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# Can Risk Parity Outperform If Yields Rise?

## *Risk Parity in a Rising Rate Environment*

### Executive Summary

- Risk parity investment strategies can outperform traditional portfolios in a moderately rising rate environment, even if the cumulative rate increase is large
- Short periods of sharply rising rates can hurt any asset allocation strategy, but risk parity is likely more vulnerable to rate shocks than traditional approaches
- Risk parity offers a modest but real edge over traditional asset allocations, outperforming a little more often than not, which can compound to a large advantage over time<sup>1</sup>
- Over the long term, we believe diversification should win

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<sup>1</sup> Based on a simple risk parity simulation discussed further in this paper. Futures and commodity trading involves substantial risk of loss and is not suitable for all investors.

Please read important disclosures at the end of this paper.

## Rising Rates – What, Me Worry?

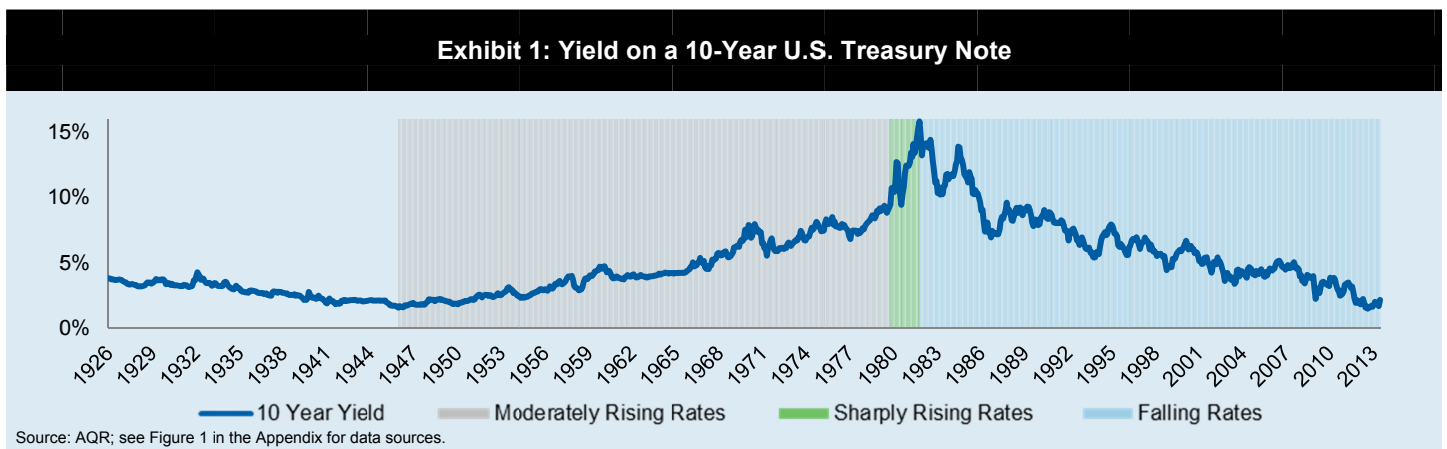
The recent sharp rise in global government bond yields combined with a tough quarter for risk parity portfolios has awakened a cacophony of risk parity critics to exhale<sup>2</sup> a triumphant “I told you so!” Critics argue that risk parity is destined to perform poorly in a rising rate environment, and thus conclude that the strategy is currently unattractive since interest rates are still at low levels and will eventually rise further. This short note seeks to dispel a common misunderstanding about risk parity and focuses on examining how we believe the strategy may perform in a prolonged period of rising interest rates.

One of the popular misconceptions in the financial media and in some of the professional literature is that risk parity investing is nothing more than “leveraging bonds.” However, in reality, many risk parity portfolios only dedicate about a third of their risk budget to global nominal and inflation-linked government bonds, leaving the majority of the risk of the portfolio invested across global equities, commodities, and, sometimes, credit and currencies. While a risk parity portfolio is more exposed to interest rate changes than traditional balanced stock and bond portfolios, which are highly concentrated in equity risk, the strategy’s goal is to rely more equally on all asset classes—fixed income included—rather than relying excessively on stocks or on bonds. Risk parity is a strategy that says, “A more risk-diversified portfolio should perform better over time than a concentrated portfolio for a given level of risk.” Risk parity exists to enable investors to diversify across risks, something that traditional asset allocations fail to provide because they are enormously concentrated in equity risk.

