally weighted portfolio, a passive market portfolio or any other market portfolio more than 50% of the time.

• **It requires leverage.** Risk parity works only if the institutional investor can leverage up to improve overall portfolio returns.

• **It is easier to structure.** A risk-parity strategy requires less data and less-sophisticated modeling than other portfolio construction methods.

Risk parity is a popular portfolio allocation strategy that weighs assets inversely proportionally to their risk. But the reason it works was a bit of a mystery before this paper, says Philip Maymin, Associate Professor of Finance and Analytics at the University of Bridgeport’s Ernest C. Trefz School of Business. “Risk parity works. Many funds offer it, and many portfolio managers are talking about it. But no one really understands why it works!”

Typically, investment information about asset selection includes the manager’s view on expected returns, risk and correlation. But risk parity completely ignores both expected returns and correlations. “You only use the asset volatilities,” Maymin points out. Instead of an equal-dollar weighting that allocates to assets based on their size, or an equal weighting that allocates 1-over-\(n\) to each of \(n\) assets, risk parity allocates to assets based on their risk levels, he explains. If one asset (fixed income) is less risky, more of the portfolio is allocated to it; if another asset (equity) is more risky, less of the portfolio is allocated to it. But why does this risk parity approach work?
That's the question that Maymin and his co-authors seek to answer in this research. His co-authors are Gregg Fisher, Chief Investment Officer of Gerstein Fisher, and Zakhar G. Maymin, formerly head of research at Gerstein Fisher’s research center and member of its investment strategy group. Zakhar is Philip’s father, and all three co-authors are longtime collaborators. Their article, Risk Parity Optimality, is in The Journal of Portfolio Management’s Winter 2015 issue.

IT DOES OUTPERFORM

The authors lay out their mathematical validation for the risk-parity approach by formulating the exact conditions of the uncertainties of asset volatilities and how they can perform under different conditions.

“It was my father’s (Zakhar’s) insight that’s at the heart of the paper. He proved mathematically that risk parity is the best possible portfolio allocation method,” Maymin says. In effect, their research shows that there is a more than 50% probability that risk-parity portfolios will outperform other portfolios under specific conditions.

Two different market portfolios (technically, tangency portfolios) exist, Maymin says. The tangency portfolio provides the optimal combination of risk-free and risky assets, in order to maximize returns for each level of risk, under the Capital Asset Pricing Model (CAPM). The first type is the ex ante or “prior” tangency portfolio, which is based on estimations of expected returns going forward, Maymin says. The second is the ex post or “after” tangency portfolio, which is based on actual returns—if one only knew them ahead of time. But since no one can know the future, the difference between the ex ante and the ex post portfolio is actually very large, he notes.

The key insight of this research is to show that whereas the risk-parity portfolio will never equal the ex post tangency portfolio—which is, by definition, the best—more than 50% of the time it will outperform the ex ante tangency portfolio, the equally weighted portfolio, the equal-dollar portfolio and any other portfolio, says Maymin.

As part of their analysis, the authors integrate aspects of game theory. They show that the risk-parity portfolio does better under worse conditions than any other strategy.

SUCCESS REQUIRES LEVERAGE

Allocating the assets by risk level also isn’t the whole story, Maymin adds. By its nature, the risk-parity portfolio tends to be more invested in bonds and less in stocks. “It’s very low risk, but also very low return,” he says. So the investor needs to leverage up in order to make money.

For instance, Maymin says, “You may get 3% return per year (without leverage) in a risk-parity portfolio. But if you leverage it up five times, then you make 15% per year. “You have to leverage up risk parity to make it work.” The approach is useful only for investors who can leverage, so as to make the strategy viable for the long term, he adds.
IT’S EASIER

Forming risk-parity portfolios does not require as much data and as many sophisticated tools as forming other portfolios, such as the tangency portfolio embraced by standard portfolio theory, say the authors.

Maymin notes that their research also settles the broader question of whether risk parity is just a clever heuristic approach as opposed to the traditional financial-optimization-based approach to portfolio management. Typically, researchers have tended to contrast heuristic approaches as “intelligent guesswork” in contrast to the complex algorithms of structured approaches.

This research shows that risk parity is a “fast and frugal” heuristic approach—one that does not need a lot of data—that tends to outperform both the more complex mean-variance approaches or the more simple equally-weighted approaches, Maymin says.

The authors do recognize in their research that risk parity does not always outperform. But by outlining the theoretical conditions under which the risk parity portfolio can outperform, fund managers can better understand how and why it works, Maymin says, and they can apply it accordingly. Depending on their views on the underlying conditions, portfolio managers can decide when to tilt toward or away from risk parity, he notes. The full theoretical conditions are detailed in their JPM article.

Their research results have garnered positive reaction from investment managers, he adds. “If you’re already doing risk parity, this gives you more comfort about why it works. If you were wondering how exactly it works, this gives you a way to better understand it.”

Maymin has worked with his father Zakhar “since I was born,” he laughs, including on a hedge fund. They have co-authored several papers, including an earlier one on risk parity, Maimonides Risk Parity. The results from the current research have been particularly interesting to co-author Fisher, a colleague and friend of the Maymins for many years. Fisher has been continually exploring ways to extend institutional-level investment management strategies to the firm’s retail clients, Maymin says.

Currently, Philip’s research areas include behavioral finance, derivatives, sports analytics and algorithmic finance. When not working, he enjoys spending time with his children. Zakhar currently concentrates on developing foreign exchange and futures trading strategies, and he is working on estimating future performance of a trading strategy based on its complexity. He is also doing some writing and is developing training software for chess players.

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—Philip Maymin

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Zak is a member of the investment strategy group at Gerstein Fisher and was formerly head of research at the firm’s research center. His background includes both academic and practitioner experience. He has worked at several companies, including Susquehanna, Sakura and Gerstein Fisher, developing risk systems, algorithmic trading and pricing derivatives. He has also been a hedge fund portfolio manager at Ellington and later founded, with his son Philip, their own hedge fund.

Zak was a professor of mathematics and statistics at Northeastern University and an adjunct professor of finance and risk engineering at NYU. He holds a PhD in mathematics/statistics from MIT. He is the author of more than a dozen academic papers in probability and statistics as well as finance, including applications of portfolio management, risk parity, optimal strategy construction and risk management. He is also the author of Publicani and Truth: Ethics for Your Child and was a New York State chess co-champion.
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