



Invesco Balanced-Risk Allocation Strategy

Overcoming Objections to Risk Parity

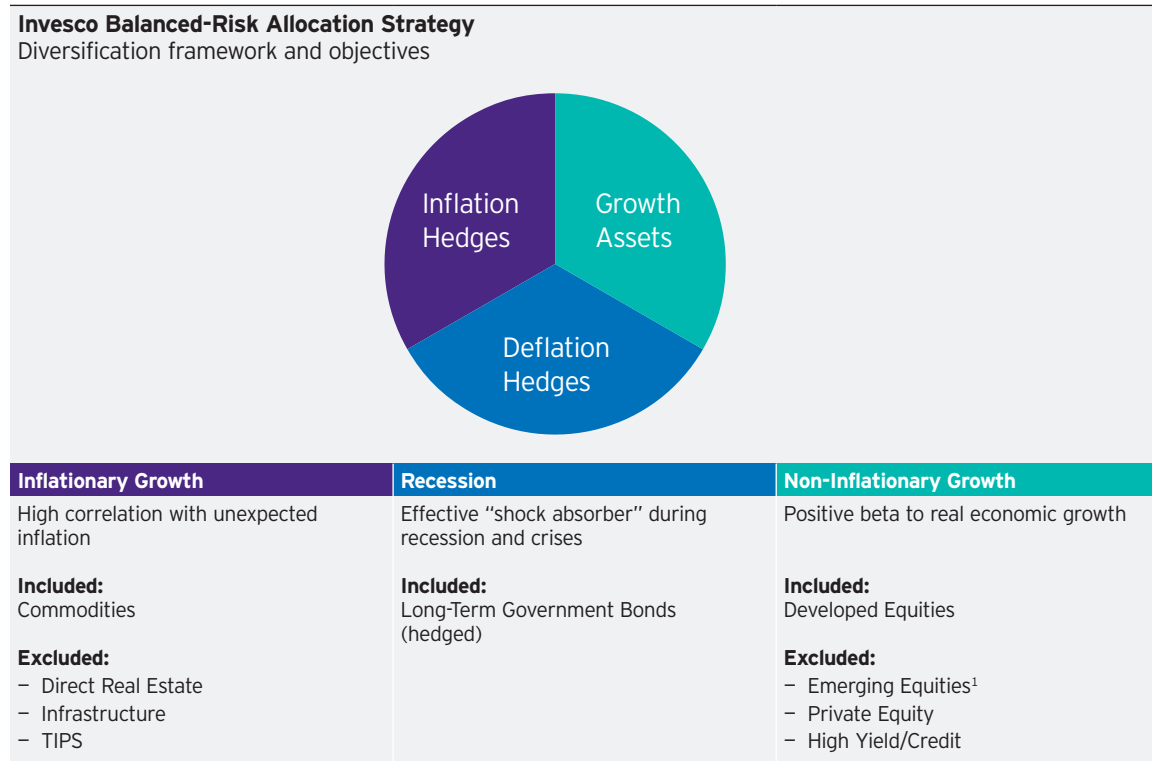
Over the last several years, risk parity has gained prominence as a general asset allocation approach as well as a specific strategy. Rising adoption rates of the approach have invited scrutiny from both practitioners and academics. We agree with some of the challenges identified by critics and have addressed them over time through our research agenda. Others, however, either do not apply to our version of risk parity or, at least to our knowledge, the approach in general.

Asset selection

Many of the critiques of risk parity include a representation of the strategy. These proxy portfolios almost always seem to miss important characteristics of risk parity. The most common misconception concerns the overuse of bonds. A number of papers construct risk parity with US equities, US Treasury bonds, credit (either investment grade bonds, high yield, or both), and TIPS. Unsurprisingly, this creates significant interest rate risk and lacks sufficient defense against inflation, especially before the introduction of TIPS in 1997.

In contrast, we think first about economic outcomes and which assets can best defend or take advantage of each (see exhibit). We next consider the liquidity, diversification benefit, and evidence of a risk premium for each asset. This results in a portfolio that has the opportunity to prove resilient in challenging environments, ample liquidity, and diversification.

When we consider the proxy portfolio described earlier in the context of the exhibit below, we can see that there is little parity among the economic environments. Stocks fall into the non-inflationary growth category as does the spread portion of high yield or investment grade bonds. Treasuries and related portion of credit products cover recession, and inflationary growth is only covered by TIPS since 1997. Reviews of how such a portfolio might have performed in the late 1970s and 1980s are therefore misleading.



