



## Risk-Parity Strategies at a Crossroads, or, Who's Afraid of Rising Yields?

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Risk-parity strategies have gained considerable popularity in recent years. Their stable, attractive risk/return profile particularly during the turbulent stages of the financial and debt crisis in 2008 and 2010/2011 unequivocally helped corresponding multi asset- class strategies to become a firmly established fixture by now in a wide array of institutional portfolios. What's less clear is how to proceed with such investments in the future.

For commonly accepted rumours have it that the historically attractive performance of risk-parity strategies has been due in large part to the trend toward record-low market interest rates. However, the yield situation looks set to return to normal in the medium term against the backdrop of reviving economic growth data, a gradually noticeable job-market recovery and a foreseeable exit from unconventional monetary policy actions, particularly in the USA. This therefore raises the question of whether risk-parity strategies can continue to deliver a stable performance in the future in the face of

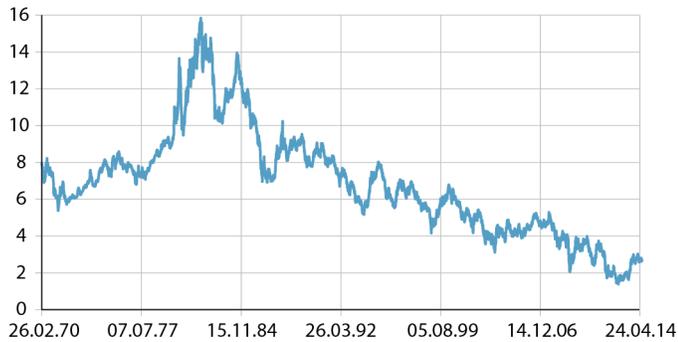
potentially rising market interest rates.

This article employs an empirical analysis in an attempt to provide conclusive answers to that question. It starts off by analysing how the high-yield phase of the 1970s would have affected a risk-parity strategy, taking the USA as an example. It then analyses the impact that some fundamental factors behind interest-rate hikes – i.e. inflation and economic growth – exert on the risk-parity strategy's return behaviour. A summing conclusion rounds out the analysis.

### A trip back in time – the past since 1970...

In stark contrast to the more recent past, the 1970s in particular were shaped by soaring market interest rates. Figure 1 shows that the two oil price shocks in 1973/74 and 1979/80 and the abrupt disinflation initiated by Paul Volcker at the start of the 1980s caused the yield on 10-year US Treasury notes to practically double to a temporary peak of around 16% in autumn 1981.

Since then, other – albeit smaller – yield spikes have intermittently interrupted the trend toward record-low market interest rates, but have been unable to reverse it.



**Exhibit 1: Rising vs Falling Interest Rates**

Source: Vescore LTD

This turbulent past provides an ideal basis for analysing the risk/return behaviour of risk-parity strategies in various market phases. Using an investment universe consisting of three asset classes – bonds, stocks and commodities – we undertake an analysis to determine how a simple risk-parity strategy would have performed compared against two classical static portfolios weighted by market capitalisation. To do this, we simulate a risk parity (RP) strategy that uses historical 40-day volatility data as a relevant risk measure. We allow leveraged positions in order to also factor in the strategy’s potential to dynamically adapt overall exposure to a specific target risk. The portfolio is balanced daily and the corresponding transaction costs are taken into account.

For the benchmark, we calculate a classical capitalisation weighted portfolio that at all times is fully invested 60% in bonds, 30% in stocks and 10% in commodities. We hereinafter call this portfolio the conservative benchmark (CB). For the sake of consistency, the weightings are likewise rebalanced daily with transaction costs taken into account. To give the benchmark comparison a broader underpinning, we additionally simulate a more aggressive portfolio with an asset allocation weighting of 40% bonds, 40% stocks and 20% commodities. We hereinafter call this portfolio the aggressive benchmark (AB).

### ... and its influence on asset allocation strategies

A yield increase can be embedded into different market scenarios. So a meaningful analysis also needs to take into account the historical context and thus the drivers behind the change in interest rates. Did exogenous causes bring about an abrupt change in interest rates that caught market participants on the wrong foot? Or was a period of positive economic growth coupled with creeping inflation – i.e. an orderly economic cycle – the underlying cause of the rise in market interest rates?

