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Risk Management: A Rigorous Art

A Comparison of Dynamic Risk Capital Allocation and Risk Parity

While risk management has always been a part of investing, the modern use of risk and return was conceptualized and formalized 60 years ago by Harry Markowitz. This theoretical breakthrough paved the way for the development of modern portfolio theory and a significant increase in the use of quantitative risk management methods in finance.

However, these same methods can offer a false sense of confidence and ultimately prove to be dangerous if used inappropriately. They can lead to misallocations of capital when the parameters are estimated using backward-looking data that are assumed to be stable. Unfortunately, change is one the few constants in finance. Therefore, understanding how investment opportunities and risks change through time and across different economic cycles is critical to implementing a successful investment strategy.

In this paper we will first review how the Dynamic Allocation Strategies Team's risk capital allocation process seeks to dynamically manage risk through time with a forward-looking lens. We will then contrast this approach with one that has gained favor during the past several years—risk parity.

Qualitative Risk Management: Approximately Right Is Better Than Precisely Wrong

History does not repeat itself but it does rhyme. A working knowledge and understanding of financial history is critical; however, one cannot mechanically extrapolate the future from past trends. To adequately understand and anticipate market movements, investors need to apply qualitative and subjective judgment. Investors therefore should abandon the ultimately futile quest for mathematical exactness and embrace a reliance on approximations and projections regarding variables about which investors often have little reliable quantitative information—the degree of risk aversion held at any one time by market participants, the presence of leverage across various segments of the economy, aggregate and stratified market sentiment, central bank monetary policy, the current state of regulatory environment, etc. Even after the fact, the impact of these variables on asset volatilities cannot be precisely quantified. Yet an educated guess regarding the impact of

these variables helps more in understanding the future risk of a portfolio than does computing past volatilities. Humility is critical in this exercise—applying qualitative judgment does not mean that we will be able to foresee and analyze all the variables that will affect the markets. We will, like every other investor, be undoubtedly affected by "unknown unknowns." However, this qualitative aspect of our investment process, which consists of examining issues we believe are important even when little quantifiable information exists, helps us to be more versatile in our analysis and to identify, understand, and incorporate these unknown unknowns faster. The development of empirical-data-driven research has been extremely beneficial to our understanding of financial markets, and we use this academic literature extensively in forming our forward-looking views. However, no matter how precise investors can be about understanding the past, they cannot extrapolate these historical trends to understand the future. In estimating the risk of our investments, we would rather be approximately right than precisely wrong and, therefore, take a qualitative approach to risk management.

Risk Is Not Volatility

The use of industry-standard quantitative models creates risk in and of itself. Indeed, the same data-driven risk models encourage all their users—insurance companies, investment banks, and portfolio managers—to increase their exposures in sync in times of low volatility and reduce these same exposures in times of high volatility. Revisiting the 2005-2006 period when volatilities were low, investors looking to fulfill their fixed risk budget were forced to increase exposure to assets that had little historical volatility or look to lower-quality instruments. This led many fixed-income managers, for example, to buy high-yield debt, CDOs, or non-agency MBSs, which, based on historical price volatilities, appeared very safe and at the time offered a marginally higher yield. Then in 2008, as markets dislocated, volatility spiked, and spreads widened, the reward for holding such credit-sensitive investments improved markedly, yet under a fixed risk budget, many investors were forced to offload such securities at heavily discounted prices since their volatilities had increased dramatically. The equity sell-off of 2008 can also be analyzed with the same lens. When volatility was low (2005-2007), equities generally did not offer attractive valuations and, therefore, had less potential for appreciation. In 2009, as volatilities increased and prices declined, many investors had to reduce their exposures precisely when the market offered highly attractive valuations. For an investor with an investment horizon that extends beyond the current market cycle, the risk associated with U.S. equities, for example, was actually greater in 2006 when historical volatilities were low than in 2009. Large investment opportunities tend to develop in times of market dislocation and high volatility, and the most dangerous investment risks usually build during times of low market volatility. One might think of this like an avalanche—risk is actually at its lowest level *after* the avalanche has occurred. During the period leading up to the event, risk (snow, in this example) had been slowly building up, in a way that did not appear to be threatening—on the surface things appeared calm, as markets often do when historical volatilities are low. Likewise, assessing risk based purely on historical volatility leads investors to take risk when volatilities are low, often results in a pro-cyclical performance profile, and is highly sensitive to tail risk.

