

Risk Parity

A Primer

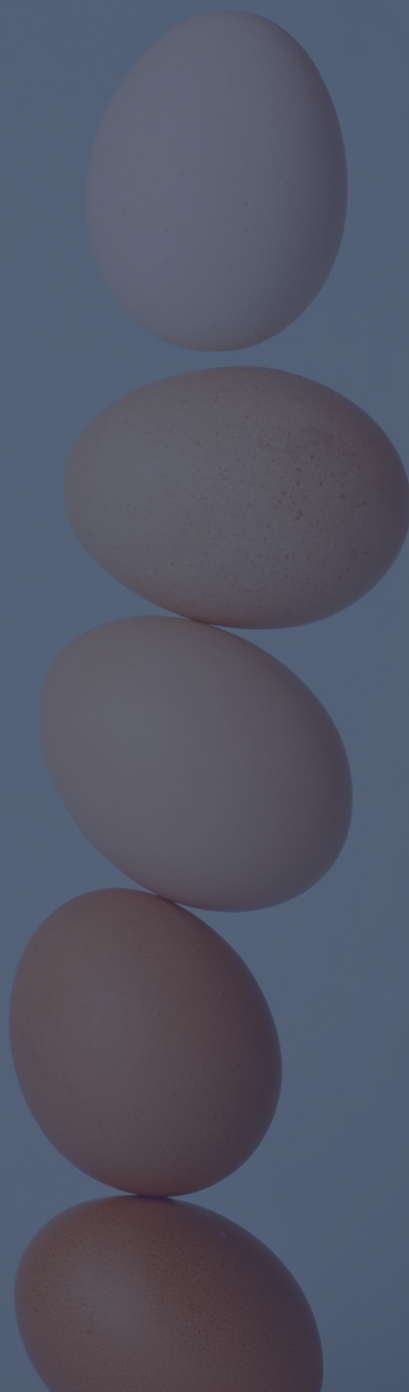


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The key to successful long-term investing is managing risk. Risk parity is a meaningful tool for the investor to manage the portfolio's return profile. Risk management is a critical concern in an environment of low interest rates and highly correlated equity markets. The asset allocation process is long, arduous, and requires experienced professionals using sophisticated analytical tools to ensure value to the portfolio, particularly for the highly uncertain return expectations. Risk parity overcomes these barriers for the investor.

The key benefits of risk parity include:

- **Balance delivers diversification** – balancing factor exposures removes the capitalization bias and *achieves real diversification*.
- **Adaptation aligns the portfolio** – efficient markets process information rapidly, and adaptation *aligns the portfolio with new information as it emerges*.
- **Managing risk delivers portfolio efficiency** – time-varying returns leave only risk management to *deliver portfolio efficiency*.
- **Consistency supports a fiduciary standard** – Managing time-varying risk increases the return's consistency and *aligns the investment with the investor*.

The practicality of risk parity enables an asset allocation paradigm with risk management at its core. The transparency and liquidity empower a timely transition from the current state to a risk-focused future. Risk parity *invests without compromise*.

Risk Parity Invests Without Compromise

Diversified portfolios following the traditional asset allocation paradigm experienced unparalleled volatility to financial markets in 2020 as the Pandemic spread across the globe. A recovery followed a sharp drop in the equity markets that were both unprecedented in their speed. Fixed income and commodity markets also fell and rebounded as the threat of higher defaults and less commodity demand loomed. Thus, investors are increasingly sensitive to *higher volatility* within their portfolio and the prospect of *low returns* for the fixed income and commodity asset classes. The response is to seek improved portfolio risk management while maintaining the return objective.

Forecasting
accurate
returns is
difficult.

There are two challenges for investors when constructing portfolios using traditional asset allocation methods. First, they are contingent on *accurate forecasts of expected return*. This requirement is particularly onerous when returns did not meet expectations.¹ Second, they do not *adapt to changing risk*. A crucial determinant of business is managing change: investing should be no different. The result is *unbalanced* and *static* risk allocations.

Risk Parity is agnostic to return, which removes the need to divine a highly uncertain expected return. Critically, risk parity dynamically manages portfolio risk to adapt the portfolio as market risk changes. Risk Parity offers an *active* management paradigm rather than the *passive* stance of traditional asset allocation. This focus enables the skeptical investor to justify the active management cost by offering *another choice* to achieve their *specific* portfolio objectives. *Risk Parity invests without compromise.*

¹ For the 10-year period ending June 30th, 2020, the total return of 60% equities and 40% bonds portfolio was 7.0%, under the return expectation of about 7.5% for the US corporate pension universe. The underlying returns were 9.2% for the iShares ACWI Index ETF (ACWI), 3.7% for the iShares US Aggregate Bond Index (AGG), and 1.2% for the iShares 1-3-year US treasury Bond ETF (SHY).

The Journey: A Focus on Balance and Adaptation

The value of asset allocation is its *balance*. Diversification is a portfolio construction process to *manage risk* in the portfolio. The theory's hallmark is that reward occurs only for market risk because diversification easily removes company-specific risk. As the saying goes, don't put all your eggs in one basket. Blackberry disciples in 2008 who ignored the iPhone know very well how a dominant market leader can change, seemingly, overnight. This insight is sage advice when companies have widely divergent outcomes and forecasting them in advance is colossally tricky.

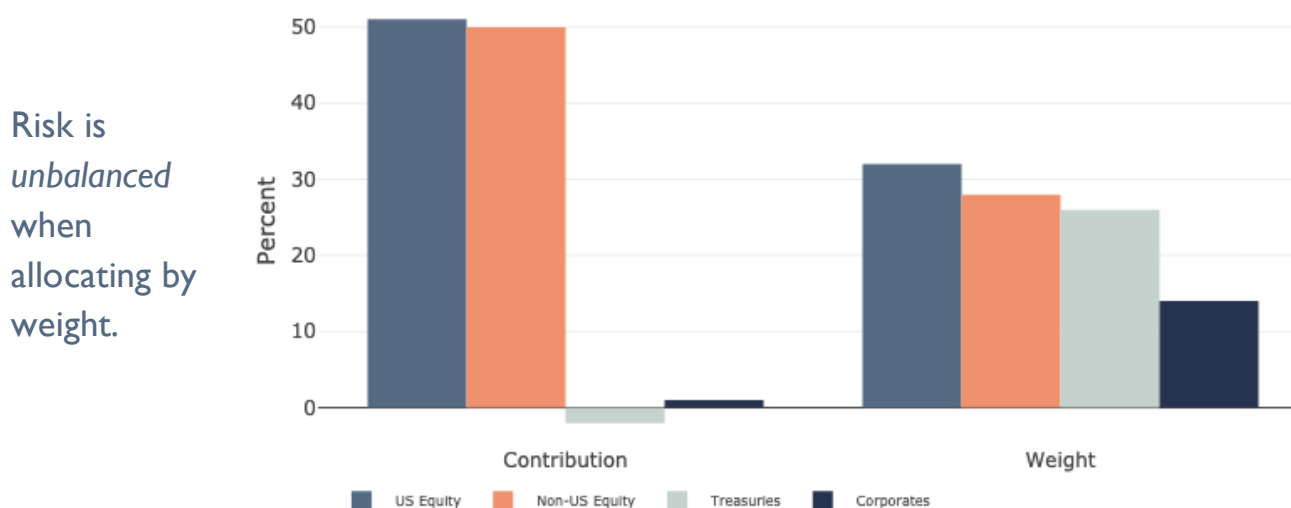
Asset classes
are less
diverse than
companies.

Trouble arises when applying the same principles at the asset allocation level. First, there is *less diversity* between the asset classes. Investors are very familiar with the saying that all correlations go to one when markets decline. This saying is a subtle reminder that no equity class is safe when equity markets drop, whether in the US, Europe, or elsewhere. A highly profitable company gaining market share may be less sensitive to the overall equity market direction. Still, the *average company* that constitutes an index is not.

Asset allocation requires *consistently accurate* forecasts of expected returns. In asset allocation, the forecast errors cancel each other with many companies and leave the investor with a portfolio resembling the broad market. When there are few asset classes (e.g., an equity allocation between the US, non-US, and the Emerging Markets), the ability to minimize the forecast error *materially reduces*. The result is that asset allocation under the standard framework becomes a *return-maximizing* process rather than a *risk-minimizing* one. In practice, investors constrain the process to limit the allocation to one asset class over the other. This action is the triumph of the need for an acceptable outcome over *misunderstanding the tool*.

