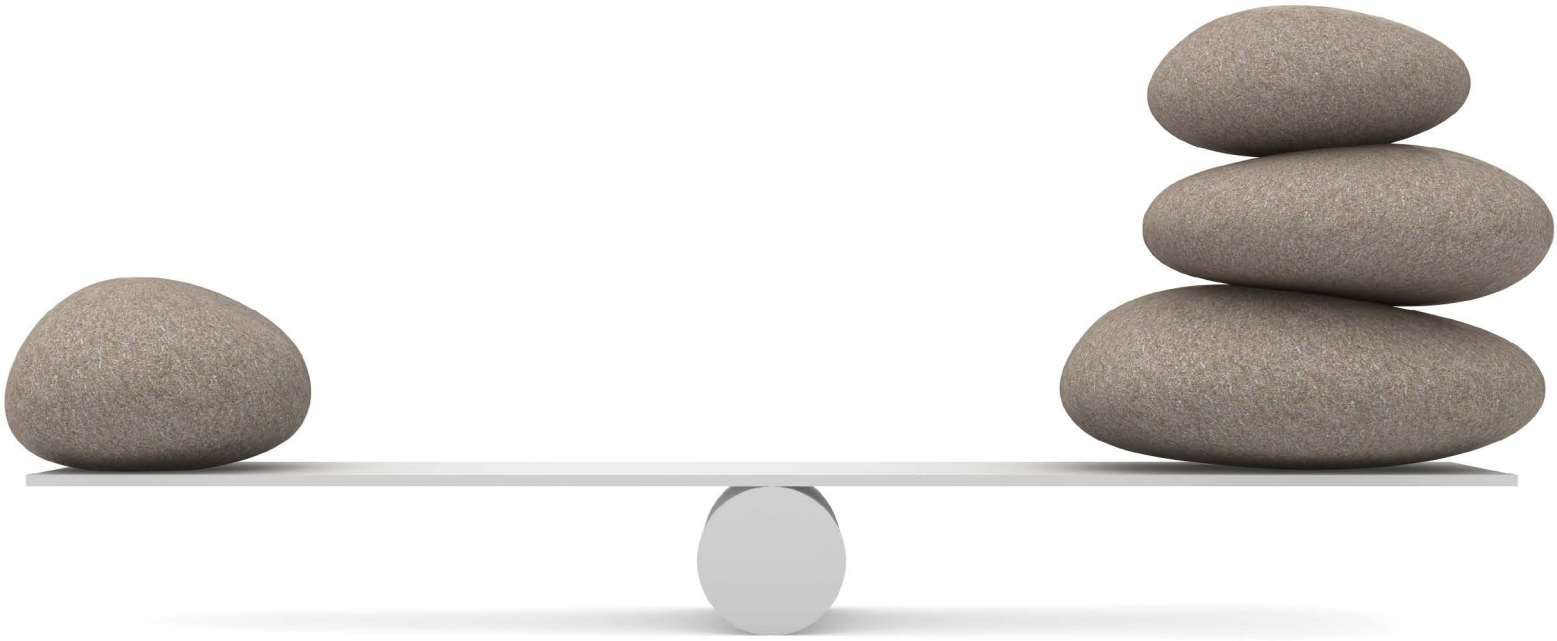


RISK PARITY **SOLUTION BRIEF**

ReSolve's Global Risk Parity strategy is built on the philosophy that nobody knows what's going to happen next. As such, it is designed to thrive in all economic regimes. This is accomplished through three unique characteristics: structural diversification, risk allocation, and dynamic risk management.

The Big Problem: Traditional Portfolios Lack Balance

Traditional portfolios come in a variety of shapes and sizes, though they have two defining deficiencies:

- They do not capitalize on the full promise of diversification; and,
- They do not manage risk in response to changing economic and market conditions.

The most common traditional approach is the ubiquitous domestic 60% stock / 40% bond portfolio. In limiting a portfolio's diversification potential to domestic stocks and bonds, and holding a static allocation that ignores the changing investment landscape, these investors are subjecting themselves to unnecessary risks.

The 60/40 portfolio was popularized by the Baby Boomers. Born between 1946 and 1964, and entering their earnings and savings years 25 years later, their financial lifecycles were aligned with the largest sustained economic expansion ever. For roughly two full decades starting in the early 1980's, developed economies were characterized by benign inflation and sustained growth in the global economy. These qualities substantially favored traditional portfolios of developed market stocks and bonds.

This hasn't always been the case. Figure 1 shows the performance of the US 60/40 portfolio over three economic eras from 1965 through 1990. Note how the portfolio struggled mightily during the 1970s stagflationary environment.

Figure 1. Real Performance of US 60/40 Portfolio, 1965-1990

Source: ReSolve Asset Management, Data from Global Financial Data and CSI.