Source: Invesco analysis. Asset allocation/diversification does not guarantee a profit or eliminate the risk of loss.

For illustrative purposes only.

1. Allowed per prospectus but currently excluded from the portfolio.

Number of assets equals better diversification

A question we hear occasionally relates to how many assets it takes to create a diversified portfolio within an asset class. In asset classes like equities, where correlations across markets are quite high, it takes quite a few.

In the example below, each line represents how the expected Sharpe ratio progresses by adding an incremental asset. The different lines represent different assumed correlations. Since we assume an identical return and risk for each asset, the only way to improve the expected Sharpe ratio is through falling levels of portfolio risk, i.e., through better diversification. After just a few assets, the improvement in Sharpe ratio levels off (the line flattens to the right of the square in each line).

One caveat for this is that we assume that each asset is a stock market rather than an individual stock. In the case of individual securities, more assets are required to create a properly diversified portfolio.

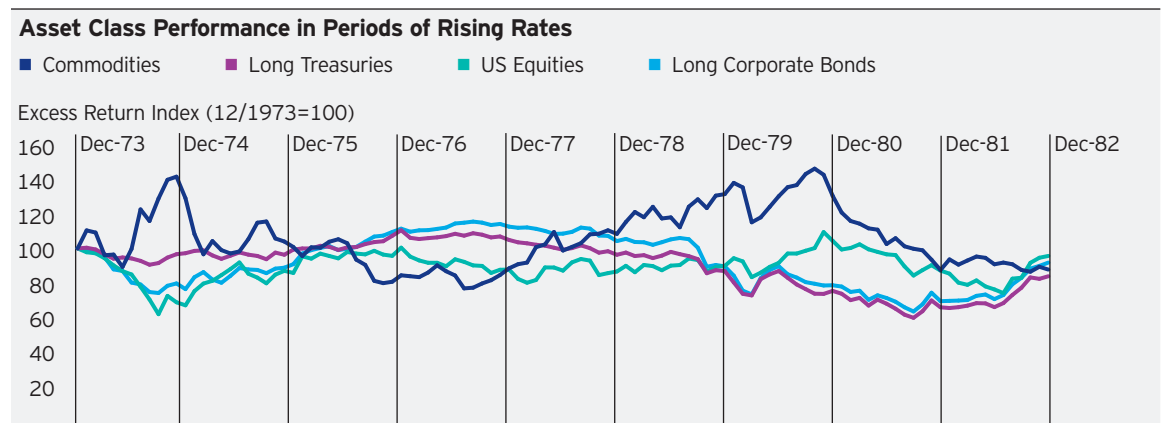


Source: Invesco Analysis. The analysis assumes an equal weight applied to each asset. Every asset is assumed to have a volatility of 15%, an expected Sharpe ratio of 0.3, and an equal correlation to every other asset. This makes the example most relevant for multiple assets within a single asset class.

Performance in rising rate environments

A common criticism of risk parity strategies is that they are doomed to fail under a regime of rising interest rates, and that the only reason the strategies look good in simulations is due to the favorable returns of both stocks and bonds from 1980-2010 as interest rates and inflation generally fell. As mentioned above, if one excludes commodities the performance in a rising interest environment can be severely impaired, especially if one models a higher use of credit and TIPS that can exhibit higher interest rate sensitivity.

As shown below, commodities (in blue) rise in accordance with unexpected inflation in the early and late 1970s while stocks and bonds generally struggled.