To factor in these market scenarios, we compare the change in their fundamental factors – the 10-year US Treasury yield, US inflation and US real GDP growth – with the cumulative return delivered by the different strategies over a fixed six-month time window. We thus ask, for instance, how a six-month increase in yields affected the six-month return of a risk-parity strategy on average. In order to attain stably underpinned market scenarios in the analysis, we divide the evolution of the fundamental factors into quintiles. The bottom quintile, for example, serves to analyse the biggest 20% of interest-rate reductions, and the top quintile

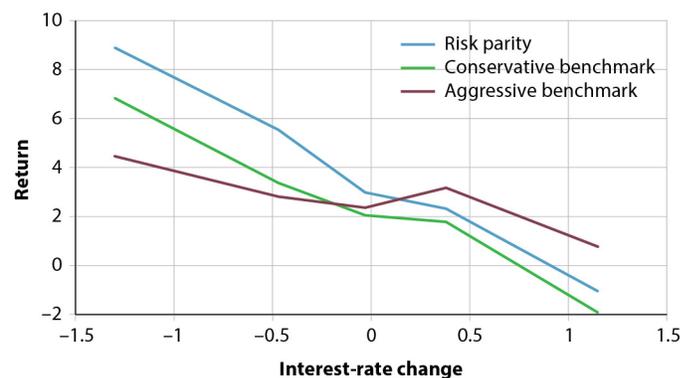
serves to analyse the biggest 20% of yield increases. The focal point of the analysis – rising vs. falling interest rates.

What basic findings does this empirical analysis bring to light?

The top section of Table 1 compares the interest-rate change over six months with the changes in the fundamental factors inflation and GDP growth over the same period. The macroeconomic picture speaks for itself. An interest-rate hike is usually tied to an increase in inflation and economic growth. This means that exogenous shocks such as the 1994 bond market crash or the 2013 “tapering” announcement that are ascribable neither to inflation nor to GDP growth cannot significantly affect the aggregate picture.

The table additionally shows the average six-month return for the individual asset classes under the different interest-rate scenarios. Not surprisingly, the return on bonds exhibits a significant inverse correlation with changes in interest rates. Somewhat more surprising is the performance of stocks, which is positive across all interest-rate scenarios despite phases such as the one in 2008, when equity markets corrected sharply as a result of the financial crisis and market interest rates tumbled in their wake. Commodities, on the other hand, indirectly live up to their reputation as a hedge against inflation and generate the highest gains precisely during periods of rising yields and associated inflation, such as during the two oil shocks in the 1970s.

How well did the different asset allocation strategies exploit the diverse characteristics of the different asset classes to generate a stable performance? To glean an answer, the middle section of Exhibit 1 and Exhibit 2 show the average volatility-adjusted six-month returns of the strategies under the different interest rate scenarios. What’s striking is that the risk-parity strategy outperforms the conservative benchmark across all interest-rate scenarios. The more yields drop, the higher the risk-parity strategy’s alpha tends to be. Both strategies delivered negative returns only in the instance of the biggest 20% of yield increases, but here too there was a slight edge in favour of the dynamic risk-parity strategy.



**Exhibit 2: Yield Scenarios vs Return Behavior**

Source: Vescore LTD

The more aggressive benchmark, on the other hand, was able to achieve a more consistent performance across all interest rate scenarios that also delivered positive returns on average. However, this consistency comes at the price of a poorer performance in the event of falling interest rates and a generally higher loss risk. A comparison of maximum drawdowns over the 1970 to 2014 time frame shows that the risk-parity strategy can limit

		Falling interest rates			Rising interest rates	
		1. Quintile	2. Quintile	3. Quintile	4. Quintile	5. Quintile
<b>Market environment and prices</b>	Change in interest rate	-1.3%	-0.5%	0.0%	0.4%	1.2%
	Change in inflation	-0.6%	-0.3%	0.1%	0.3%	0.3%
	Change in GDP growth	-0.9%	-0.5%	0.1%	0.7%	0.8%
	Return on bonds (10-year)	10.2%	4.0%	0.8%	-2.0%	-7.3%
	Return on stocks (SPX)	4.6%	3.6%	3.7%	5.2%	3.4%
	Return on commodities	-0.1%	3.1%	5.1%	10.6%	10.2%
<b>Total return and return attribution</b>	Risk parity (RP)	8.9%	5.5%	3.0%	2.3%	-1.0%
	Conservative benchmark (CB)	6.8%	3.4%	2.1%	1.8%	-1.9%
	Aggressive benchmark (AB)	4.5%	2.8%	2.4%	3.2%	0.8%
	RP bonds	6.6%	3.3%	0.4%	-2.2%	-4.8%
	CB bonds	5.4%	1.9%	0.4%	-1.1%	-4.2%
	AB bonds	3.0%	1.1%	0.2%	-0.6%	-2.3%
	RP stocks	1.5%	1.3%	1.2%	1.6%	1.0%
	CB stocks	1.3%	1.1%	1.2%	1.9%	1.4%
	AB stocks	1.5%	1.2%	1.3%	2.1%	1.5%
	RP commodities	0.7%	0.9%	1.4%	3.0%	3.0%
<b>Exposure data</b>	Overall exposure RP	2.0	2.6	2.7	2.6	1.7
	Bond exposure RP	1.3	2.0	2.1	2.0	1.1
	Equity exposure RP	0.3	0.3	0.4	0.3	0.3
	Commodity exposure RP	0.3	0.3	0.3	0.3	0.3
	Delta overall exposure RP	7.1%	25.1%	18.5%	7.7%	-8.0%
	Delta bond exposure RP	13.8%	42.3%	32.7%	17.7%	-8.6%
	Delta equity exposure RP	3.6%	22.7%	18.0%	12.3%	2.5%
	Delta commodity exposure RP	0.9%	8.8%	11.4%	10.0%	7.8%