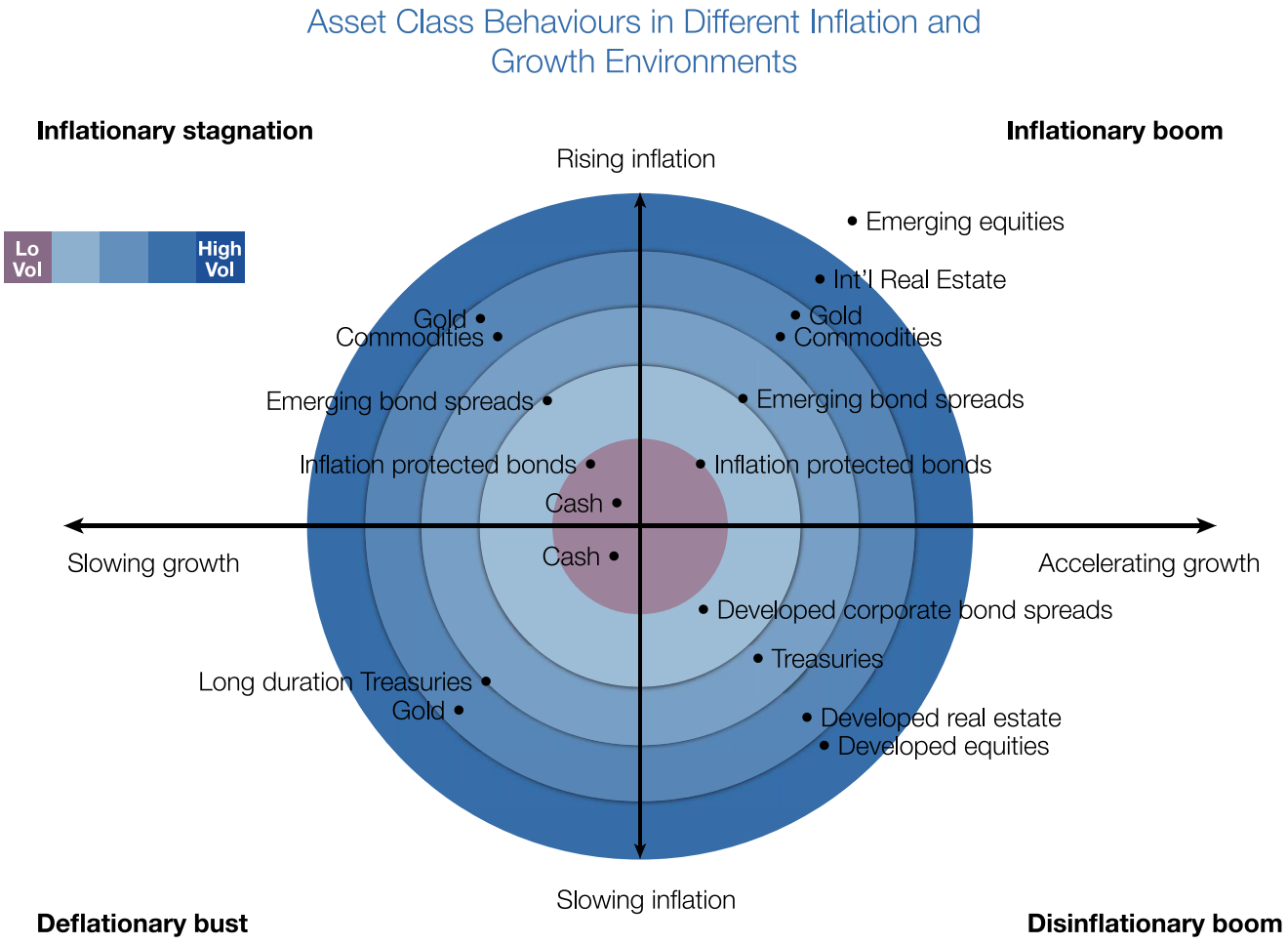
Investors need balance now more than ever.

Investors are primarily concerned not with what happened in the past, but with what comes next. Are we on the brink of another prolonged period of disinflationary growth, characterized by falling rates and rising equity valuations? If so, then a traditional 60/40 approach may serve clients well. But if not, what are the implications for the traditional approach? And even with an informed opinion about what the future holds, wouldn't an optimal approach have the potential to thrive regardless of what happens next?

The Importance of a Structurally Diverse Investment Universe

Investors anticipate economic outcomes that evolve along two dimensions: economic growth and inflation. Combinations of these dynamics create environments that lead to predictable asset class behaviors. Figure 2 provides a model for asset classes that might be expected to thrive under all possible combinations of inflation and growth. Assets close to the center tend to respond in a mildly positive way to the regime, while returns to assets on the periphery are highly sensitive to that environment.

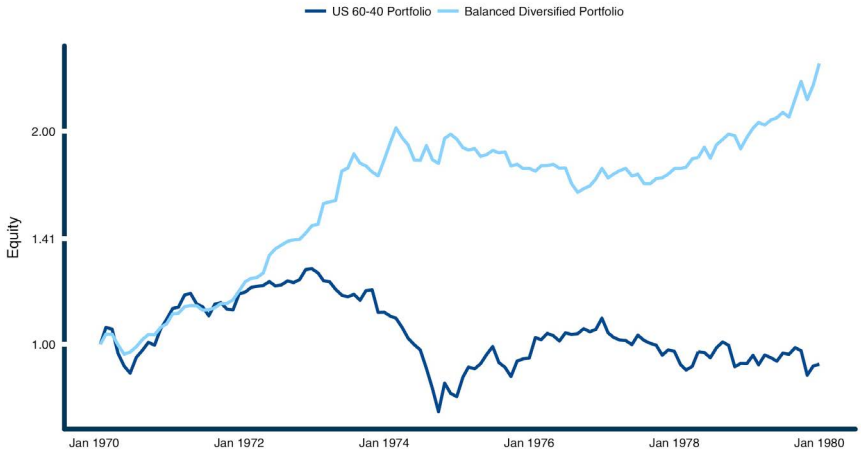
Figure 2. Asset Classes That Thrive in Each Economic Regime



Source: ReSolve Asset Management

While Figure 1 showed that stocks and bonds struggled during the 1970s stagflation, Figure 2 shows that assets such as gold and commodities can provide ballast during such periods. As such, Figure 3 presents how an equally weighted portfolio of US stocks, Treasuries, gold and commodities performed admirably, while 60/40 languished during the stagflationary 1970s.