The result of the traditional asset allocation process is that the risk in the portfolio is *unbalanced*. For a traditional 60% equity and 40% bond portfolio, the equity risk *contribution* is greater than the *whole portfolio* (exhibit 1). This extreme outcome occurs because the fixed income factor, specifically Treasury Bonds, *reduces* overall portfolio risk.² In fact, Treasury bonds do not offer a meaningful contribution until their weight exceeds 50 percent (i.e., a 20% equity and 80% bond portfolio). Indeed, weighting a portfolio by asset class does not achieve diversification.

Exhibit 1. Traditional Portfolio Risk Contribution & Asset Weights



Source: Capital Risk calculations. The benchmark is 60% Global Equities (ACWI) and US Aggregate Bonds (AGG). The representative ETF symbol is in brackets. The period is June 2010 to June 2020, and the weights are as June 2020. The performance is hypothetical and does not reflect an actual investment.

The result of these unbalanced risk allocations shows up in the performance metrics. Risk-adjusted returns (i.e., return-to-risk) decline, and return performance is less persistent. The tail and drawdown risks are high due to material equity exposure (exhibit 2). A closer inspection of the data reveals that the portfolio risk measures are roughly proportional to the equity

² This risk factor calculation measures the varying factor exposure (i.e., the sensitivity to the equity market). This measure differs from the risk contribution that estimates how much each asset class contributes to the overall risk.

exposure at 60%.³ In parallel to the risk contribution, this outcome suggests that there is little diversification. It appears that traditional asset allocation is merely a reweighting of equity exposure.

Exhibit 2. Traditional Portfolio Performance & Risk Measures

Portfolio asset allocation is merely a ratio of equity.

| Beta | Return/ Risk | Return | Risk | Value-at-Risk (CI=95%) | Maximum Drawdown |
|----------------------|-----------------|------------|-------------|---------------------------|---------------------|
| Portfolio (60/40) | 0.76 | 7.3 | 10.4 | 15 | 22 |
| Global Equity (ACWI) | 0.53 | 9.4 | 17.7 | 30 | 34 |
| US Equity (ITOT) | 0.79 | 13.8 | 17.4 | 30 | 35 |
| Growth (IUSG) | 0.91 | 16.1 | 17.7 | 30 | 32 |
| Value (IUSV) | 0.61 | 10.8 | 17.7 | 31 | 38 |
| Small (IJR) | 0.52 | 11.2 | 21.7 | 36 | 44 |
| Non-US Equity (EFA) | 0.31 | 5.8 | 19.0 | 34 | 34 |
| Fixed Income (AGG) | 0.92 | 3.7 | 4.1 | 6 | 10 |
| Corporates (USIG) | 0.87 | 5.0 | 5.8 | 8 | 19 |
| Treasuries (IEI) | 0.93 | 3.0 | 3.2 | 5 | 5 |

Source: Capital Risk calculations. The benchmark is 60% Global Equities (ACWI) and US Aggregate Bonds (AGG). Representative ETF symbol is in brackets. The period is June 2010 to June 2020.

Risk parity offers the prospect of better diversification through improving the balance of risk factors in the portfolio. This trait is not the only benefit. In contrast to traditional asset allocation, risk parity synthesizes new information. The adaption of the portfolio manifests in the *risk-adjusted return*.

³ The maximum drawdown of global equities was 34%, which equates to 20.4% for the portfolio. This number is *lower* than the realized number of 22%.

Efficient markets *adapt* to new information. The return and risk of investments are time-varying, not static. The financial markets are where buyers and sellers settle on a price to exchange an investment's future cash flows. While the latter statement is banal, there is power in it. If the environment (e.g., the economy) did not change, *neither* would the financial markets. Thus, in a dynamic economy, the financial markets must produce a price for the investments that *also changes*.

Risk parity *adapts to* information.

Risk parity rebalances an investment when the market changes in contrast with static asset allocation. Ideally, asset allocation increases risk exposure when the risk is low and reduces risk when it is high. A risk reassessment may occur because of a credit crisis, the popping of an equity bubble, or another market event. Risk parity is agonistic to the risk driver. Instead, the focus is on the degree of risk, which instructs investors to *adapt to market events dynamically*.

This logic of adaption for risk parity is intuitive. Most investors focus on the efficiency (i.e., return-to-risk) of their portfolio and believe market risk and return are either static or dynamic. These two beliefs result in four possible outcomes for portfolio efficiency (exhibit 3). Portfolio efficiency changes except when return and risk are both static, which is unrealistic in a competitive market. Thus, the preference *should be* for a process that adapts to changes in portfolio efficiency.

Exhibit 3. Relationship of Return & Risk Variability to Portfolio Efficiency

| | Risk | |
|--------|---------------------|--------------------|
| | Dynamic | Static |
| Return | Dynamic Variable | Static Variable |
| | Static Variable | Fixed |

As risk changes, risk parity adjusts the allocations within the portfolio. The impact on portfolio efficiency is substantial. Risk increases result in lower portfolio efficiency. Risk parity accounts for this information by reducing exposure because of the deterioration in reward to risk. Conversely, as risk declines, risk parity increases allocations because the return to risk improved. If markets are efficient, then these risk parity actions are *undeniably logical*.

Similar logic applies in the broader context of a portfolio with more than one risk factor (e.g., equities and bonds). Changes in risk result in a different portfolio efficiency for each asset *absolutely* and *relatively*. The trade-off within the portfolio is a function of changing risk, which merely *allocates to the more efficient assets*.

Efficient
markets
require
adaptation.

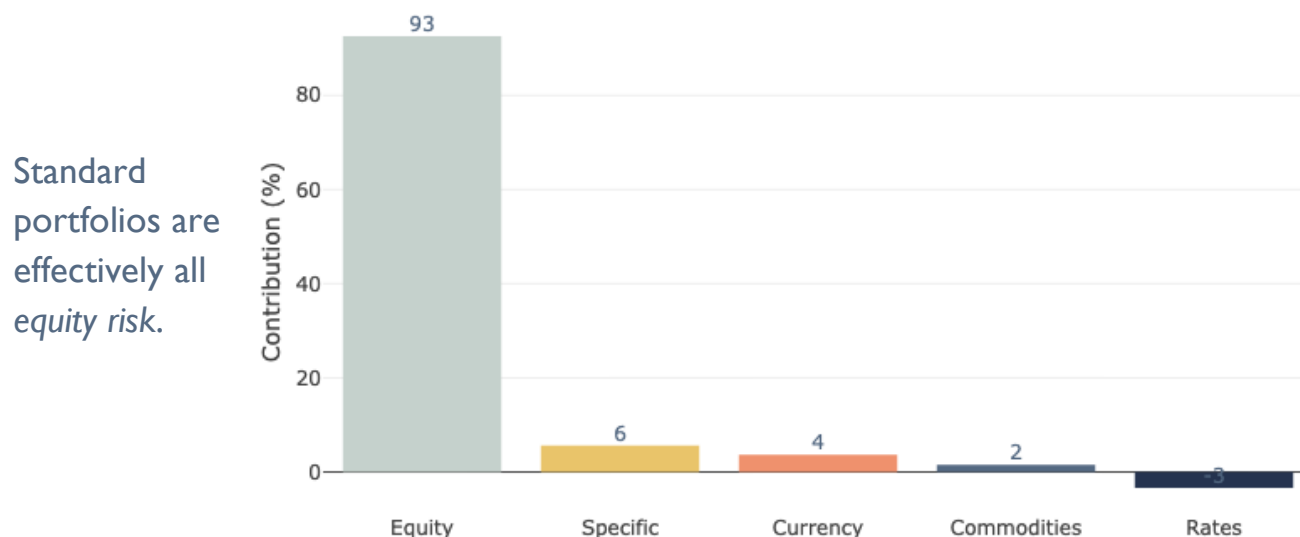
Both allocation methods are consistent with optimizing risk-adjusted return. The difference is the focus: the long-term averages or the current market information. Even this distinction is trivial because the long-term average derives from the short-term numbers. The reality is one of first principles and a belief in efficient markets. If the markets process information efficiently, then using the current data is a viable choice, which is the mechanism that drives risk parity.