Allocating Risk Across Time

To avoid this pro-cyclical risk allocation, we believe in sizing our exposures as a function of investment opportunities rather than historical volatilities. This leads us to alter the level of overall portfolio risk through time. In doing this, we simply acknowledge that *risk is rewarded over time but is not rewarded all the time*. During periods exhibiting scarce opportunities, we will take less risk not only because of the paucity of opportunities, but also so that we are able to appropriately ramp up our level of active risk when opportunities arise. Therefore, we allocate risk not only across and within asset classes, but also dynamically across time. While portfolio risk can vary in the short run, we still endeavor to realize an appropriate risk level over a full market cycle. To arrive at this average level of portfolio risk , we simulate potential risks' paths over very long periods, which is necessary to appropriately calibrate our exposures in times of both high and low volatility.

Quantifying Qualitative Inputs

The use of simulations may appear at odds with our skepticism of data-driven risk management. It is important to note that while our approach to risk management is qualitative, we do not reject out-of-hand the use of quantitative techniques. To wit, we have developed two proprietary risk models that use a cutting-edge multi-layer

modeling structure[1]. However, the inputs of these models are qualitative and are set after intensive discussions by the investment team. The inputs are then revisited on a regular basis—typically no less often than annually. The process by which the team establishes and reviews these global inputs forces the team to quantify its qualitative views, which instills rigor and discipline into the process. We strongly believe that risk management is an art and not a science; however, it is an art that, properly executed, requires embracing theoretical rigor and discipline.

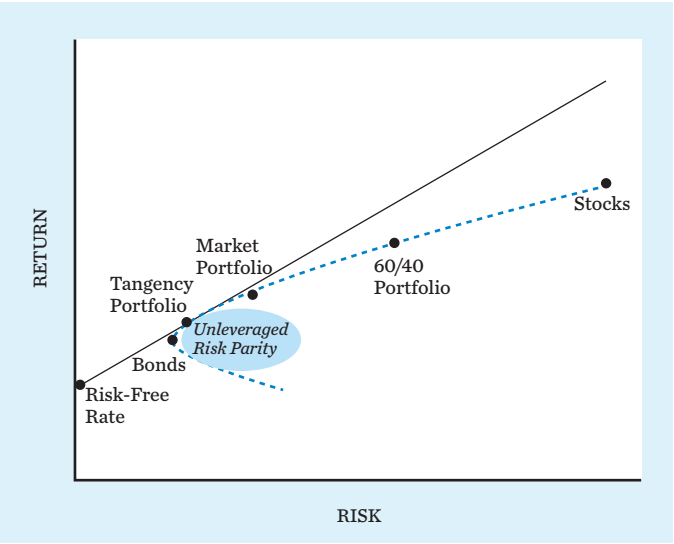
Risk Parity: the Good, the Bad, and the Ugly

Because of the recent commercial success of risk parity strategies, we are often asked to compare our risk management approach to that of risk parity. The difficulty in comparing and contrasting our approach with risk parity resides, in part, in the fact that there are multiple definitions of risk parity. Therefore, we will dissect the various principles of risk parity strategies and review how each these of these principles compares with our approach to risk management as previously outlined.

The Good: Moving Away From 60/40

Proponents of risk parity often start with a simple and valid point: the risks in traditional 60/40 portfolios are dominated by one asset class—equities—and one can achieve a better risk/return trade-off by moving closer to the market portfolio—investing more in bonds and less in equities (see figure 1).[2] The market portfolio contains more bonds than equities; therefore, reducing the weight of equities and increasing that of bonds naturally results in a more efficient portfolio. By looking beyond equities, we can expand on the Black, Jensen and Scholes[3] observation that the *empirical* security market line (SML) is flatter than the CAPM-based *theoretical* SML. This result implies that the portfolio with the highest Sharpe ratio (or tangency portfolio) has less beta (i.e., less equity and more bonds) than does the market portfolio (or the traditional 60/40 portfolio). As we illustrate in figure 1, a portfolio with more bonds and fewer equities than the market portfolio should offer a better risk/return trade-off than the market portfolio.

Figure 1



Source: William Blair & Company

The issue with these low-risk portfolios, however, is that even if they offer better risk-adjusted returns, they also offer *lower* returns. As investors know, actual returns, not risk-adjusted returns, will pay for future liabilities. In other words, no matter how efficient from a risk management standpoint the strategy is, future retirees should expect lower standards of living if less risk is taken today. It has always been difficult to "eat" risk-adjusted returns.