Figure 3. Real Returns of US 60/40 Portfolio vs Equal Weight of US Stocks, Bonds, Gold and Commodities, 1970-1980



	US 60-40	Balanced Diversified
Compund Return	-0.65%	9.65%
Volatility	10.77%	9.69%
Sharpe Ratio	-0.01	0.99
Max Drawdown	-37.19%	-18.92%
Positive Rolling Yrs	49.00%	75.00%
Growth of $1	$0.94	$2.49

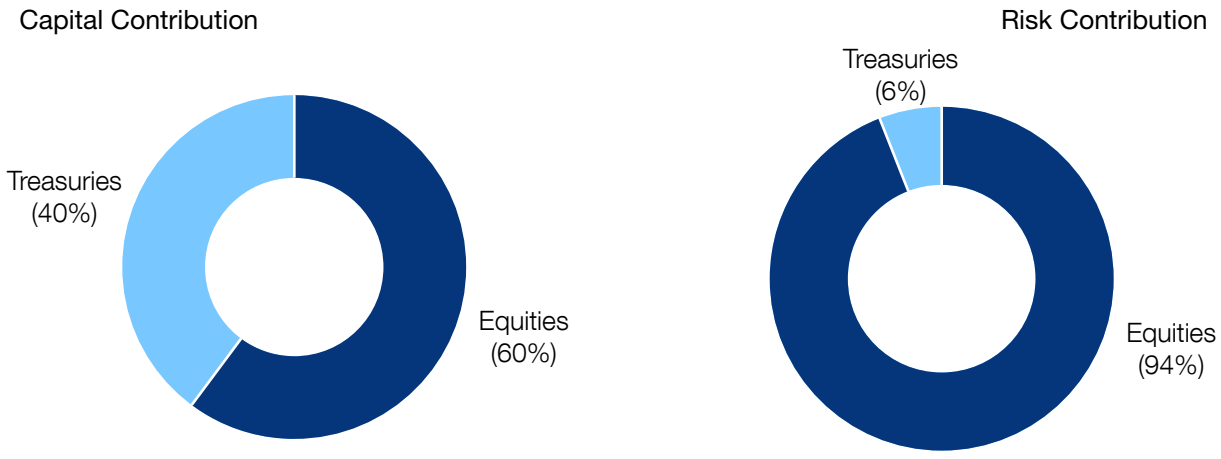
Source: ReSolve Asset Management, Data from Global Financial Data

A structurally diverse investment universe creates the potential to thrive under any economic regime. It is a necessary – but insufficient - quality for developing a meaningful diversification strategy.

Capital Allocation versus Risk Allocation

Using more diverse asset classes is an important starting point, but it fails to capture all of the benefits of diversification. Most investors assume that the percentage of capital allocation equates to a portfolio's risk allocation, such that a 60/40 portfolio would derive roughly 60% of its risk from stocks. As Figure 4 shows, the reality is that such a portfolio tends to be dangerously overexposed to equity risk.

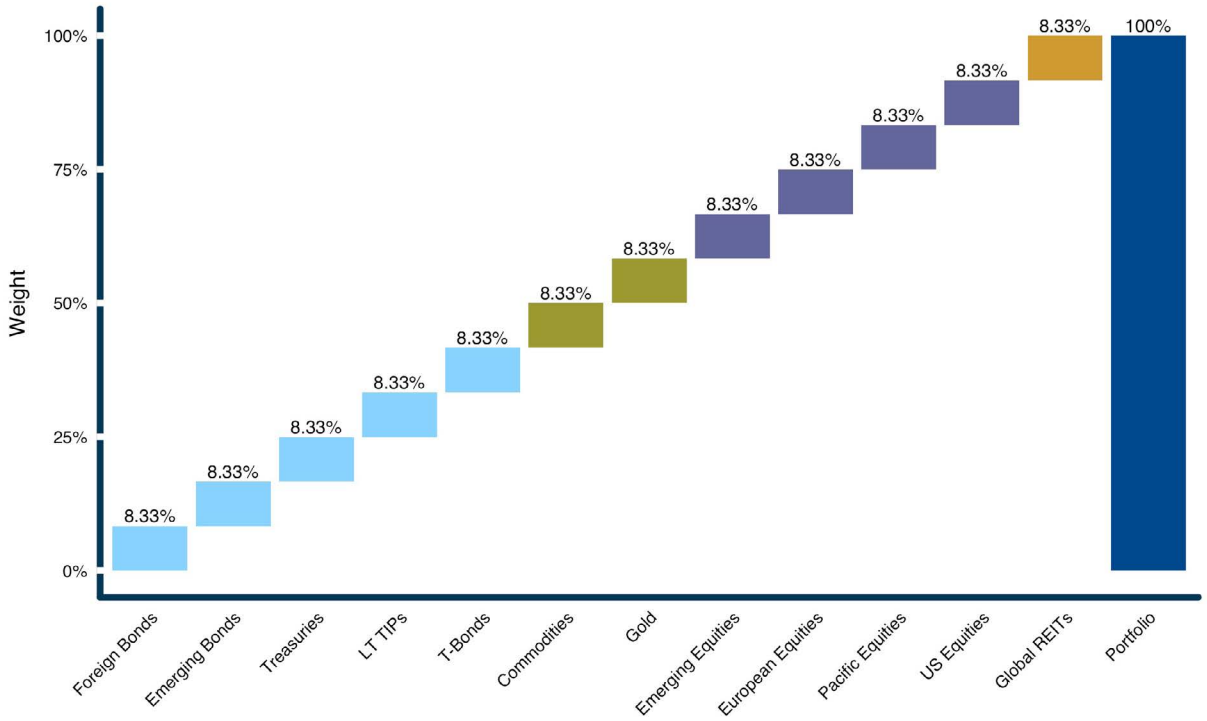
Figure 4. Capital Contribution versus Risk Contribution of US 60/40 Portfolio, 1900-2016



Source: ReSolve Asset Management, Data from Global Financial Data and CSI.