Risk parity offers two valuable attributes to a portfolio: *balance and adaptation*. These qualities manifest themselves in all asset allocation methods through diversification. By construction, it seeks to balance the risk factors exposures across the portfolio by their actual contribution to risk, not an arbitrary asset weighting. By process design, it adapts to new information in the markets by managing the portfolio efficiency. The result for the investors is improved portfolio efficiency and a more consistent return profile through *managing risk*.

Cutting the Pie: Asset Classes versus Risk Factors

Traditional asset allocation varies the asset class weights when optimizing the portfolio for efficiency. A problem arises from this methodology because each asset class can possess exposure to other risk factors. Equities may have commodity and currency exposure, while corporate bonds can contain interest rate and equity factors. Disentangling the factor exposures requires robust statistical analysis. More important is whether this increased complexity matters. The answer is *addition by subtraction*.

Exhibit 4. Traditional Portfolio Risk Factor Attribution



Source: Capital Risk calculations. The portfolio is 60% Global Equities (ACWI) and US Aggregate Bonds (AGG), which is further subdivided into ten assets classes. The period is June 2010 to June 2020 and weights are as of June 2020.

The standard asset allocation portfolio of 60% equities and 40% bonds clearly shows the factor loadings (exhibit 4). Despite the portfolio allocating over a quarter of the portfolio to international equities, the equity risk factor accounts for nearly 93% of the total. While this number is smaller than the risk contribution shown earlier, it still accounts for almost all the exposure in *one factor*. The ten asset classes in the portfolio reduce to only four factors, which is a triumph of *parsimony over complexity*.

Every great recipe is contingent on the ingredients and *the ingredient's proportions*. Since return premia are time-varying, the mix of factors must also change over time. An asset classes' relevant factors will change as the market environment changes, and the managers dynamically adjust their views. Factors are no different. Thus, the number of relevant factors and their weights will vary over time.

Determining how to adjust the factor exposures over time is the domain of financial theory and statistical analysis. The usual techniques to calculate the factor loadings are regression analysis using data known at that time. The range of possible methods is unbounded. Leaning towards simplicity in model selection reduces the required assumptions. Tangible benefits accrue to this decision, including a ready explanation of the linkages between factors and indices, reduced model risk from parsimony in factor selection, and reduced implementation and transaction costs.

The critical decision point is the risk level.

More significant to the investor is the selection of the *appropriate risk level*. All investors have unique objectives for their portfolio due to their differing return requirements and risk appetites. A well-balanced risk factor portfolio may only require a small completion allocation to risk parity to achieve its target portfolio efficiency. Another investor may seek risk parity with a higher volatility level due to the need to improve portfolio efficiency and *generate a higher return*. Thus, each investor must determine *their level* of risk parity that benefits *their portfolio*.

There is not a general rule for an investor on what level of risk parity to target. Even though investors share similar factors exposures, *the amount* of their exposures varies. Crucially, the varying levels of risk parity, transparency, and a continual communication of the risk factor exposures empower the investor with the means to tailor the exposures to *their needs*. The potential benefit is increased diversification in *their portfolio*.

Managed Diversity: Risk Parity in the Portfolio

The strategic rationale for an asset class is whether it improves portfolio efficiency (i.e., the ratio of return-to-risk). The intransigent nature of expected returns and the measurable benefits of diversification implies that the risk component is more amenable to management. This statement does not suggest the irrelevance of the new asset class returns. An asset class's addition to the portfolio must achieve either a similar expected return at lower risk or a higher return at an equivalent risk level. For the former objective, adding Treasury Bills to the portfolio reduces portfolio risk and increases efficiency while sacrificing the portfolio's expected return target. In the latter goal, adding a higher return asset increases risk and may decrease portfolio efficiency. Irrespective of the aim, the addition of an asset class *must improve portfolio efficiency*.

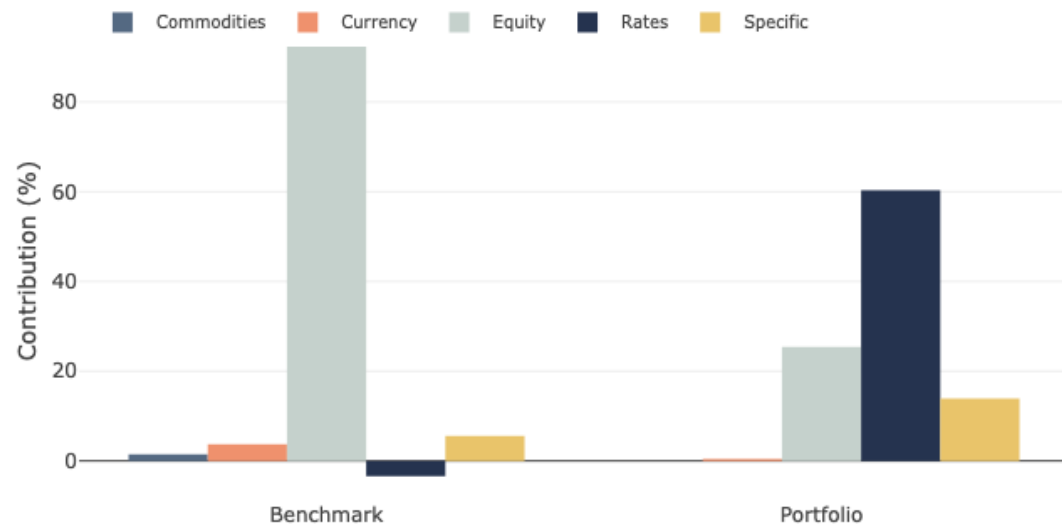
We take stock of our current inventory before we go to the store to buy groceries. Portfolio management is no different. The starting point for augmenting a portfolio with a new asset is the current risk factor exposure. Equity exposure dominates a traditional portfolio with interest rate risk providing minor diversification (see exhibit 4, p. 12). Thus, the investor's goal is to find an allocation that provides less equity exposure and diversification into the other factors.

*Interest rate
and diversified
risk offset
equity risk.*

Knowing the items available at the store is crucial before you go. A review of the risk factor provides a material insight into the benefits of risk parity. The formerly dominant risk factor, equity, is much less material to risk parity (exhibit 5). Interest rate risk exposure dominates at about 60%. Further, the specific risk accounts for over 10% due to the variability of the factors. These are beneficial ingredients for improving portfolio efficiency for the traditional portfolio. The risk analysis suggests that risk parity provides valuable diversification.

Exhibit 5. Risk Parity & Traditional Risk Factor Exposures

The risk factors are materially different.



Source: Capital Risk calculations. The benchmark is 60% Global Equities (ACWI) and US Aggregate Bonds (AGG). The Risk Parity portfolio targets 16% risk with allocations to four asset classes, rebalanced daily: US Equities (ITOT), Developed Equities (EFA), Emerging Equities (EEM), and US Long Treasuries (TLH). The period is June 2010 to June 2020. Weights are as of June 2020. The performance is hypothetical and does not reflect an actual investment.

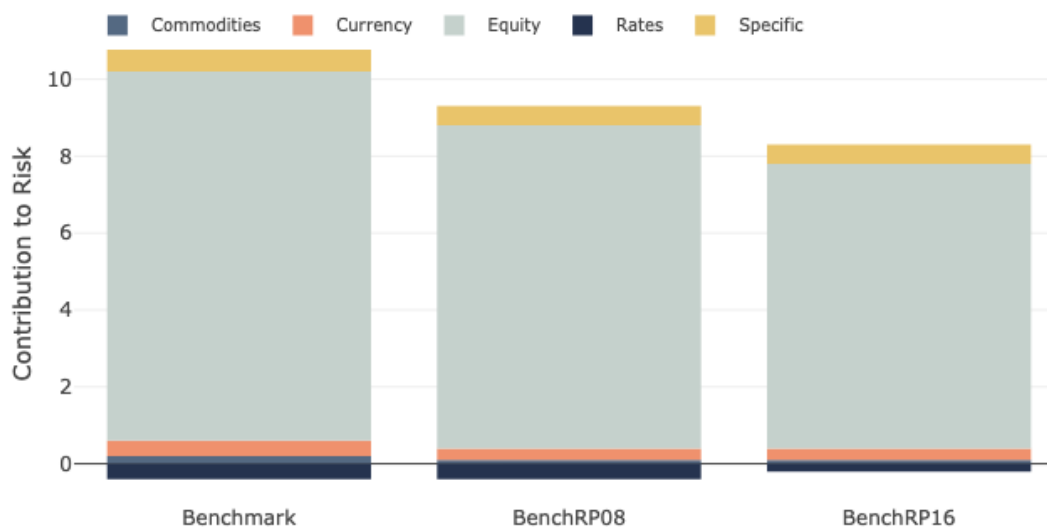
The mix of ingredients is vital to a good recipe. Portfolio construction is similar. The addition of a new asset or strategy requires removing another (although leverage is possible, it's not considered here). While any of the assets are possible, the risk target and risk factor exposure provide guidance. The risk parity target of 16% risk suggests replacing a similar risk asset, equities. The exposure to interest rates and higher specific risk suggests that it may act as a replacement for fixed income in a portfolio⁴. The goal of the addition is *enhanced efficiency*.