While the ideas behind risk parity have been around since the 1950s, implementation of the strategy began in the late 1990s, coinciding with a period of falling interest rates. It is therefore important to understand how the strategy may perform if we were to enter a sustained period of rising rates.

Exhibit 1 is a chart of the yield on the U.S. 10-year Treasury note from 1926 to the present. We focus on the shaded sub-periods during which yields have moved a full round trip from a low around 1.6% in November 1945, to a high of 15.8% in September 1981, and back down to around 1.6% just a couple of months ago. While the past is never a perfect precursor of the future, by focusing on a period where rates made a significant round trip, we hope to avoid the bias that can occur when looking only at performance over a falling rate period. We break the sample into three sub-periods: moderately rising rates, sharply rising rates, and falling rates so that we can further explore how risk parity and traditional portfolios may have performed under each broad scenario.

In order to examine the performance of the risk parity strategy, including its performance in a rising rate environment, we simulated returns to a simple three asset class risk parity strategy back to August 1947. We begin the simulation here, slightly after the low in yields of November 1945 cited earlier, as that is when we start to have meaningful commodities futures price data.<sup>3</sup> The simple risk parity strategy targets an equal amount of risk in equities, bonds and commodities. It is rebalanced every month to target a constant portfolio volatility of 10% annualized. To target portfolio volatility, we use a simple



<sup>2</sup> ...after a very long period of holding their collective breath.

<sup>3</sup> Commodities performed very well from 1945 to 1947 based on spot price changes, so risk parity would have benefited even more if we could have started the analysis earlier in November of 1945, but we wanted the analysis to represent the returns to investable commodity futures.

**Exhibit 2: Performance of Simple Risk Parity Strategy and Traditional 60/40 Portfolios**

	Total Annualized Gross Returns			Volatility			Sharpe Ratios		
	60-40 US	60-40 Global	Risk Parity	60-40 US	60-40 Global	Risk Parity	60-40 US	60-40 Global	Risk Parity
<b>By Sub-Period:</b>									
Rising Rates: 1947-1981	7.0%	8.3%	10.7%	9.0%	7.2%	10.3%	0.30	0.57	0.62
Falling Rates: 1981-2013	11.0%	10.5%	12.8%	10.1%	9.7%	9.3%	0.65	0.63	0.90
Full Sample	8.9%	9.4%	11.7%	9.6%	8.5%	9.9%	0.48	0.59	0.74
<b>By Decade:</b>									
1947-1949	6.9%	3.4%	14.9%	8.7%	7.3%	9.1%	0.67	0.32	1.52
1950-1959	11.8%	13.2%	14.1%	7.2%	5.1%	10.7%	1.37	2.20	1.14
1960-1969	5.5%	6.7%	8.3%	7.9%	5.5%	10.5%	0.19	0.49	0.41
1970-1979	5.0%	7.1%	11.3%	11.0%	9.2%	10.0%	-0.12	0.09	0.50
1980-1989	15.3%	17.2%	14.1%	12.3%	10.4%	10.3%	0.53	0.81	0.52
1990-1999	13.8%	10.8%	13.3%	9.3%	9.2%	10.1%	0.96	0.65	0.84
2000-2009	2.5%	3.4%	9.9%	9.5%	9.7%	8.5%	-0.02	0.08	0.85
2010-2013	11.2%	8.6%	7.5%	7.6%	8.6%	7.8%	1.47	0.99	0.94

Source: AQR; the simulated Simple Risk Parity Strategy is based on a hypothetical portfolio. Please see Appendix for disclosures relating to hypothetical results.

forecast for asset volatility: the most recent realized 12-month volatility for each asset class.<sup>4</sup> Figure 1 in the Appendix contains more details on the global basket of equities, bonds and commodities utilized in this study.<sup>5</sup> Bear in mind that the point of this analysis is not to show precisely how risk parity would have done in 1947; we can't turn back the clock and invest the portfolio. Instead, its aim is to be illustrative of how risk parity could perform going forward should we experience a market environment similar to the postwar period, which included a prolonged and substantial rise in interest rates.