The Bad: Leverage

Risk parity proponents argue that the solution to this conundrum is simple: leverage. To achieve an equity-like return with a risk parity portfolio, an investor needs to leverage the portfolio 2 to 3 times. One issue with leverage is that traditional measures of risk, such as standard deviation, typically fail to adequately capture the risks associated with leverage. Note that we are not inherently opposed to leverage, per se. In fact, we have the ability to tactically use leverage in our portfolios at times when we ascertain that the risks associated with leverage are appropriately compensated. However, we do not systematically use leverage to magnify simple (and often small) market risk premia. Leverage encompasses explicit costs (financing rarely comes free), which are often not properly accounted for in risk parity studies, as demonstrated by Anderson, Cooper and Goldberg[4].

1 Staub "Multilayer Modeling of a Market Covariance Matrix" *Journal of Portfolio Management* Spring 2006

2 This observation is a direct result from the CAPM model, which states that the most efficient portfolio is the market portfolio, which is a capitalization weighted portfolio of all the assets available across all the capital markets.

3 Black, Fischer, Michael C. Jensen, and Myron S. Scholes. (1972). "The Capital Asset Pricing Model: Some Empirical Tests." http://papers.ssrn.com/sol3/papers.cfm?abstract_id=908569

4 Robert M. Anderson, Stephen W. Bianchi, CFA, and Lisa R. Goldberg (2012) "Will My Risk Parity Strategy Outperform?" Financial Analysts Journal, November/December 2012, Vol. 68, No. 6:75-93.

These costs will reduce the leveraged portfolio's returns and, therefore, its risk-adjusted returns will be lower than the unleveraged portfolio. Moreover, the use of leverage increases tail risks. Again, such risks are not sufficiently captured by the traditional measures of risk used in most risk parity studies. Lastly, risk parity strategies leverage an asset class (bonds) with a concave payoff structure. Indeed, by definition bonds offer a small coupon (flow) that typically brings with it a high level of probability, and a large potential loss (principal), which has a low level of probability. This is the definition of tail risk.

Most studies on risk parity focus on the U.S. market, which is the most diverse capital market and where the largest bond issuer (and implicit or explicit guarantor of many securities), the U.S. government, has never experienced any significant credit issues. Therefore, tail risk assessment based on historical data naturally shows a limited tail risk for the U.S. bond market. As mentioned earlier, extrapolation of the future based on historical trends never leads to safe assumptions. We believe that the use of historical volatility to compute a Sharpe ratio fails to capture the tail risk associated with leveraged fixed income portfolios (this may also explain why bonds offer higher Sharpe ratios in the first place).

The observation of significant asset flows into leveraged risk parity strategies is not reassuring. Such a phenomenon can lead to a sharp deleveraging episode triggered by investors who do not properly understand the risks associated with their investment and want to exit the strategy. The lesson of the quant crash of 2007 or of the deleveraging that took place in credit markets in 2008-2009 is that the asset flows into similar strategies combined with leverage can lead to deleveraging episodes that are rapid and vicious. None of these risks are properly accounted for in a Sharpe ratio, which is, by definition, based on historical standard deviations. This is why our qualitative approach to risk management leads us to be skeptical about the sterling historical risk-adjusted returns often cited by risk parity proponents in historical back tests.

The Ugly: Parity

The ugly part of risk parity resides in the timing of the concept. Not surprisingly, the success of risk parity's asset growth came on the heels of a lost decade for equities and a period of strong performance for bonds. This means that investors are buying into bonds offering small yields financed by even lower cash rates ("buying high" is an investment strategy that often presents a hurdle for long-term success). While in the current environment central bank policy is driving a very small financing cost for leveraged positions, it seems hazardous to construct a policy portfolio based on the current state of affairs. *"Lower for longer" does not mean "lower forever."*

Until this point we have not discussed the parity aspect of risk parity, per se, instead choosing to focus on leveraging a portfolio with a larger allocation to bonds. A central argument of risk parity is that one should take the same amount of risk in each segment of the portfolio. Therefore, the correct test of risk parity is to compare the performance of a portfolio rebalanced to maintain the same amount of risk in each asset class to that of a simple stock/bond portfolio with an equivalent fixed allocation. This corresponds to a 25% equity/75% bond allocation if we assume volatilities of 15% for equities and 5% for bonds. The result of this test is straightforward and can be inferred from the detailed and thorough empirical research published by proponents of risk parity—the simple (fixed) stock/bond portfolio outperforms the risk parity portfolio. It is the larger allocation to bonds that leads to higher risk-adjusted returns. Hence, the risk parity rebalancing process itself, based on historical volatilities, adds nothing in terms of actual or risk-adjusted returns. In addition, by allocating capital only as a function of risk, risk parity investors lose sight of critical concepts that are central to our investment process—expected returns and risk premia. These concepts simply should not be ignored by investors when determining the most appropriate allocation of capital. Possessing an informed forward-looking view of risk, which incorporates these concepts, provides the foundation from which investors can properly build a diverse portfolio.