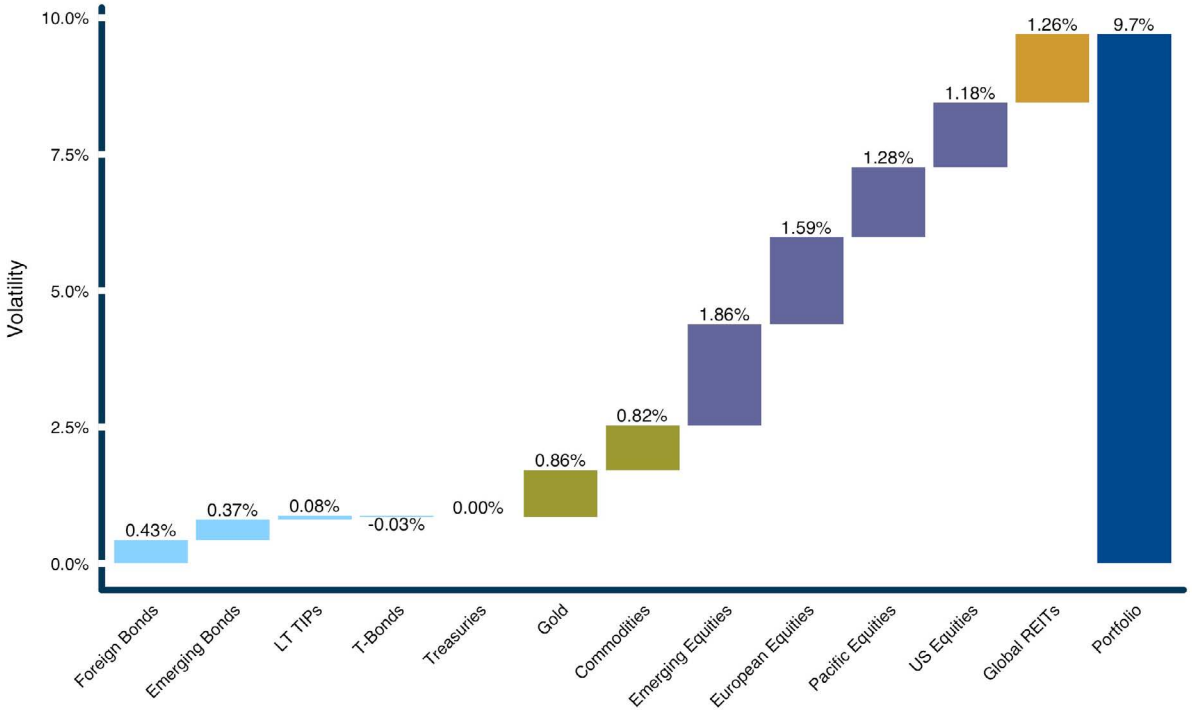
Figures 5 and 6 expand on this point by showing the portfolio weights that result from allocating capital equally across the 12 asset classes in ReSolve's investment universe, and the resultant risk contribution.

Figure 5. Equal Capital Allocation of 12 Diversified Global Asset Classes



Source: ReSolve Asset Management, Data from Global Financial Data and CSI.

Figure 6. Actual Risk Contribution by each Asset Class using Equal Capital Allocation



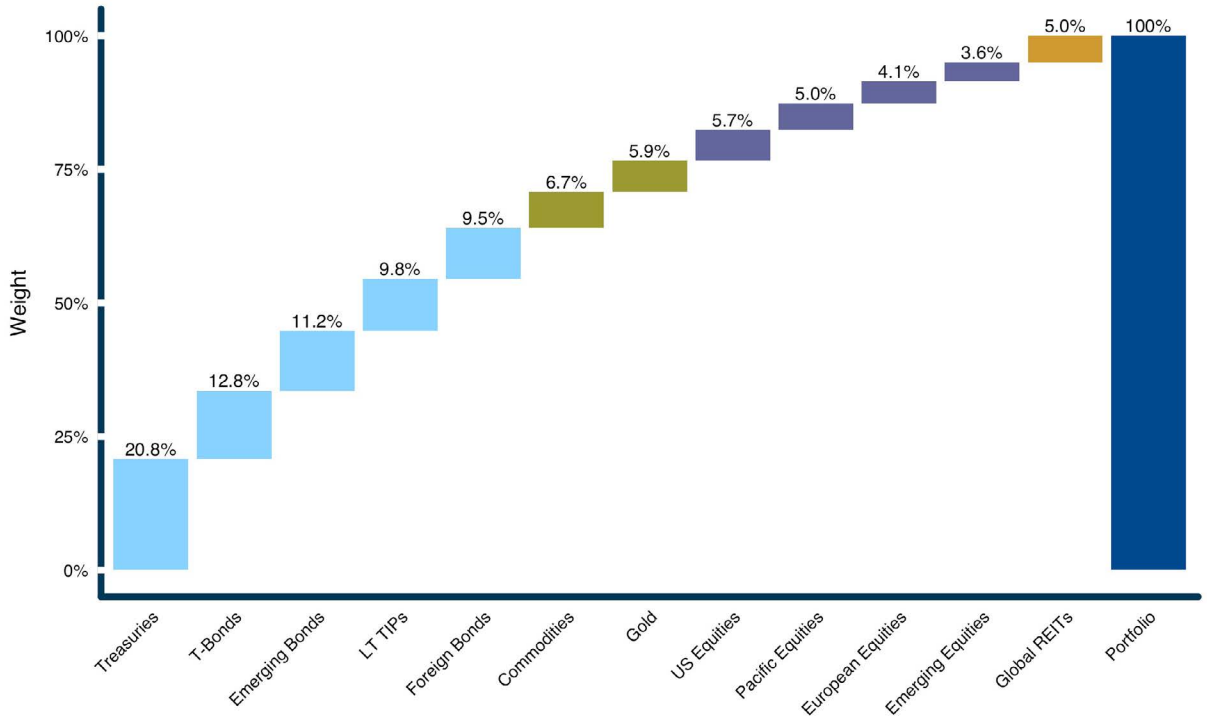
Source: ReSolve Asset Management, Data from Global Financial Data and CSI.