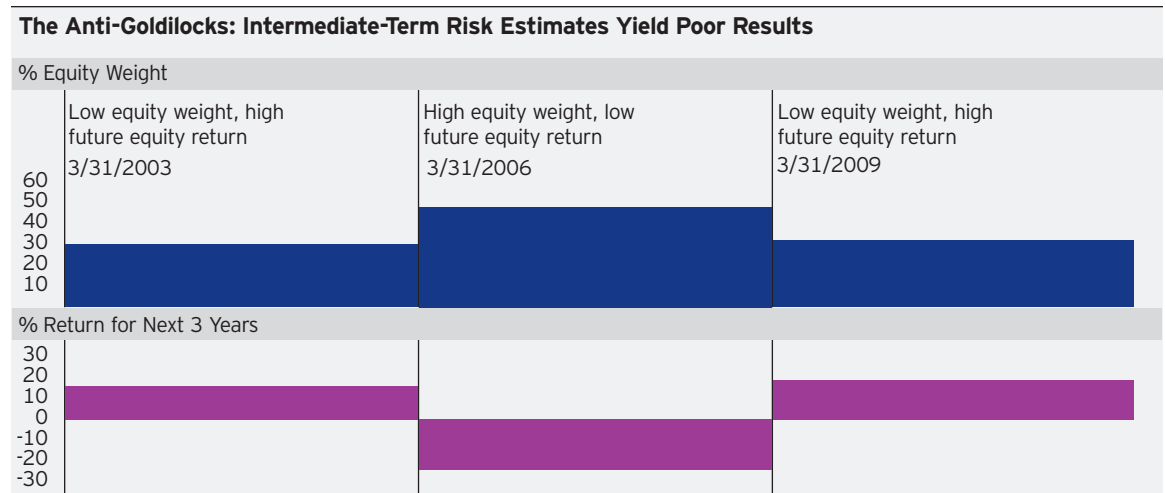


Sources: DataStream, Invesco analysis. Commodities represented by Bloomberg Commodity Index, Long Treasuries represented by Barclays Capital Long Treasury Index, US Equities represented by S&P 500 Index, Long Corporate Bonds represented by Barclays Capital BAA Long Corporate Index, Cash represented by 3-month Treasury Bills. Past performance cannot guarantee future results. An investment cannot be made in an index.

Estimates of volatility and correlation

Another flaw we find with the methodology used to model volatility across risk parity critiques is the use of short volatility capture periods. We have seen the use of three year windows that are too short a period to reflect a full economic cycle and not responsive enough to near-term changes. An example of the counter-intuitive results of such an approach is shown below.

Using only US stocks and 10-year Treasury bonds, one would have allocated approximately 30% of the portfolio to stocks at the end of March, 2003 (top graph to the left). Over the next three years (bottom graph to the left), stocks would have outperformed bonds by over 15% annualized. At that point, rising stock prices helped to reduce the measured volatility of stocks to a degree that they would receive a 50% weight as of March, 2006. This higher weight occurs just in time for a three-year period where stocks underperform bonds by nearly 25% annually. In March, 2009, the high recent volatility of stocks means that their weight falls back to 30%. The next three years witnessed approximately 20% annualized outperformance by stocks.



Sources: DataStream, Invesco analysis. Weights for each period are set so that an equal amount of risk is contributed by stocks and bonds. Stocks represented by S&P 500 Index, Bonds represented by the benchmark US 10-year Treasury. 3-year risk estimation period.

Volatility as the lone measure of risk

Risk parity critiques use historical volatility as the sole risk measure to assess and balance risk across the set of assets they choose in their simulations of risk parity portfolios. One flaw they highlight is that there is an inverse relationship between price and volatility that leads risk parity to over/under weight exposures at inopportune times.

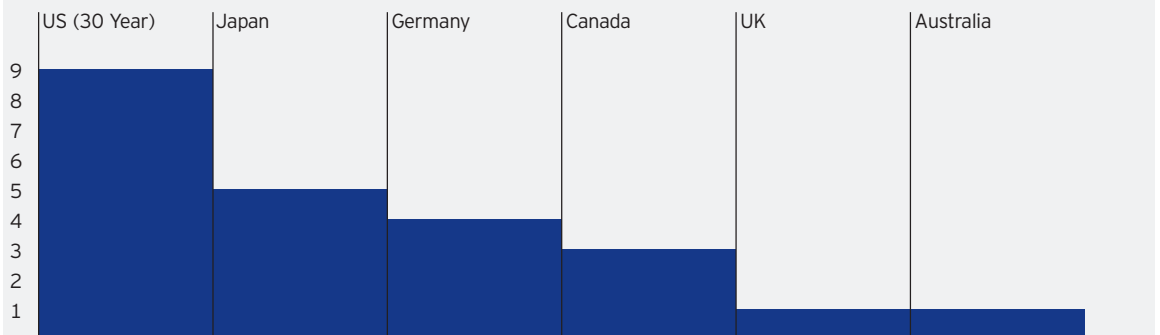
We agree with this assessment under the strict set of conditions used to arrive at this conclusion. Historical volatility is rather blunt as a standalone instrument when used to assess the forward risk of different asset classes. Additional considerations can improve on historic volatility which is why we have focused our research efforts over the past few years on addressing this issue.