The new portfolio replaces 10% of the Developed ex-US equities with the risk parity target risk of 16%. The payoff is compelling. The traditional portfolio improves with every portfolio measure (exhibit 6). The return is parallel, the risk and drawdown are lower, while the ratio is higher than the *three*

⁴ For Barclay's Aggregate US Bond Index, about two-thirds of the index is in Treasuries or about 25% of a traditional portfolio with 60% equities and 40% bonds.

components. Further, there is a marked reduction in risk and *its composition with non-US equity reduced*. The benefits are palpable.

Exhibit 6. Risk Parity & Traditional Portfolio Risk Factor Exposures



Risk parity improves portfolio efficiency.

| Measure | Portfolio 60/40 | Risk Parity Vol= 8 | Risk Parity Vol= 16 | Portfolio 80/20 + RP8 | Portfolio 80/20 + RP16 |
|--------------|-----------------|--------------------|---------------------|-----------------------|------------------------|
| Return (%) | 7.3 | 3.9 | 16.2 | 7.2 | 9.0 |
| Risk (%) | 10.4 | 2.6 | 10.6 | 8.7 | 8.0 |
| Ratio | 0.70 | 1.49 | 1.53 | 0.82 | 1.12 |
| Drawdown (%) | 22 | 5.7 | 21 | 19 | 18 |

Source: Capital Risk calculations. The benchmark is 60% Global Equities (ACWI) and US Aggregate Bonds (AGG). Underlying asset class investments are in ETFs. For the Risk Parity Vol= 16% (RP16), the portfolio substitutes 20% of equities. For the Risk Parity Vol= 8% (RP8), the portfolio substitutes 20% of bonds. Portfolios rebalance monthly. The period is June 2010 to June 2020. All weights are as of June 2020. The performance is hypothetical and does not reflect an actual investment.

The case for risk parity in the portfolio is compelling. While the past is not a prelude, and the future may differ, risk parity's inclusion improved portfolio efficiency in the period evaluated. The demonstrated benefits to the portfolio include:

Enhanced Efficiency – Risk parity improves a portfolio's risk-adjusted return without sacrificing return. Further, the result is a portfolio that is higher in efficiency than its three components. This outcome displays the value of risk diversification.

*Risk parity
manages
portfolio risk.*

Capital Preservation – Risk parity reduced total portfolio risk and mitigated the maximum drawdown. In the last two decades, equity drawdown approached 50% twice, and the recent Pandemic crash saw equities fall over 30%. In the two most recent equity pullbacks, the portfolio with risk parity endured less of a drawdown.

Risk Factor Exposure – Risk parity reduces the factor exposure to equity, which serves to help mitigate the next equity bear market. In contrast, risk parity increases the exposure to interest rates to *balance* portfolio risk. While the risk to the portfolio from higher interest rates is material, the benefits of adaptation mitigate the impact by *preserving capital*.

While the portfolio benefits are apparent, there are more practical benefits for the investor. Transitioning into a risk parity allocation is a long process because of the required manager due diligence and the lock-up periods that provide access monthly, quarterly, or longer. Further, the inability to exit the strategy on-demand results in the investor bearing reduced liquidity in their portfolio. Risk parity address these concerns because *it is more practical*. Liquidity, accessibility, and transparency ensure an investor can invest without compromise.

Loss Aversion: The Source of Risk Parity Returns

The objective of risk parity is managing risk. A portfolio contains three principal drivers of risk: public markets, strategy, and uncorrelated return (“alpha”). The differentiation between the three is critical to portfolio management.

Public market beta is exposure to traditional assets, including equities and bonds. For US investors, typical indices that measure these returns profiles are the S&P 500 index for US large-capitalization stocks and the FTSE Broad Investment Grade Index for bonds. The price of these exposures is negligible with the advent of zero or near-zero cost ETFs for major stock indices. Beneficially, they are the dominant exposure for most strategies in public or private markets.

Strategy betas are alternative factors that may include value and size for equities, carry trades in currencies, yield curve strategies in bonds, and momentum factors in all markets. While not an exhaustive list, they convey the diversity of markets and strategies employed. They are also the second-largest component of the potential return stream. Crucially, these systemic exposures are accessible through focused ETFs at a low cost. This combination is valuable when constructing a risk parity portfolio.

Alpha or uncorrelated return is a return exposure that is unrelated to the prior two components. In investment theory, this is a measure of the manager's skill with positive values preferred. Complications exist with this factor exposure. Identifying active managers with talent in advance of the skill's realization is arduous and compelling research indicates its near impossibility. Even if persistently identifying the manager in advance existed, it may not matter.

Public market and strategy factors dominate index returns. Conveniently, the vast expansion in the number of ETFs over the last two decades permits

Risk parity
manages
factor
exposures.

efficient implementation of the well-reasoned rationale for a factor through ETFs (exhibit 7). The benefits are two-fold. First, the ETFs implement a strategy at a low cost. Second, the liquidity of the ETFs minimizes the execution risk. Thus, these investible strategies *increase risk factor accessibility*.

Exhibit 7: Deconstructing Risk Factors with ETFs

| Risk factor accessibility is inexpensive. | Beta | Factor | Index | ETF |
|---|----------------|-------------|------------------------|-----------|
| | Public Markets | Equities | Equity | ITOT, IVV |
| | | Bonds | Treasury Bonds | IEF, SHY |
| | Strategy | Value | S&P Core Value | IUSV, EFV |
| | | | MSCI EAFE Value | |
| | | Growth | S&P Core Growth | IUSG, EFG |
| | | | MSCI EAFE Growth | |
| | | Currency | US Dollar | UUP |
| | | Commodities | Gold, Oil | GLD, USO |
| | Alpha | Selection | Not applicable | |
| | | Timing | Time-varying model | |
| | | Liquidity | Conceded for liquidity | |

This illustration is hypothetical and solely intended for demonstration purposes.

Source: Capital Risk.

Since any active strategy is a zero-sum game, the exposure to skill is typically not present in a diversified portfolio as underperformers offset outperformers. This statement does not preclude a narrowly focused fund with a handful of managers from generating alpha. That is most likely the only way possible for an uncorrelated return to express itself in a portfolio. Further, some alpha is

the price for giving up liquidity (e.g., hedge funds). Risk parity's expectation is for no meaningful alpha from selection or liquidity because of diversification, which leaves *timing* as the only possible alpha source.

Risk parity is a *strategy*. The distinction is vital because a strategy is dynamic and changes positions over time. Conversely, a traditional fund manager is more static and may hold an investment position for years (i.e., value investor). In the former, exposures change over time with time-varying risk premia while constant in the latter. Thus, risk parity's crucial ingredient is to vary the market exposures over time by *avoiding risk when it increases*.

Risk parity
adapts to
avoid risk.

The mantra of buy-and-hold is as old as investing. The difficulty of timing the market is canon. Yet, in a diversified portfolio, the only way to beat the market is *timing*. Widely considered the greatest investor of all time, Warren Buffet invests with two dictums. Only buy good companies (properly, don't purchase bad companies) and *buy at a fair price*. The first is a tool to manage risk, while the second a comment on *when to buy*. Static or dynamic returns are irrelevant to risk parity because changing *risk indicates when to allocate*.