Blindly adding low correlation assets is clearly insufficient to maximize diversification because an asset's ability to diversify a portfolio is also a function of volatility. If assets are held in equal weight, high volatility assets like stocks will overwhelm the diversifying properties of lower volatility assets like bonds. As a result, the portfolio's overall volatility is much closer to that of an equity-concentrated portfolio rather than the desired balanced risk profile.

What does proper risk allocation look like?

The ReSolve Global Risk Parity (GRP) portfolio is formed by ensuring each asset contributes the same amount of risk to the portfolio, after accounting for diversification benefits. For example, Figure 7 provides the capital allocation formed on the basis of observed average asset class relationships and risks from 1995-2016. As expected, low volatility fixed income consumes the greatest share of capital, while higher risk stocks, REITs and commodities receive relatively small allocations.

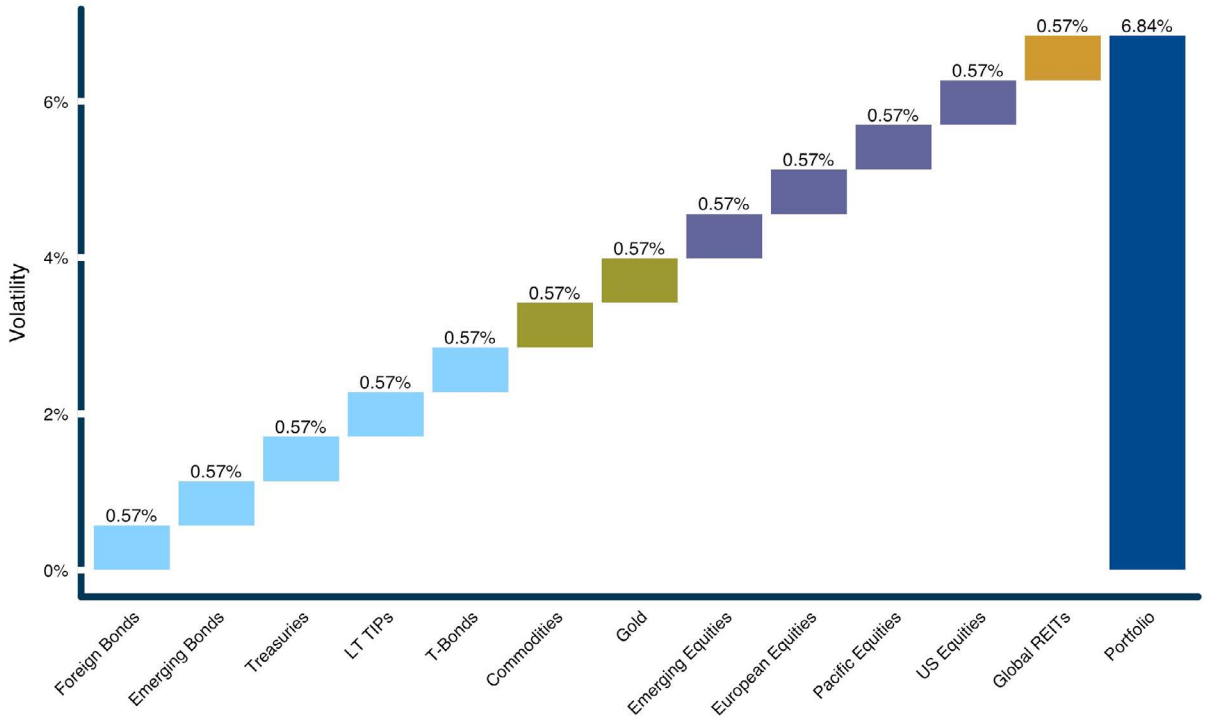
Figure 7. Capital Allocation to each Asset Class when Asset Classes Contribute Equal Risk



Source: ReSolve Asset Management, Data from Global Financial Data and CSI.

The capital allocations above lead to an optimally balanced portfolio where each asset class contributes an equal amount of risk. Figure 8 shows how this works, and also demonstrates the beneficial impact on portfolio volatility, which dropped from 9.7% with equal capital allocation to 6.8% using equal risk contribution. This reflects the benefit of intelligently allocating risk to improve diversification.