While some proponents of risk parity view it as an active strategy (see: Asness[5]), others argue that risk parity is a better way to build a passive portfolio. They argue that if one knows absolutely nothing, including the risk premium, then the best approach to building a passive policy portfolio is to equalize the risk contribution from each asset class. Our approach to investing differs markedly from this somewhat naïve philosophy. If we know nothing about an asset class, not even its risk premium, we avoid it. We take risks only if by doing so we expect to be rewarded with positive returns. If we have no view on an asset, we seek to fully hedge the risk associated with this variable. Therefore, in our view the only rational investment decision, if an investor knows nothing about the risk, is to invest 100% of the portfolio in cash—the lowest-risk asset. This low-risk

5 Clifford S. Asness "My Top 10 Peeves?" Financial Analysts Journal, January/February 2014, Vol. 70, No. 1: 22–30

approach presents quite the hurdle for attractive long-term real performance.

Lastly, the risk parity allocations are dependent on the somewhat arbitrary definition of an asset class, rather than on the economic characteristics of the asset class. Let us illustrate this point with a simple risk-parity-framed allocation between two asset classes:

- Stocks (MSCI ACWI)
- Bonds (Barclays Global Aggregate)

Based on historical volatilities[6] of 15.3% for stocks and 5.4% for bonds, a risk parity portfolio would invest 26% in stocks and 74% in bonds. Now, let's use exactly the same investment universe, but add one degree of freedom by considering an emerging equity allocation separately from developed equities:

- MSCI World (historical volatility = 14.6%)
- MSCI Emerging Markets (historical volatility = 22.1%)
- Barclays Global Aggregate (historical volatility = 5.4%)

Suddenly the risk-parity-oriented allocation to bonds drops from 74% to 62%, ostensibly only because a more granular definition of asset classes was used. In this respect, risk parity takes an almost collectivist approach to the allocation of resources: *distribute risk equally among all asset classes regardless of their merits.* In contrast, our approach to risk management, based on the intrinsic characteristics of asset classes as well as accounting for risk and risk premia, will result in exactly the same allocations regardless of how asset classes are defined. To be fair, some proponents of risk parity have recognized this issue. For example, Asness, Frazzini and Pedersen[7] state that "we should not take too seriously the precise prescription to have equal risk in stocks and bonds."

Conclusion

Our dynamic approach to risk capital allocation differs markedly from risk parity because our approach to risk incorporates qualitative aspects, relying on the subjective judgments of seasoned investment professionals rather than existing as solely quantitative and backward-looking. While our qualitatively oriented approach may, on the surface, appear to lack the preciseness of an approach to assessing risk that is based purely on historical data, it is nonetheless an approach that is multidimensional, steeped in theoretical and empirical rigor, resolutely forward-looking, and focused on future risks rather than past volatilities. We certainly do not seek to minimize risk, per se, but rather to minimize uncompensated risk. If we have no view on an asset, we will either avoid the asset altogether or at least seek to fully hedge the risk(s) associated with the asset.

We scale our risk as a function of current and future investment opportunities as opposed to past volatilities. We take risk only when we can identify attractive investment opportunities that are grounded in fundamental value and do so based on a forward-looking assessment of risk. This approach finds its roots in the time-tested precepts of Benjamin Graham and is supported by solid academic research such as Shiller (1981), who showed that financial markets create opportunities for investors who invest with a longer horizon based on an asset's fundamental value. We embrace the notion that risk management is more an art than it is science. We also recognize that successful investors must "construct" this art within a rigorous framework that offers the best opportunity for documented and repeatable success.

6 Historical volatilities are computed using monthly returns from January 1990 to January 2014

7 Clifford S. Asness, Andrea Frazzini, and Lasse H. Pedersen "Leverage Aversion and Risk Parity" Financial Analysts Journal, January/February 2012, Vol. 68, No. 1:47-59.

Important Disclosure

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