Exhibit 2 contains some performance statistics for both the simple risk parity strategy and traditional 60% stock, 40% bond portfolios (both U.S. only and global).

<sup>4</sup> We analyze here a simulation of a basic risk parity implementation. The methods of implementation vary significantly across different risk parity managers. The instruments used and markets invested in, the amount of effort to maintain constant total and relative risk contributions, risk forecasting techniques, the inclusion of active tilts around a risk parity core, and how each manager deals with drawdowns will affect the year to year outcomes. These implementation choices can lead to large differences in the short term, and potentially material differences in the long term, though they are a topic for a different paper. We have studied many of these implementation differences and can say that the results shown in this paper are robust to the various methodologies of implementation as long as there is global diversification within stocks and bonds and meaningful exposure to commodities.

<sup>5</sup> The simulation contains whatever markets we have returns for at each point in time historically. The appendix gives more detail on when each market becomes available for the simulation. Starting in August 1947, there were only a few global equity, bond and commodity markets available. This creates a portfolio that is (too) narrow within each asset class. The point of this exercise is to convey an economically representative simulation of how a risk parity portfolio might perform over one particular rising rate scenario, not to argue that this is what would be achieved from a portfolio that someone would have or could have invested in at the time. As such, we left out things like historical financing and transactions costs – modern day financial market tools like equity and bond futures markets and repo financing didn't exist so the implementation of many types of portfolios were infeasible back then. We do, however, think this study is representative of how a risk parity portfolio would perform today, gross of transactions costs and fees, if a similar environment unfolded going forward. Importantly, subtracting today's transactions costs, financing costs and fees (which would be relevant going forward) would not materially change the results shown.

The simple risk parity strategy outperformed, in both total and risk-adjusted returns, both the U.S. 60/40 portfolio and the global 60/40 portfolio<sup>6</sup> over the full sample, over the 1981 to 2013 period of falling rates, and, perhaps to the surprise of many, over the 1947 to 1981 period of rising rates. If we were to study a risk parity strategy that only invested in U.S. stocks and bonds, as some studies have done, we would find that the two market risk parity portfolio would have underperformed during this period. However, risk parity is not implemented with only U.S. stocks and bonds. Having global diversification within stocks and bonds and broad diversification into commodities is more representative of actual risk parity portfolios, and incorporating these other markets changes the results dramatically.

While risk parity did well overall, including the long period of rising rates, it is vital to point out that risk parity can underperform other asset allocation methods for extended periods, as seen in the table above. Risk parity, in our view, offers a modest long-term edge over a traditional allocation—an edge that persists even in long-term periods of rising rates—but it is not an arbitrage or a panacea. To reap the potential long-term benefits of any investment strategy that has a real but modest edge requires investors to be disciplined enough to stick with it for the

<sup>6</sup> The US 60/40 portfolio consists of a 60% allocation to US Equities and a 40% allocation to US 10 year treasuries, rebalanced monthly. The global 60/40 portfolio consists of a 60% allocation to GDP-weighted global equity markets and 40% GDP-weighted global 10 year treasury markets, rebalanced monthly up until January of 1970 at which we use the MSCI World Equity index for the equity portion. Prior to 1970 we did not have market capitalization figures for all of the global equity markets. We incorporate whatever global markets we have data for at each point in time, and the bond portion of the global portfolio is currency hedged as is more common investment practice. The risk parity portfolio is currency hedged throughout as that is the standard implementation.