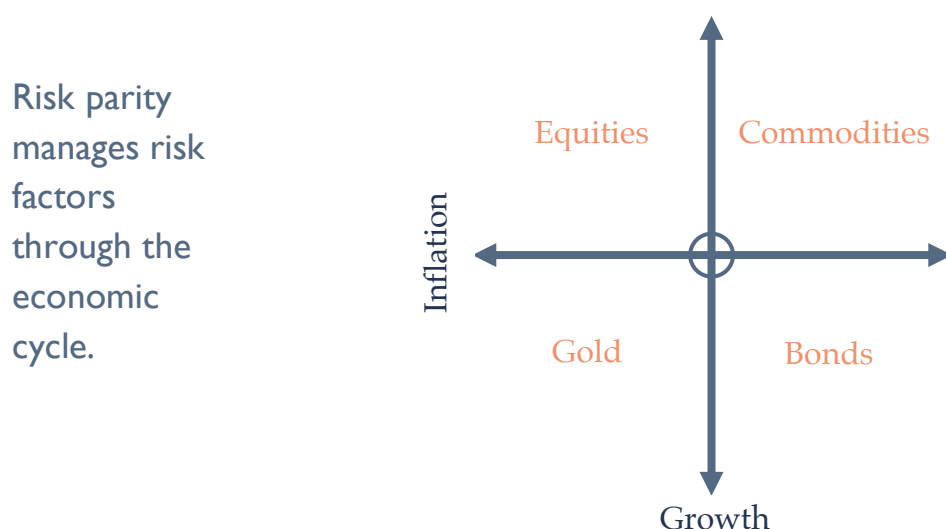
The challenge of return forecasting is complicated and broad in scale. The diversity of companies is immense. Since the total market is the consensus view of the market participants (i.e., fund managers) with specific company views removed, overcoming the forecasting obstacle is inconsequential in a diversified portfolio. Thus, it is possible to extract factor exposures through daily analysis of the index returns. A considered implementation is critical, and ETFs provide liquid and inexpensive vehicles. The benefit is clear: *efficiency and liquidity without a trade-off*.

Efficient Markets: Why Risk Parity Works

The explanation for why risk parity works reside in two parallel theoretical frameworks for investment. The first is modern portfolio theory that connects investment strategy to the public markets. The second is behavioral economics, which connects the strategy deployed to the universe of investment managers. These frameworks provide the rationale for risk management because *risk and return vary through time*.

The traditional rationale for risk parity is intuitively appealing. Risk parity traditionally argues that it balances exposure to risk factors that are difficult to forecast. An investor who maintains constant and equal exposures to various factors is not required to predict their levels. Through boom and bust times in the factors, gains in one factor offset losses in another factor. This argument is valid *if the factors are diverse*.

Exhibit 8: Risk Parity Macro Risk Factors and the Economic Environment

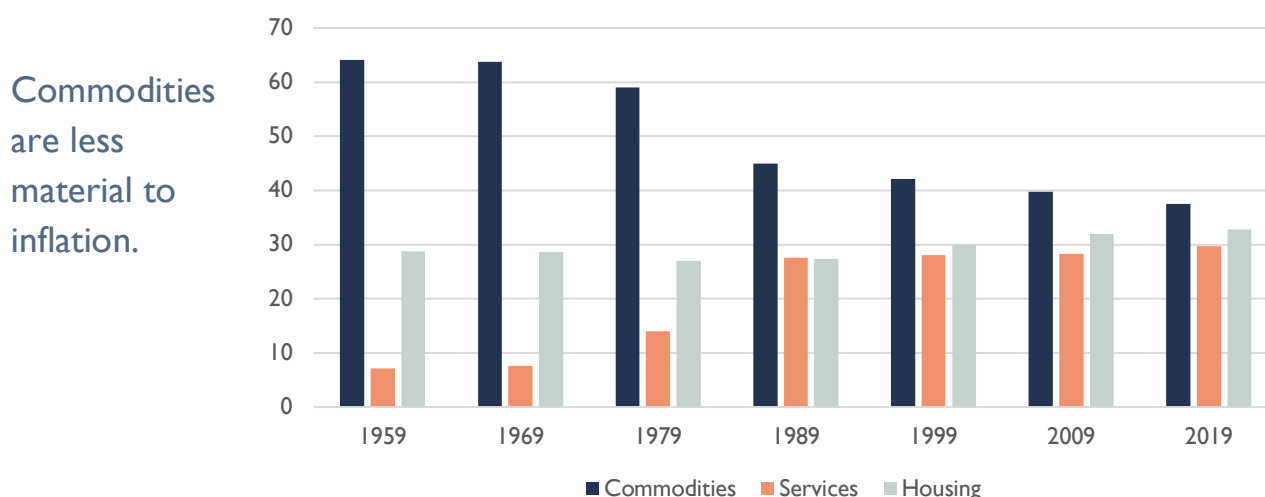


The standard macro factors are associated with different states of the economy (exhibit 8). Expanding growth with low inflation is an ideal environment for equities. High growth with high inflation argues for commodities. Low

growth and rising inflation support bonds. Low growth and low inflation suggest gold as a store of value. Since these economic states are unknown in advance, persistently accessing them is prudent and avoids forecasting. The benefit is a stable return stream through the economic cycle.

Challenges arrive when factors are related. The role of commodities is to hedge inflation risk. The composition, however, of inflation has changed through time. First, commodities as a proportion of consumer prices are nearly one-half the ratio that they were 60 years ago (exhibit 9). Thus, equalizing risk in a portfolio that includes commodities *overstates* the impact of commodities.

Exhibit 9. US Consumer Price Index Composition (1959-2019)



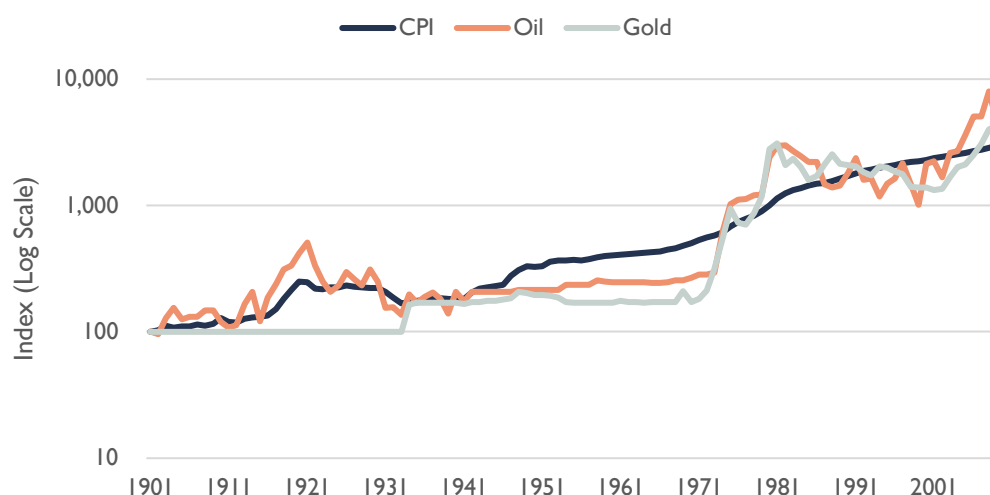
Source: United States Bureau of Labor Statistics.

There is a more significant concern than the declining impact of commodities on inflation and the follow-through to financial assets. The expected return for nearly all commodities is *negative* in real terms. Crude oil experienced a real return that barely exceeds zero in the historical data. As the world seeks to go carbon-neutral, the demand for crude oil will fall along with its expected return. The dominance of crude oil in the commodity index ensures the prospect of positive real returns for the index is improbable in the long-term.

Gold is a commodity unlike any other. It has no vital economic purpose besides relative scarcity. Jewelry drives commercial demand rather than industrial applications. This lack of purpose is not the problem; instead, it's the argument for gold as a store of value. Gold is used defensively during periods of uncertainty, whether driven by lower inflation or growth. Unfortunately, gold experienced a similar long-term return as crude oil: it barely beats zero in real terms.⁵

Exhibit 10. Gold, Crude Oil, & US Consumer Price Indices (1901-2019)

The real returns barely exceed zero.



Source: Federal Reserve Economic Database.

The argument for an asset's inclusion in the portfolio includes diversification or increased portfolio efficiency. A prerequisite of both is a positive expected return. The data suggests that commodities, including gold and crude oil, do not meet the hurdle. Their impact on inflation has declined, which makes them less effective as a hedge. Their past real returns barely exceed zero, with their prospective returns even dimmer. Thus, without a rationale for the inclusion of commodities or gold, the asset classes reduce to equities and bonds.