Figure 8. Risk Allocation when Assets are Held with Equal Risk Contribution



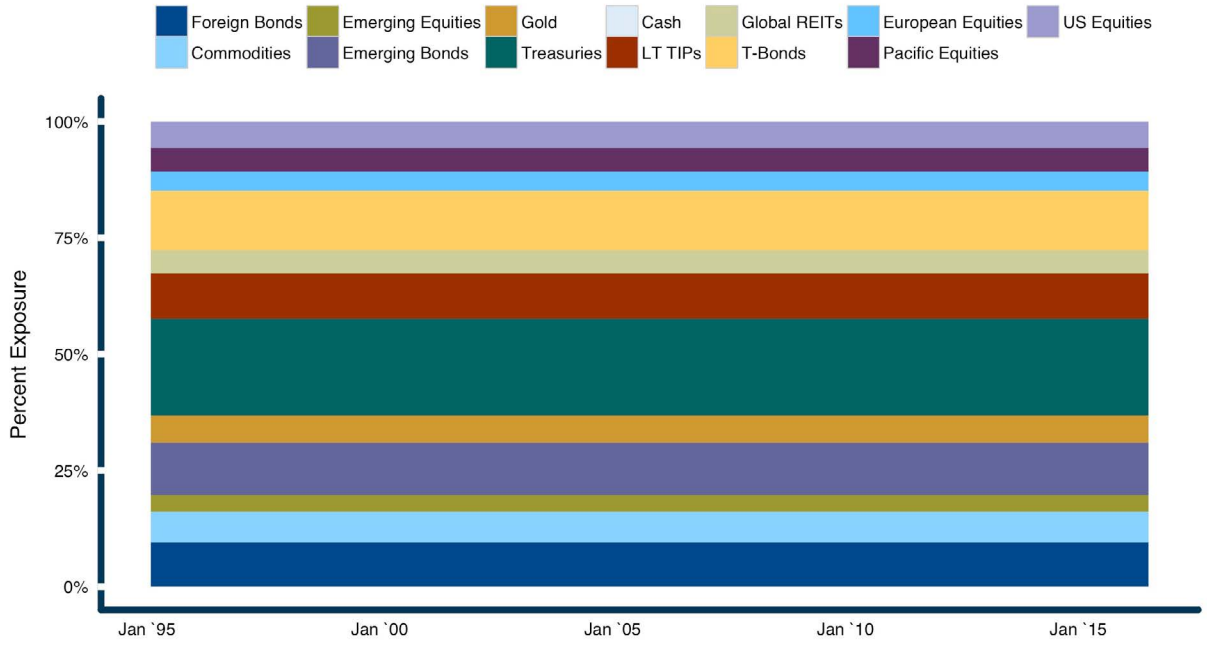
Source: ReSolve Asset Management, Data from Global Financial Data and CSI.

Dynamic Risk Management

Adapting the portfolio to changing conditions offers yet further diversification opportunities. Correlations and volatilities across asset classes are not static; they deviate profoundly from their long-term average values through time. As just one example, recall the volatility of stocks and bonds during the 2008 financial crisis compared to their relatively benign values today.

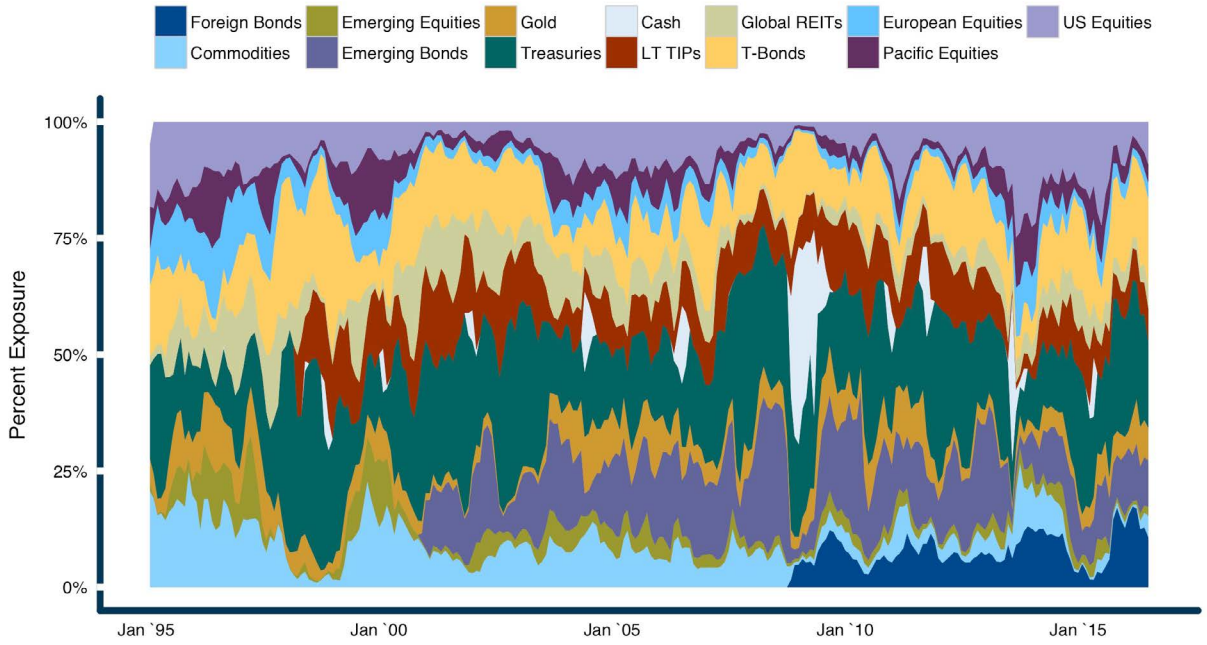
Risk parity may be enhanced by systematically responding to changes in asset risks with subtle changes in allocations. To give a sense of the difference in portfolio constituents over time, Figure 9 shows the risk parity allocation each month from 1995 - 2016 using strategic asset weights based on long-term historical risks and correlation relationships. Then, in Figure 10, we provide an example of monthly portfolio weights where the portfolio evolves systematically in response to real-time changes in asset price behavior.