## Exhibit 3: Performance Comparisons across Three Sub-Periods

	Total Annualized Gross Returns				60-40 US	Volatility		60-40 US	Sharpe Ratios		% of Months
	60-40 US	60-40 Global	Risk Parity	Cash		60-40 Global	Risk Parity		60-40 Global	Risk Parity	
<b>By Sub-Period:</b>											
Moderately Rising Rates: August 47-September 79	7.5%	8.7%	11.9%	3.8%	8.8%	6.8%	10.0%	0.42	0.72	0.81	49%
Sharply Rising Rates: October 79-September 81	0.0%	3.1%	-6.7%	12.7%	13.0%	11.7%	14.4%	-0.98	-0.82	-1.35	3%
Falling Rates: October 81-June 13	11.0%	10.5%	12.8%	4.4%	10.1%	9.7%	9.3%	0.65	0.63	0.90	48%
Full Sample	8.9%	9.4%	11.7%	4.3%	9.6%	8.5%	9.9%	0.48	0.59	0.74	100%

Source: AQR; the simulated Simple Risk Parity Strategy is based on a hypothetical portfolio. Please see Appendix for disclosures relating to hypothetical results.

long term (or be able to forecast its periods of underperformance with a precision often claimed but rarely realized).

### Rising Rates – Speed Matters

Risk parity allocations and, very commonly, traditional allocations tend to suffer in periods of rapid, unexpected rate increases. Rate shocks can induce investors to de-risk their portfolios, and in the short term, turn to cash as the best investment. When rates rise sharply—more quickly than the market expects—the present value of future cash flows from long duration assets, like stocks and bonds, are reduced. It's fairly obvious that sudden yield increases directly hurt fixed income investments (both nominal and inflation-linked), but its effect on equities can depend on the circumstances. For equities, their reaction to higher yields can come down to whether the higher expected cash flows from earnings and dividend growth are enough to overcome the higher discount rates of those future cash flows.

Based on this simulation, risk parity portfolios have tended to perform well in environments when rates are steady, falling, or even rising at a moderate pace. To highlight performance during

a period of rapidly rising rates, we chose the two-year period in the sample where yields rose the most (and bonds fell the most) and labeled that the “Sharply Rising Rates” period. Exhibit 3 shows performance comparisons across the three sub-periods from the simulation.

From August 1947 to September 1979, the yield on the 10-year U.S. Government Note rose from approximately 1.8% to 9.4%, an increase of 760 basis points over a 32-year period. The risk parity portfolio handily beats the two traditional portfolios during this period. However, from October 1979 (a couple months after Paul Volcker was appointed Fed Chairman) to September 1981, yields on 10-year Treasuries quickly rose an additional 640 basis points to an annualized yield of 15.8%. During this short period, all portfolios significantly underperformed cash, with the risk parity portfolio suffering the most.

How did the risk parity portfolio outperform during the long period of moderately rising rates even though it has a larger allocation to fixed income risk than the traditional portfolios? Exhibit 4 shows performance characteristics of the different asset classes over these three broad sub-periods.

## Exhibit 4: Performance Characteristics of Different Asset Classes across Three Sub-Periods

	Total Annualized Gross Returns				Stocks	Volatility		Stocks	Sharpe Ratios	
	Stocks	Bonds	Commodities	Cash		Bonds	Commodities		Bonds	Commodities
<b>By Sub-Period:</b>										
Moderately Rising Rates: August 47-September 79	11.1%	4.2%	14.6%	3.8%	10.2%	3.0%	15.4%	0.71	0.12	0.70
Sharply Rising Rates: October 79-September 81	10.0% <sup>7</sup>	-1.3%	-3.0%	12.7%	12.4%	11.2%	17.5%	-0.22	-1.26	-0.90
Falling Rates: October 81-June 13	9.7%	9.7%	6.3%	4.4%	14.5%	6.3%	13.4%	0.36	0.83	0.14
Full Sample	10.4%	6.6%	9.9%	4.3%	12.5%	5.3%	14.5%	0.48	0.43	0.39

Source: AQR

<sup>7</sup> All three asset classes lost to cash during the quickly rising rate sub-period. Stocks posted positive nominal returns during this brief sub-period, but lost to cash leading to a negative Sharpe ratio.