- **Bonds:** Modified duration has supplanted volatility as the means to determine our overall weight to bonds. Duration is also used to determine the relative weighting across bond markets (see exhibit for a comparison to historic volatility). We also employ a credit risk assessment to sovereign debt markets in order to gauge the likely safe-haven behavior of the markets we own.
- **Commodities:** The shape or term structure of commodity futures curves is used to determine the exposures and weighting to those exposures we desire before volatility is considered.
- **Equities:** We use historical volatility to determine our weight to equities; however, we also apply a valuation metric to determine the relative weighting across equity markets, which reduces the dependency on historical volatility as an assessment of future risk.

Difference in Bond Volatility

Invesco estimated bond risk relative to historic volatility (6/30/14)

Difference in estimated risk (%)



Sources: Datastream, Invesco analysis. Invesco estimated bond volatility based on modified duration. All markets other than the US reflect 10-year benchmark bonds.

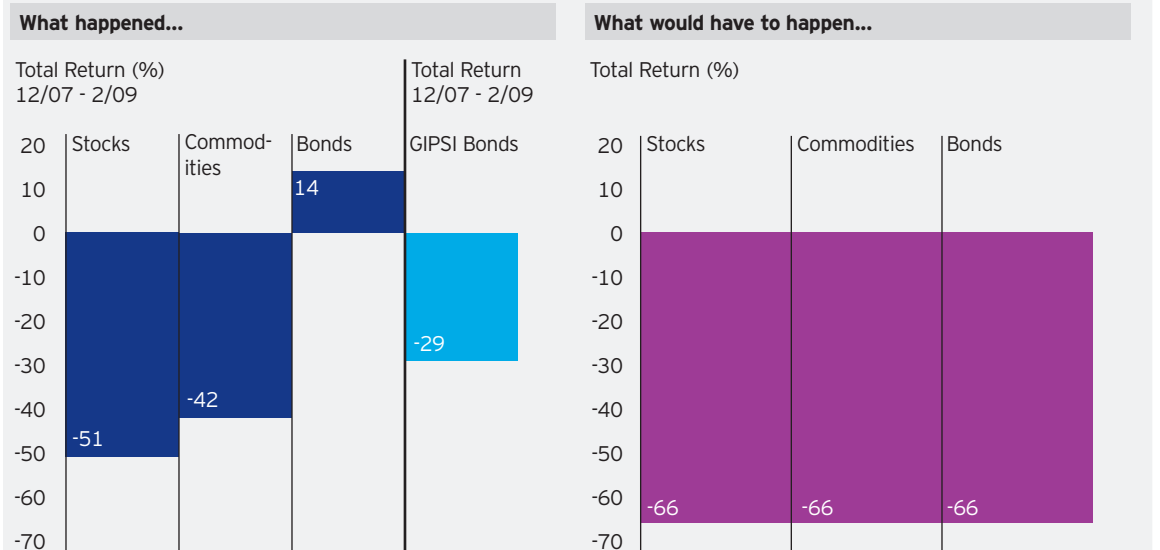
Leverage

Above we discussed the short-comings of the approaches that some commentators have used to approximate a risk parity strategy. One consequence of these approaches is that they tend to exaggerate – certainly relative to what we do – the extent to which the strategy requires leverage and where that leverage comes from. The modest leverage we employ is simply the economic leverage afforded to us through the use of exchange-traded futures, not the financial leverage gained through borrowing.

The risk posed by leverage manifests itself when the levered assets fall and the risk is proportional to the degree of leverage. A portfolio with 5:1 leverage (not uncommon in some of the hypothetical strategies) would be wiped out if its underlying assets fell by 20%. Less dramatically, a highly levered portfolio could find itself forced to sell assets at distressed prices if it no longer met its collateral requirements.

Recall the experience of the global financial crisis. From the end of 2007 through the trough in February, 2009, global stocks fell approximately 50% while commodities fell 40%. Replay that, but make it more severe with stocks falling a third again as much and commodities half again as much for a 67% decline for each. And then, rather than a positive return from developed government bonds during the crisis, have them face twice the decline as the troubled peripheral bond markets (aka, “GIPSIs” and excluded from our portfolio) during the European debt crisis. This is what would have to happen for our current strategic allocation to breach our required collateral levels.