⁵ See Capital Risk's *A Primer on Commodities* that shows the long-term return is negative for all commodities except crude oil and gold. While there is an argument for the tactical positioning of commodities in a bond portfolio, the rationale for a permanent position is lacking.

Risk parity
does not
include
corporate
bonds.

Equities and bonds possess solid economic arguments. Equity returns are prospectively positive. The higher proportion of services (i.e., people) in inflation implies that business, thus equities, is a natural hedge to inflation. That leaves bonds as the counterbalancing asset in public markets and naturally brings up which bonds to include. Corporate bonds are equivalent to Treasury Bond and selling a put option on the equity. The investor is effectively taking a capped return (i.e., the option premium) for the prospect of losing many multiples of this amount. More worrisome is that when equity markets decline, so do corporate bonds as credit risk increases. Thus, the rationale for including corporate bonds disappears as they limit reward for similar risk, while not providing diversification when needed. This trait is counter to the principles of a risk-parity portfolio. It leaves Treasury bonds (i.e., the risk-free asset) as the bond of choice for risk parity strategies. This definition of asset classes for inclusion (e.g., equities and Treasuries) aligns with modern portfolio theory. This outcome is convenient when determining the rationale for risk parity strategies.

Modern portfolio theory suggests that the public markets are efficient and *time-varying*. There are two different drivers of time-varying risk and return. First, a company's value does not come from the firm's financial structure but the provision of the goods or services. The financial structure can transition the returns from one class of capital to another but *does not change the underlying value*. For example, a firm may increase leverage by issuing debt. This action results in two outcomes: higher return for the equity holders and higher risk for both capital providers. The implication is that even without changes in the broader economy, individual firms' behavior can alter their specific return or risk expectations.

Second, in evolving competitive markets, the field in which firms play changes. Even if a firm is individually inactive, the other firms can compete for market share or innovate to grow the market. The result from these actions is

changed return and risk expectations. Antidotally, this is why we drive cars rather than horses and why China emerged as an economic leader. The economy evolves, and so do return and risk expectations.

Risk parity does not require illiquid investments.

These relationships also apply to private market investments. While a significant portion invests in public markets, others invest in less liquid or private markets. This latter action does not change the value of the firm. It only differs in the frequency and confidence of the valuation. Critically, most illiquid securities' value derives from the robust price discovery process in the public market, and they borrow in public debt markets. Thus, investors are susceptible to public market variability, whether they invest in public or private markets. Materially, the implication is that risk parity *does not require illiquid investments* to achieve efficiency.

Behavioral finance suggests a few commonalities that impact risk parity. The *herding mentality* shows that managers and asset flows tend towards a common strategy or type of exposure (e.g., machine learning strategies). The investor exhibits a behavioral bias by falling for the *narrative fallacy* by seeking a good story for the currently popular strategy. The latter can lead to *confirmation* and *overconfidence biases* as asset flows in and validate the strategy. *Anchoring bias* suggests that managers will continue with an approach irrespective of the performance (e.g., value investing for the last decade) and leads to *loss aversion*. *Self-attribution* bias leads managers to suggest they are the ones that delivered the good outcomes while sheer bad luck drove the poor outcomes. These biases result in *common views* and *persistent factors exposures* that enable factor models to capture the exposures.

A linkage exists between the common views and the modern portfolio theory. The investment managers have differing opinions and allocations to a factor, which results in diversification of the strategies. The zero-sum outcome of strategies removes the unique alpha exposures in a diversified index. The

commonality is the diversified public market and strategy specific factors. The challenge is not identifying the public market factors. It is specifying the *amount of the factor exposure*, which risk parity defines with the level of risk.

Adaptation
improves
portfolio
efficiency.

Risk parity is a timing process. In a world of instantaneous pricing, the markets evolve rapidly. Thus, timeliness is paramount when managing factor exposures for an individual manager because the impact of small changes is large. At the index level, the result is different. The diversity of views provides efficiency because all managers do not frame information the same, nor do they share common starting points (i.e., for the same asset one may be short and another long). Further, the communication of data related to companies occurs quarterly in their financial reports. Economic data is similarly infrequent by occurring on a monthly or longer frequency. Thus, information disseminates gradually and results in *persistent factor exposures*.

Identifying the factors to represent the exposures in the financial markets is a laborious task. While dramatic strides in computation efficiency make the job manageable from a data science perspective, they are subject to overfitting and poor out-of-sample performance. Thus, the objective is an a priori economic rationale for the exposure while finding validity in and out of sample. There is material value in simplicity because it achieves *efficient implementation*.

The possibility of risk parity exists because an efficient market removes the alpha component. The remaining public market exposures are available in low-cost ETFs. Advances in computer capacity and data science enable the identification of the factor exposures. Thus, there is an ex-ante rationale for risk parity and enables *improved diversification through risk management*.

Better by Design: The Benefits of Risk Parity

The challenges to alternative strategies endure despite strides in market liquidity (i.e., ETFs) and data science (i.e., manager identification). While index return performance leaves investors wanting, it is not what provokes nascent alternative strategy investors. The critique tends to center on management fees, lack of liquidity, and opaqueness. Risk parity *resolves the conflict between investors and managers*.

Risk parity targets a *fixed* risk level by *design*.

The defining investment benefit is the ability of the investor to define their *risk level in advance*. While total risk is somewhat consistent with expectations at the total portfolio level, the individual asset risk is largely *undefined ex-ante*. Risk parity targets a *specific level of risk*, which the investor defines in advance. While the ultimate returns are mostly unknown, the investor is relatively confident of the realized risk level. This outcome includes the subsequent portfolio efficiency increases relative to the other assets. These attributes are unique to risk parity because it is a *design feature of the strategy*. In an investment world where uncertainty reigns, reduced uncertainty along one dimension is *valuable*.

A comparison of risk parity to alternative strategies highlights their benefits (exhibit 11). Risk parity provides a lower cost and efficient expression of the factor exposures that the investor seeks in their alternative strategy allocation. The lower cost stems from using passive strategies in the factor exposures through ETFs. There are two cost-savings. First, the ETFs utilized are low cost. Second, the ETF asset size provides liquidity that reduces execution and market impact costs. The capacity for a risk parity strategy constructed in this manner is not unlimited. Fortunately, its use of public market investments implies that it can offer a *similar capacity to public markets*.

Exhibit 11: Alternative Strategy Options and Characteristics

| Beta | Risk Parity | Alternative Strategy Index | Fund of Alternatives | Single Strategy |
|--------------|--|--|--|-------------------------------|
| Objective | Target stable return and risk level that meets overall portfolio objective | Exposure to alternative strategies with rules-based or unconstrained methods | Customized portfolio of alternative strategies to meet portfolio objective | Maximize returns |
| Risk Target | Yes. Investor defined. | No. | No. | Possible. Manger defined. |
| Investments | Liquid securities | Alternative strategies | Alternative strategies | Liquid or illiquid securities |
| Fees | Management | Management | Management & Performance | Management & Performance |
| Liquidity | Daily | Weekly or Monthly | Monthly / Quarterly | Monthly / Quarterly |
| Valuation | Daily | Weekly or Monthly | Monthly | Monthly |
| Transparency | Position level | Fund level | Aggregate positions possible | Aggregate positions possible |
| Constraint | Minimal | Some | Some | Material |
| Access | Immediate | Weeks | Months | Months |
| Activity | Passive | Passive | Active | Active |

This illustration is hypothetical and solely intended for demonstration purposes.

Risk parity offer numerous benefits.

The use of ETFs and other publicly traded instruments permits full and frequent transparency. In a world where investors increasingly demand to know what they own, this is material protection for those with a fiduciary standard. Further, in a world of increasingly advanced risk management, it permits a fuller understanding of the portfolio's exposures. Critically, this portfolio insight enables allocators to *take action*.

The liquidity and transparency permit tactical positioning for the investor. This ability may express itself through a rapid expansion into a risk parity investment to exploit an insight or remove an exposure. It may manifest itself by reducing the risk parity allocation to offset a vulnerability in the portfolio's less liquid alternative strategies. This latter ability permits an allocator to maintain their capacity with an alternative strategy manager that may impose gates or penalties on redemption. Thus, the strategic investor can *adapt to market events*.