There are several interesting observations to note. First, all asset classes provided a healthy risk-adjusted return over the full period. Second, even during extended periods where certain asset classes failed to deliver significant risk-adjusted performance (bonds from 1947 to 1981 or commodities from 1981 to 2013) the more diversified risk parity portfolio outperformed. Third, bonds as an asset class still provided positive performance in excess of cash during the long period of moderately rising rates.

It is a common misperception that it's easy to time the bond market if one can have a good sense for where interest rates are headed. However, in order to add value from "timing" the bond market, not only must one predict the future direction of interest rates correctly, but also be right on the speed and magnitude of the yield moves – a fairly difficult task. The reason for this is because bond prices reflect the market's expectation of the future path of interest rates. Investors usually expect rates to rise which leads to an upward sloping yield curve (yields further out in the future being set higher than short term yields). Upward sloping yield curves enable bond investors to earn both the coupon and the 'roll down' return as long as the term structure remains similar, giving bond investors a cushion against the possibility of rising yields. If yields do not rise as expected, bond investors typically enjoy high risk adjusted returns. If bond yields rise as expected, bond investors have still historically earned a risk premium (to perhaps compensate for the risk that yields could have risen more). This explains why, over this long period where rates rose quite substantially, bond investors were still able to enjoy positive returns in excess of cash.

Finally, during the postwar period we studied, equities did perform the best of the three asset classes on a total and risk-adjusted basis. Equities were fairly cheap on a fundamental basis in August 1947, with U.S. equities boasting a P/E ratio of only 11.3 at the time (26th percentile), while at the end of the sample, June 2013, their P/E stands at a fairly high 23 (86th percentile).<sup>8</sup> As a result, equities were able to enjoy the windfall gains from earnings multiple expansion during the postwar period while bonds experienced something closer to a round trip in terms of valuation. This highlights the tremendous power of diversification. By studying a period that is a round trip for

bond yields and a period of sharply rising equity valuations, we have analyzed a period specifically biased against risk parity and toward the equity risk dominant 60/40 portfolios. Despite the headwind against risk parity during this period, diversification still proved superior to concentration. **Even if you knew ahead of time that equities would perform the best over this period, you still benefited by diversifying your portfolio.**

During the long period of moderately rising rates, commodities and equities performed well enough to offset the anemic performance of fixed income. Of course, that doesn't have to happen going forward. There are many potential paths markets could take. Among many other possibilities, here are five scenarios to consider:

- 1) **Rates could fall further.** This is the "Japan" or global deflation scenario. Central bank efforts fail to have lasting impact, and economic growth and inflation remain anemic. Of course, while not a good economic scenario, risk parity should hold its own, or better, as fixed income would likely outperform other asset classes.
- 2) **Rates could stay at similar levels as now.** Growth remains anemic and inflation remains subdued. There may be below average returns to stocks and commodities, but bonds would likely do well in this scenario as investors would collect the coupon and realize gains from the roll down of the currently steep yield curves.
- 3) **Rates could rise due to higher growth expectations** (real rates rise but inflation remains in check). Growth assets, like stocks, may perform well, as may industrial commodities (due to increased demand). Precious metals and inflation-linked bonds could suffer along with nominal bonds. Diversified portfolios, like risk parity, would likely produce reasonable positive returns, but lag traditional portfolios because their concentrated exposure to equities should do well.
- 4) **Rates could rise due to increases in inflation expectations.** Stocks and nominal Treasury bonds would likely suffer in this scenario, but commodities and inflation-linked bonds could provide refuge.
- 5) **Rates could rise due to a global sovereign credit crisis or because central banks lose control of monetary policy.** While not a likely scenario, it's a plausible one. Most asset classes would likely decline in this scenario, and therefore, diversification is of little help. Here the key is capital preservation for which risk management should come into

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<sup>8</sup> Whether equities can repeat this performance in the years to come remains to be seen. We are referring to the CAPE, or Cyclically Adjusted P/E ratio made famous by Dr. Robert Shiller (<http://www.econ.yale.edu/~shiller/data.htm>). Please refer to our discussion on equity valuations in our whitepaper: "An Old Friend: The Stock Market's Shiller P/E."

play.<sup>9</sup> After this scenario plays out, there would likely be many cheap assets to invest in, so having relatively more capital to invest is critical.