Leverage



Sources: Bloomberg L.P., Datastream, Invesco analysis. Stocks represented by MSCI World Index, Commodities by Bloomberg Commodity Index, Bonds by US 10-year Benchmark Treasury Index. GIPSI bonds represented by the average of Greek, Italian, Portuguese, Spanish, and Irish 10-year Benchmark Bonds.

Required return in the second panel reflects a portfolio structure where \$1.40 is invested for each \$1.00 in assets and required collateral is 7% of portfolio value (i.e., 93% cushion). The 66% decline shown in the right-hand panel is 93% divided by the 1.40 leverage figure. The 66% decline could be composed differently rather than equally contributed by each asset class. For example, one could decline by more than 66% and the others less. Portfolio structure will change over time.

Risk Parity ignores returns and valuation

Several commentators have made the point that risk parity ignores returns and valuations. While this can be true in certain circumstances it is not in ours. The underlying assumption in risk parity is that the Sharpe ratios of each of the assets will be similar over time. This is a quite sensible starting point for an asset allocation process and one from which we can make material enhancements both in terms of strategic and tactical allocation.

Our adjustments to simple historic volatility can also be viewed as a reflection of elevated or diminished return expectations. For example, our use of duration for bond risk means that higher yields lead to a higher bond weight, all other things equal. Since the yield-to-maturity of a bond is a reasonable estimate of its long-term return, one could also consider this a time-varying return estimate.

Similarly, our enhanced risk measures for equities and commodities are effective due, in part, to the tendency for the worst-ranked to have poor future returns (which tend to coincide with higher volatility).

The main motivation for our tactical allocation process is the recognition that while assets' Sharpe ratios may be similar over time; they vary considerably in the near-term. Accordingly, we consider a variety of factors to help determine the attractiveness of each asset relative to cash over time (see table).

Tactical Allocation Process		
Asset Class	Strategic	Tactical
Stocks	Cyclically-Adjusted P/E	Each asset versus Cash: valuation, economics, trend
Bonds	Duration-based risk measure	Each asset versus Cash: valuation, economics, trend
Commodities	Long-term term structure	Each asset versus Cash: supply-demand balance, economics, trend

In conclusion, we encourage investors to consider the specifics of their investment strategies, as they can deviate meaningfully from their common, broad-brushed descriptions. Whether it's the asset selection process, estimates of volatility or the source and use of leverage, differing approaches can have material impacts on investors' risks and rewards. Despite the increasing scrutiny given to risk parity strategies of late, we believe our approach provides a research-driven robustness that may provide investors with consistent, risk-adjusted returns over time.

About risk

Commodities may subject an investor to greater volatility than traditional securities such as stocks and bonds and can fluctuate significantly based on weather, political, tax, and other regulatory and market developments.

Derivatives may be more volatile and less liquid than traditional investments and are subject to market, interest rate, credit, leverage, counterparty and management risks. An investment in a derivative could lose more than the cash amount invested.

In general, stock values fluctuate, sometimes widely, in response to activities specific to the company as well as general market, economic and political conditions.

Fixed-income investments are subject to credit risk of the issuer and the effects of changing interest rates.

The risks of investing in securities of foreign issuers can include fluctuations in foreign currencies, political and economic instability, and foreign taxation issues.

Issuers of foreign government debt or the governmental authorities that control repayment may be unable or unwilling to repay principal or interest when due, and the portfolio may have limited recourse in the event of default. Without debt holder approval, some governmental debtors may be able to reschedule or restructure their debt payments or declare moratoria on payments.

The investment techniques and risk analysis used by the portfolio managers may not produce the desired results.

Obligations issued by US Government agencies and instrumentalities may receive varying levels of support from the government, which could affect the portfolio's ability to recover should they default.

Underlying investments may appreciate or decrease significantly in value over short periods of time and cause share values to experience significant volatility over short periods of time.

FOR US INSTITUTIONAL INVESTOR USE ONLY – NOT FOR USE WITH THE PUBLIC

NOT FDIC INSURED | MAY LOSE VALUE | NO BANK GUARANTEE

Note: Not all products, materials or services available at all firms. Advisors, please contact your home office.

All data provided by Invesco unless otherwise noted.

Asset allocation/diversification does not guarantee a profit or eliminate the risk of loss.

Invesco Advisers, Inc. is an investment advisor; it provides investment advisory services to individual and institutional clients and does not sell securities. Invesco Distributors, Inc. is the US distributor for Invesco's retail products. Each entity is a wholly owned, indirect subsidiary of Invesco Ltd.