*Risk parity
reduces
operational
risk.*

Alternative strategies are not without risk, particularly when they are opaque. This trait creates an operational risk for the investor that the performance data hides. The lack of timely or frequent transparency in the holdings brings susceptibility to a headline risk of a malevolent manager misleading the investor. Further, the complexity of the exposures and the operations presents a cumbersome and costly manager research initiative for each manager. Risk parity obviates this operational risk and *simplifies selection*.

Operational risk in alternative strategy investment expresses itself along two other dimensions. Better performing funds may be closed to new investors while still reporting to the index provider. The result is a narrower universe of managers for consideration and who may underperform the index. Further, societal or governance factors and regulatory constraints may restrict an investor from direct access to an alternative strategy. Risk parity delivers unburdened *governance* and unhindered *accessibility*.

Crossing the Divide: Implementing Risk Parity

The how, when, and where are important for risk parity.

The case for risk parity derives from the improvement of portfolio efficiency. Risk parity enables quicker implementation of an alternative strategy allocation. Further, the liquidity profile of the investor’s portfolio improves. The prior simplified case studies demonstrate these beneficial attributes, which exhibit 12 highlights. The studies show *how* risk improves the portfolio, *when* an allocation can occur, and *where* the liquidity profile improves. This evidence reveals that risk parity delivers an efficient outcome tailored to the investor’s *specific risk and return* requirements while enabling enhanced accessibility and liquidity.

Exhibit 12: Risk Parity Address the Challenges of Alternative Strategies

| Challenge | Solution |
|------------|--|
| Costs | <ul style="list-style-type: none">• Reduced search and selection costs• Reduced management costs• Reduced oversight costs |
| Liquidity | <ul style="list-style-type: none">• Daily liquidity• Decreases time to access |
| Policies | <ul style="list-style-type: none">• Alleviates policy constraints• Overcomes governance burden• Reduces regulatory burden |
| Management | <ul style="list-style-type: none">• Allows scaling of risk parity exposure• Enhances the expression of views• Improves risk management integration |

This illustration is hypothetical and solely intended for demonstration purposes.

Practical considerations are paramount for implementation. Risk parity usually requires the use of leverage in the portfolio. This outcome occurs because of the lower volatility of the Treasury assets relative to the higher risk equity assets. In this strategy, the use of leverage is reduced *by design*. This beneficial result occurs because the strategy targets a specific volatility level for the risk parity strategy while deploying *longer duration* Treasury bonds. The result does not entirely remove the need for leverage in the portfolio but materially diminishes it. Since leverage can still exist, a few implementation challenges require addressing.

Risk uses leverage including derivatives.

The use of leverage requires financing and is where derivatives are valuable. Treasury futures are among the world's largest financial market, with a daily turnover in the billions. The Treasury futures market's financing cost is three-month LIBOR, a rate parallel to a single-A credit rating. For most companies, this cost of financing is equal to or lower than their own. Most significantly, this does not require assets sales or other financing activities for implementation. The implication for most portfolios is that duration extensions is not an *access* issue, but a *communication* concern. Thus, effective communication to the *key stakeholders* of the strategy's benefits are critical.

One crucial dimension of utilizing derivatives is managing the collateral required to back the positions. There are two issues to address. First, earning a return parallel to the LIBOR rate, which is achieved with collateral invested in Treasury bonds with a duration of two years. This additional term return compensates for the credit spread in the LIBOR return. While adding interest rate risk, it may *reduce* the amount of required leverage versus a pure cash strategy that has shorter duration. Second, the credit risk of the portfolio is trivial by maintaining daily mark-to-market positions. Thus, this implementation minimized further credit risk with additional asset risk, the primary outcome of *any* risk parity implementation.

The critical issue with the implementation in this manner is the impact of adverse movement in Treasury rates, which could cause a liquidity constraint.

By deploying long-duration Treasury bonds (e.g., 10-20 years), the need for leverage is reduced by half.⁶ Exposure to a specific yield curve segment (e.g., 10-20 years) implies that *yield curve risk* is not diversified. This risk is primarily a concern when the yield curve is negatively sloped (i.e., short-term yields are higher than long-term yields), which is an infrequent occurrence. Fortunately, this drawback results in reduced leverage, reduced implementation requirements, and the prospect of earning a return on the excess capital when the portfolio does not require a full investment. Critically, the interest risk sensitivity (i.e., dollar duration) is *not* materially different. Thus, for most investors, these trade-offs appear to deliver a more efficient implementation; however, each investor's goals and policy constraints will require actions unique to them.

The sequence of returns will differ from the public markets.

There is one risk that remains for a risk parity portfolio. The sequence of returns will be different from the other assets in the portfolio. This outcome is by design. The challenge is that extended periods of deviations from the other asset class returns may bring questions during poor relative performance periods. Robust communication with the key constituents helps manage this challenge, highlighting the long-term focus on the strategy and the underlying principles that drive the performance. Conveniently, this discussion is not different from the one held for any asset class, strategy, or strategic asset allocation.

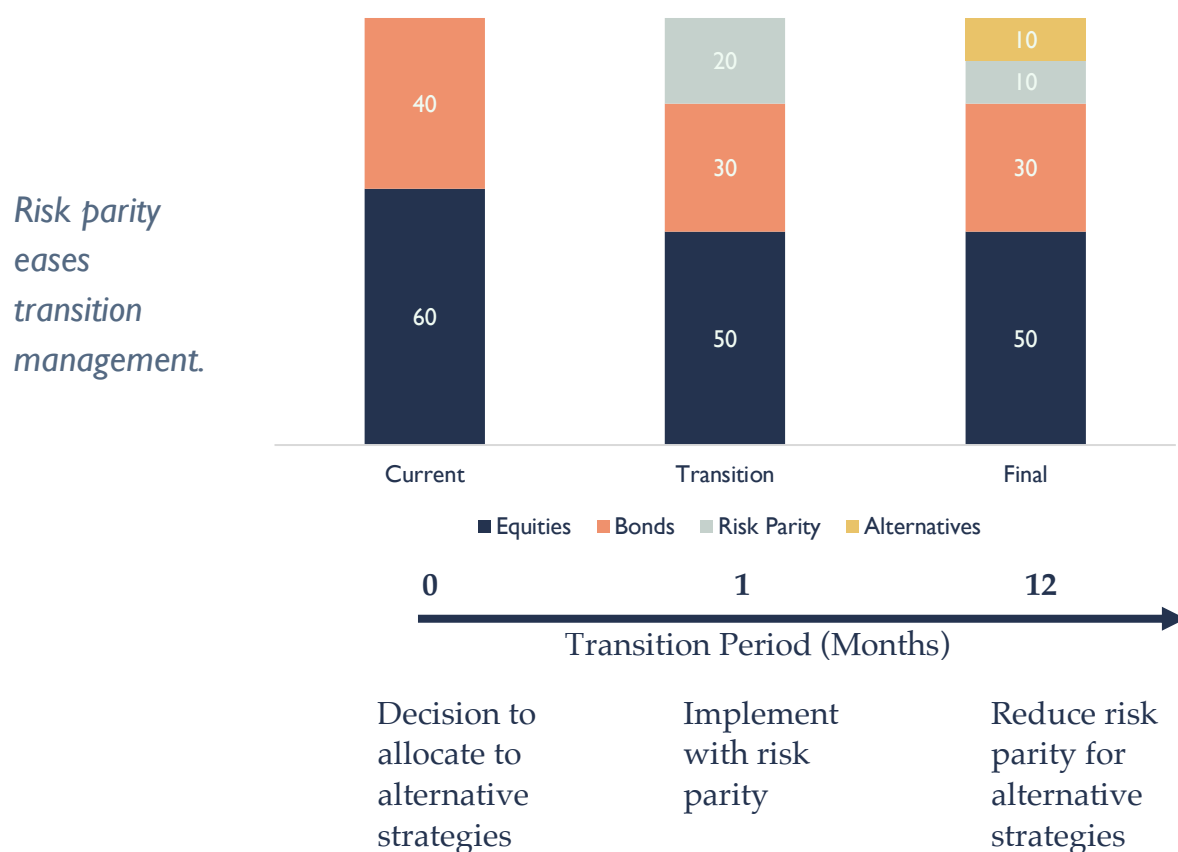
The difference for risk parity is that the assets are transparent, the investment liquid, and the rationale for adaption in efficient markets solidly grounded in theory and practice. While there is no certainty of returns, the *risk management* focus should increase *portfolio efficiency* for both the investment and the total portfolio. Indeed, an investment can't meet cash flow needs with portfolio efficiency alone. In the final analysis, an asset class's delivery of the expected return is the *key performance indicator*. Risk parity is not different in this regard.