The reality is that the future could bring one or more of these scenarios, and our humble forecasts about how different markets may react to each are only that: forecasts. Markets can be surprising. We believe our best defense against surprise is building a strong foundation that doesn't rely on our forecasts being right, but instead relies on a long-term expectation that markets will provide risk premia in return for capital invested and that diversification is the best way to enable us to stay invested through the tough periods for any one particular asset class.

## Summary

Risk parity investing is not a panacea. If all asset classes go down, it will lose money. When equities are soaring, it may do very well but will likely underperform 60/40 and other strategies that load up on equity risk. When interest rates rise sharply and, more generally, when multiple non-equity asset classes perform poorly, risk parity will struggle to keep up with 60/40 and other equity-dominated portfolios in the short term. However, as this note demonstrates, it can still outperform even in a prolonged period of rising rates. Anyone evaluating the case for risk parity should consider a wide range of scenarios, including the equity crash scenario that severely hurts 60/40 investors, and the most common scenarios where some asset classes are performing reasonably well and others are performing not so well, where diversification would provide meaningful benefit to a portfolio.

Risk parity is, in our view, a reasonable investment strategy which emphasizes diversification over concentration, and is not simply “leveraging bonds.” We believe there is strong theoretical and empirical backing to suggest that more diversified portfolios, like risk parity portfolios, can produce superior risk-adjusted returns relative to concentrated portfolios.<sup>10</sup> The last few decades have indeed been a good environment for the strategy. However, there will be times where the strategy suffers either in absolute terms or relative to 60/40, or both. In the end, we believe risk parity offers a small edge in the short term that

can compound to a large advantage over time, and that holds up even during long periods of moderately rising rates, even if that cumulative rise in rates is substantial.

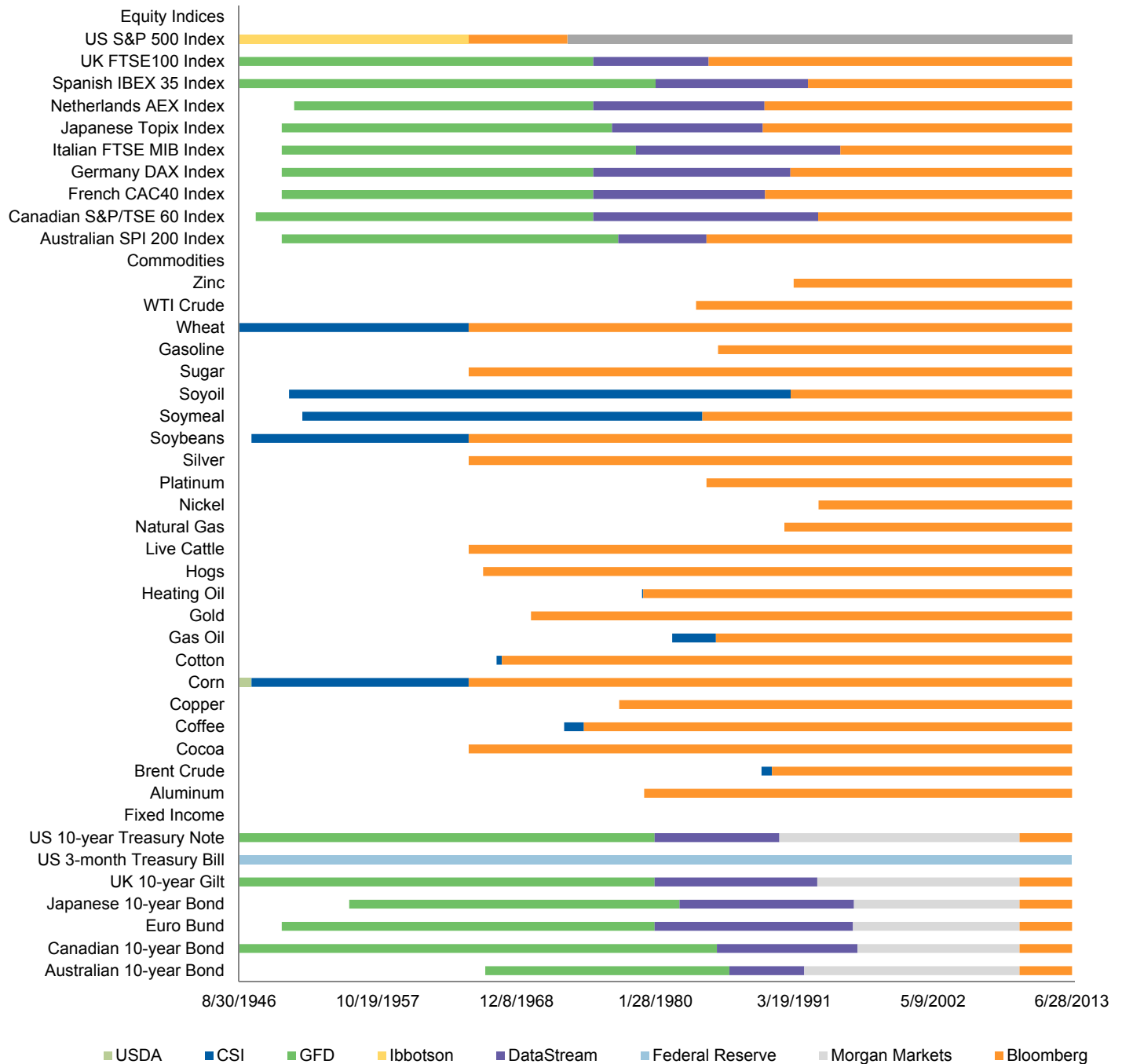
In the long run, diversification wins.