Figure 9. Traditional Risk Parity Allocations, 1995-2015



Source: ReSolve Asset Management, Data from Global Financial Data and CSI.

Figure 10. Dynamic Risk Parity Allocations, 1995-2015



Source: ReSolve Asset Management, Data from Global Financial Data and CSI.

Another feature that sets Risk Parity apart from other investment methods is its constant risk target. When portfolio volatility expands beyond a set target during periods of market duress, the portfolio increases its allocation to cash to hold risk in check. Such regular adaptations keep portfolio volatility stable through time.

Finally, while the ReSolve Global Risk Parity Strategy almost always maintains some positive weight in all asset classes, there is value in reducing exposure to assets in persistent negative trends. The case examples below demonstrate how, by embracing the well-known 'absolute momentum' factor, the ReSolve Strategy dramatically improves downside protection with the added benefit of higher returns over the long-term.

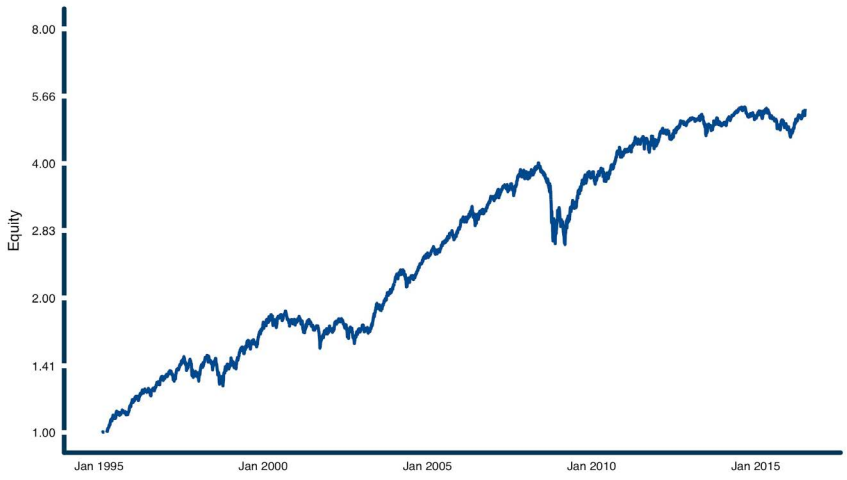
Putting it all Together: ReSolve Global Risk Parity

In this section we will walk through a continuum of asset allocation methods to demonstrate the advantage that accrues from using the techniques discussed in this paper.

The 60/40 approach is extremely sensitive to a single economic regime, so its success or failure depends on whether the favorable regime dominates over an investor's time horizon. We prefer methods with the ability to thrive in broader circumstances, which requires an allocation to a much broader set of asset classes. This prompts the question: how should build a portfolio from such a diverse group of assets?

Let's begin by imagining an investor without home bias, allocating equal capital to ReSolve's structurally-diverse 12-asset universe. Exhibit 1 shows the result of equally weighting the portfolio, and rebalancing every month.

Exhibit 1. Equal Capital Weight

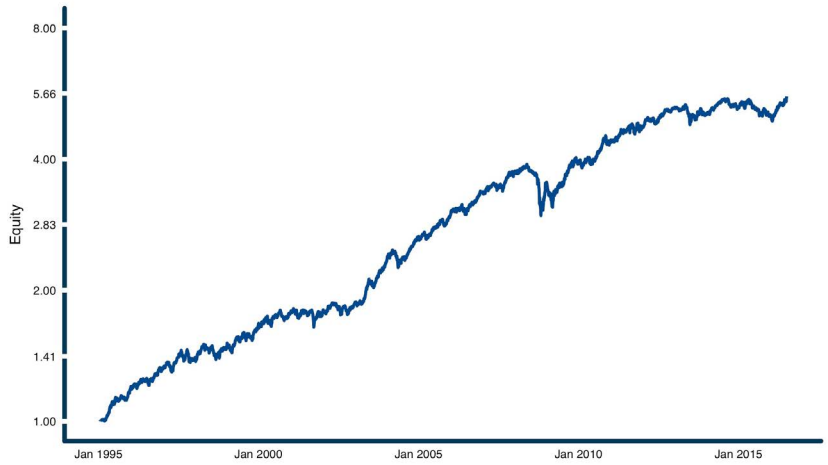


Source: ReSolve Asset Management, Data from Global Financial Data and CSI.

	Equal Weight
Compund Return	8.05%
Volatility	9.79%
Sharpe Ratio	0.64
Max Drawdown	-34.29%
Positive Rolling Yrs	78.00%
Growth of $1	$5.29

For our next step let's assume that an investor has some knowledge of each asset's independent risk, but no knowledge of correlations. More volatile assets receive smaller allocations while more benign assets receive larger ones. Exhibit 3 demonstrates the incremental benefit of volatility management.