⁶ As of June 2020, the iShares US Treasury Bond ETF's (GOVT) duration is seven versus 15 for the comparable 10-20 year ETF (TLH).

Allocation Transformation: Managing the Transition

An abiding complication for alternative strategy investing is implementation. Once an investment committee approves risk parity as a strategy, the implementation begins. This process usually includes multiple prospective manager due diligence, the provision of liquidity from the current portfolio, and the final investment when the manager opens to a new investment. This prolonged process may last a year. Risk parity materially reduces the gap because it is a *process* (exhibit 13). Approval of the process means that it is merely a function of identifying an implementation manager. Further, its liquidity permits it to act as a transition strategy to *other* alternative strategies. Both capabilities *considerably reduce the transition gap between decision and action*.

Exhibit 13. Transition into Alternative Strategies with Risk Parity

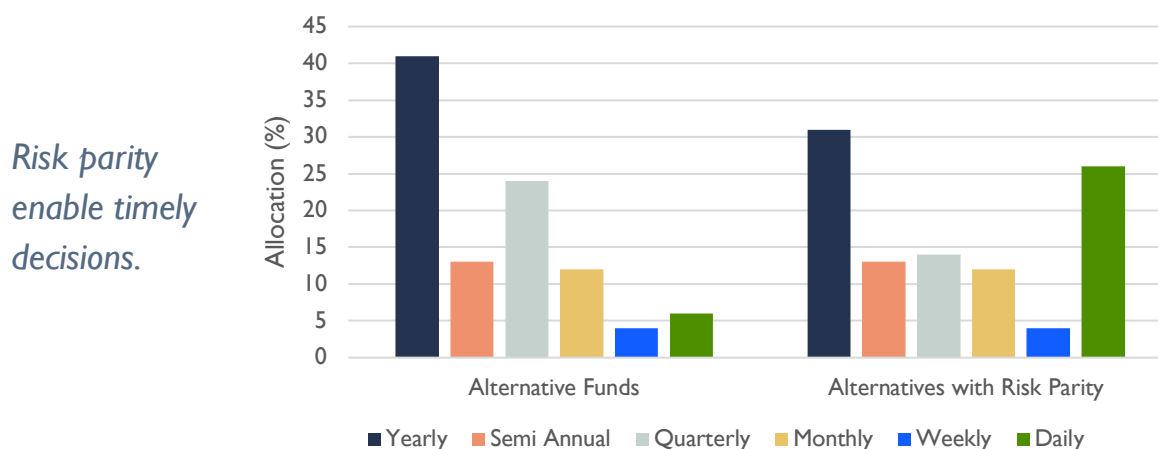


For illustration only. This example does not reflect an actual investment.

Enabling Action: The Benefit of Amplified Liquidity

A pressing concern for investors in alternative strategies is the lack of liquidity. Most investors are locked for six months or longer, with nearly 80% exceeding a quarter (exhibit 14). This constraint is material for investors. The risk is selling either corporate bonds or equities that declined during a market crash. While no guarantee exists that a risk parity strategy does not decline, their liquid nature and the preponderance of short-term income-producing assets provides a degree of security that their *value falls less*.

Exhibit 14. Liquidity Profile for Investors in Hedge Funds



Source: Liquidity profile is from "Hedge Funds: Portfolio, Investor, and Financing Liquidity," Aragon et al., 2017, Securities and Exchange Commission. The portfolio replaces 20% of the alternative with risk parity. Adjustment is hypothetical. For illustration only and does not reflect an actual investment.

The impact of allocating twenty percent of the alternative allocation to a risk parity strategy is material. When reducing the two largest liquidity profiles by 10% each, yearly and quarterly, the average maturity drops to 122 days from 157 days. Critically, monthly liquidity or better increases to 42% from 22% for the hedge fund allocation. In the total portfolio with a 20% alternative allocation, eight percent is available for reallocation. This amount meets the rebalancing needs of most investors. In practical terms, risk parity *enables tactical decisions*.

A Balanced Conclusion

The universe of alternatives provides a diverse array of strategies as substitutes to traditional asset classes. The increasing integration of the financial markets and the proliferation of alternative managers ensure competition for alpha. The expansion of ETFs and data science magnify these trends by empowering more investors to access these different return strategies. In a diverse portfolio of strategies, the result is that *uncorrelated alpha to the significant public markets is minimal*.

Risk parity invests through balance and adaptation.

The benefits of risk parity are many and emanate through the focus on *balance* and *adaptation*. The result is that risk parity improves a traditional portfolio's efficiency and reduces the major risk factor exposures. Risk parity delivers lower costs, increased transparency, and enhanced liquidity to the investor. These are measurable benefits. The demand for alternative strategies may increase as near-zero interest rates linger. Risk parity is a compelling argument to the investor and fiduciary seeking to manage their portfolio risk, liquidity, and cost. Risk parity empowers them towards their strategic objective, a diversified portfolio.

Practicality for an investor is paramount. Risk parity enables timely transition management by closing the implementation gap, promotes tactical decisions with enhanced liquidity, and advance risk management through transparency. In a world with an increasing fiduciary standard, *risk parity invests without compromise*.

Important Information on Back-Tested or Simulated Performance

The analysis includes data from Hedge Fund Research Liquid Alternative Universe Index and the Credit Suisse Liquid Alternative Beta Index. The performance was simulated to measure how a portfolio of ETFs and indices designed to track hedge fund indices would have performed in the period beginning December 31, 2007. The simulated returns reflect execution at daily closing prices with no transaction costs. Any earned or paid interest occurred at market rates for invested or borrowed cash. The index portfolio weights were computed using daily data. Index rebalancing occurred on the first day following the computation of the portfolio weights and when all required investments vehicles were tradable in the market. Capital Risk Management, LLC (Capital Risk) conducted all analysis using a proprietary system and makes no representations or warranties to third party data used in the analysis.

The simulated performance shown is for illustrative purposes only and does not represent actual performance of the index. Capital Risk does not represent that the actual performance would reflect the simulated performance had the firm managed the index or accounts in this manner. Simulated or back tested performances are inherently limited and may include the following: (i) hindsight bias: the data used is historical and does not reflect the investment process as it might have occurred under the varying economic and market events that transpired during the period. No back tested or simulated performance can truly account for all the financial risk in actual performance and will invariably show positive rates of return. (ii) Transaction and market impact costs are not included and thus it does not reflect actual implementation of the trading strategy. (iii) Investor psychology is not addressed and thus does not account for the investors ability to withstand losses, harvest profits, or other actions that are known to impact investors. (iv) Assumptions are used in the model and they impact the outcomes. Thus, similar results may not occur in the actual management of indices. No representation or warranty is made as to the reasonableness of any assumptions made or that these assumptions are completely stated or fully considered. Assumption changes may materially impact the returns presented. This material does not represent any index's performance. Investors should not assume that they will experience similar investment performance to the back-tested or simulated performance shown. Material differences frequently occur between back-tested or simulated performance results and the actual results subsequently realized by any investment strategy.

Back tested or simulated results are achieved with the benefit of hindsight and model is designed with a retroactive application and is unlike an actual performance record based on the actual trading of assets withing a portfolio. Back tested or simulated performance does not reflect an adviser's decision-making process if the adviser were managing a portfolio when material economic or market factor events occurred. Adjustment of the investment strategy may occur at any time, for any reason and can continue to change until achieving a desired or better performance result. Thus, back tested or simulated performance results will differ from actual realized performance. The back-tested or simulated performance includes hypothetical results that do not reflect the reinvestment of dividends and other earnings or the deduction of advisory fees, brokerage or other commissions, and any other expenses that a client would have paid or actually paid. No representation or warranty is made that any index will or is likely to achieve profits or losses comparable to those shown. Other modeling techniques or assumptions might produce significantly different results and prove to be more appropriate. Historical back tested or simulated results are neither indicators nor guarantees of future returns. Frequently sharp differences between back- tested or simulated performance results and the actual results subsequently achieved occur. As a sophisticated investor, you accept and agree to use such information only for the purpose of discussing with Capital Risk your preliminary interest in investing in the strategy described herein.

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