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<sup>9</sup> Different managers handle risk management and drawdowns differently. We feel that it is imperative to have a formal drawdown control process that seeks to reduce portfolio risk levels for scenarios that can and will happen which are outside the scope of “normal.” It is equally imperative that this process has a clear roadmap for when to resume normal levels of risk taking.

<sup>10</sup> Asness, Frazzini and Pedersen (2012) “Leverage Aversion and Risk Parity”

Appendix – Figure 1





## Disclosures

The information set forth herein has been obtained or derived from sources believed by the author and AQR Capital Management, LLC (“AQR”) to be reliable. However, the author and AQR do not make any representation or warranty, express or implied, as to the information’s accuracy or completeness, nor does AQR recommend that the attached information serve as the basis of any investment decision. This document has been provided to you for information purposes and does not constitute an offer or solicitation of an offer, or any advice or recommendation, to purchase any securities or other financial instruments, and may not be construed as such. This document is intended exclusively for the use of the person to whom it has been delivered by AQR and it is not to be reproduced or redistributed to any other person. AQR hereby disclaims any duty to provide any updates or changes to the analyses contained in this presentation.

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Diversification does not eliminate the risk of experiencing investment losses.

### **Past performance is not an indication of future performance.**

The model gross performance results included herein do not reflect the deduction of investment advisory fees, which would reduce an investor’s actual return. For example, assume that \$1 million is invested in an account with the firm, and this account achieves a 10% compounded annualized return, gross of fees, for five years. At the end of five years that account would grow to \$1,610,510 before the deduction of management fees. Assuming management fees of 1.00% per year are deducted monthly from the account, the value of the account at the end of five years would be \$1,532,886 and the annualized rate of return would be 8.92%. For a ten-year period, the ending dollar values before and after fees would be \$2,593,742 and \$2,349,739, respectively. AQR’s asset based fees may range up to 2.85% of assets under management, and are generally billed monthly or quarterly at the commencement of the calendar month or quarter during which AQR will perform the services to which the fees relate. Where applicable, performance fees are generally equal to 20% of net realized and unrealized profits each year, after restoration of any losses carried forward from prior years. In addition, AQR funds incur expenses (including start-up, legal, accounting, audit, administrative and regulatory expenses) and may have redemption or withdrawal charges up to 2% based on gross redemption or withdrawal proceeds. Please refer to AQR’s ADV Part 2A for more information on fees.

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