Exhibit 2. Naïve Risk Parity



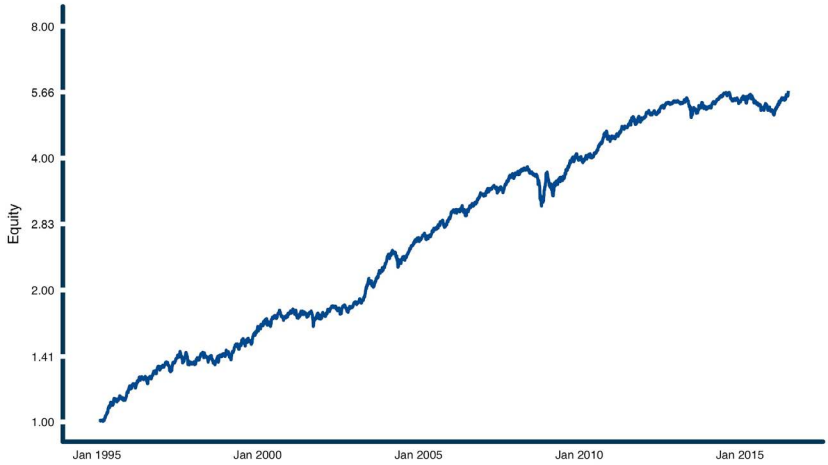
Source: ReSolve Asset Management, Data from Global Financial Data and CSI.

	Equal Weight	Naive Risk Parity
Compund Return	8.05%	8.31%
Volatility	9.79%	7.00%
Sharpe Ratio	0.64	0.89
Max Drawdown	-34.29%	-23.70%
Positive Rolling Yrs	78.00%	86.00%
Growth of $1	$5.29	$5.57

Though returns are similar to equal weight, the Sharpe ratio increases from .64 to .89. This improvement is a function of reduced portfolio risk (7.00% vs. 9.79% for equal weight). Not surprisingly, lower volatility also means more consistent returns (86% positive years vs. 78%) and lower maximum drawdowns (-23.7% vs. -34.3%). All this simply from preventing the lunatics (stocks) form running the asylum (portfolio).

Next, we integrate correlations such that each asset contributes equal risk to the portfolio after accounting for diversification effects. The result is shown in Exhibit 3.

Exhibit 3. Robust Risk Parity

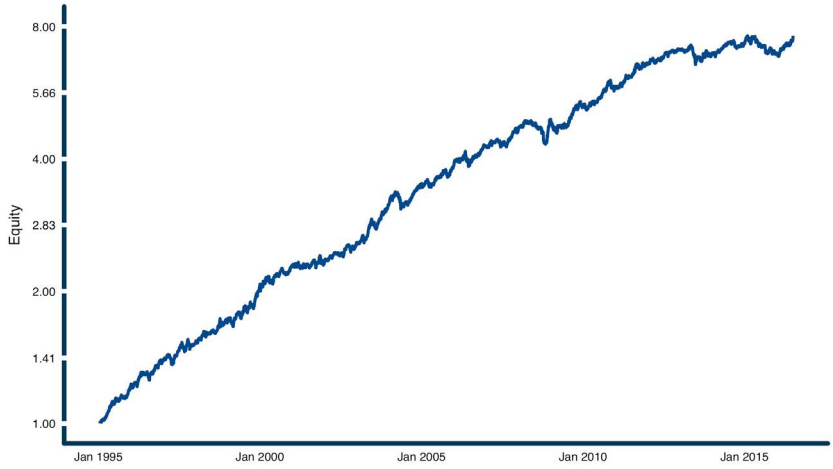


Source: ReSolve Asset Management, Data from Global Financial Data and CSI.

	Equal Weight	Naive Risk Parity	Robust Risk Parity
Compund Return	8.05%	8.31%	8.42%
Volatility	9.79%	7.00%	6.42%
Sharpe Ratio	0.64	0.89	0.97
Max Drawdown	-34.29%	-23.70%	-18.63%
Positive Rolling Yrs	78.00%	86.00%	84.00%
Growth of $1	$5.29	$5.57	$5.69

Finally in Exhibit 4, we bring all of the concepts together to generate an idealized implementation of risk parity. This approach uses broadly diverse asset classes allocated by their risk contributions, and dynamically adjusts asset class weights in accordance with changes in the investment landscape. Here is what's possible:

Exhibit 4. ReSolve Risk Parity



Source: ReSolve Asset Management, Data from Global Financial Data and CSI.

	Equal Weight	Naive Risk Parity	Robust Risk Parity	ReSolve Risk Parity
Compund Return	8.05%	8.31%	8.42%	9.90%
Volatility	9.79%	7.00%	6.42%	6.22%
Sharpe Ratio	0.64	0.89	0.97	1.23
Max Drawdown	-34.29%	-23.70%	-18.63%	-11.74%
Positive Rolling Yrs	78.00%	86.00%	84.00%	88.00%
Growth of $1	$5.29	$5.57	$5.69	$7.61

At its core risk parity is about accruing all the benefits diversification has to offer. Each step along the way – building a structurally diverse investment universe, integrating volatility, examining correlations, and dynamically adjusting exposures – accrued additional benefits from more thoughtful risk management.

Diversification is about balance and preparation. It is an explicit recognition that nobody knows what's going to happen next. And if that's the primary risk facing traditional portfolios, ReSolve Global Risk Parity may be the answer.

ReSolve
ASSET MANAGEMENT

How does it compare?

For statistics on how the full implementation of this strategy stacks up to other types of markets and portfolio construction methodologies please sign up for our free exclusive content portal. Inside you will find simulations, exclusive whitepapers, and other research to help you better understand our investment methods and philosophy.

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