### Exhibit 3: Rising vs Falling Interest Rates

Source: Vescore LTD

the maximum loss to minus 21%. Both benchmark portfolios, in contrast, exhibit much bigger losses in value: minus 25% for the conservative benchmark and minus 30% for the aggressive benchmark. This means that the risk-parity portfolio is able to combine the conservative benchmark's excess return amid falling market interest rates with the aggressive benchmark's good return profile amid rising yields. At the same time, the risk-parity strategy also provides the best capital preservation for investors since it exhibits the smallest maximum drawdown.

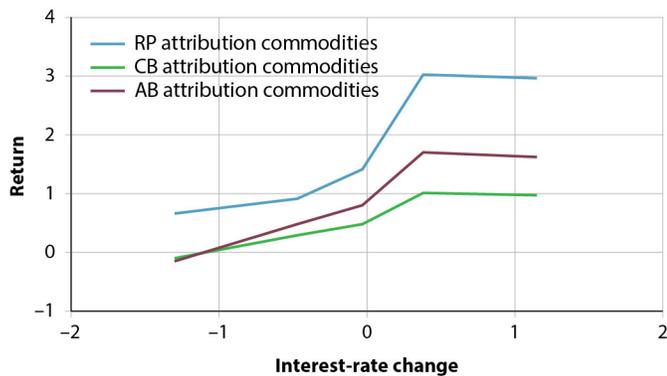
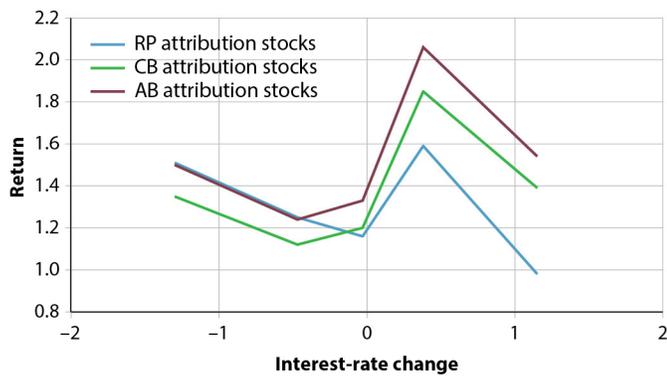
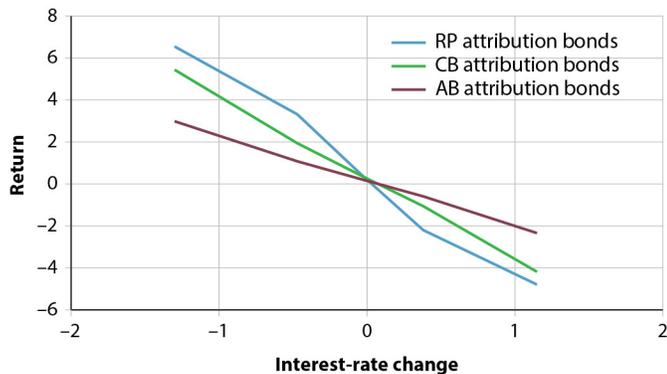
This raises the question of what lies behind these risk/return characteristics. Why does the aggressive benchmark appear to be less sensitive to yield movements but seems at the same time to be the riskiest of the asset allocation strategies? What is the reason behind the risk-parity strategy's consistent alpha relative to the conservative benchmark? The middle section of Exhibit 1 and Exhibit 4 provide initial answers; for each strategy they compare the return attribution of the individual asset classes under the different interest-rate scenarios.

With regard to the return attribution for bonds, the findings indicate that the risk-parity strategy profits the most in an environment of falling market interest rates, but at the same time suffers the most in a climate of rising yields. The aggressive benchmark exhibits the lowest sensitivity to yield movements

because it has the smallest average exposure to bonds. However, the return attribution of stocks to the overall performance of the various strategies stays similar under the different interest-rate scenarios. Here, too, a comparison of the three strategies verifies the risk-parity strategy's tendency to profit from stocks particularly amid falling market interest rates. But the most significant differentiation owes to the return attribution to commodities. The risk-parity strategy is the one that profits the most from the commodity markets regardless of the interest-rate scenario. The higher the yield increase, the greater its excess return. As a result of its dynamism, the risk-parity strategy seems to be the one best able to exploit the inverse correlation between bonds and commodities to offset the adverse effects of higher bond yields.

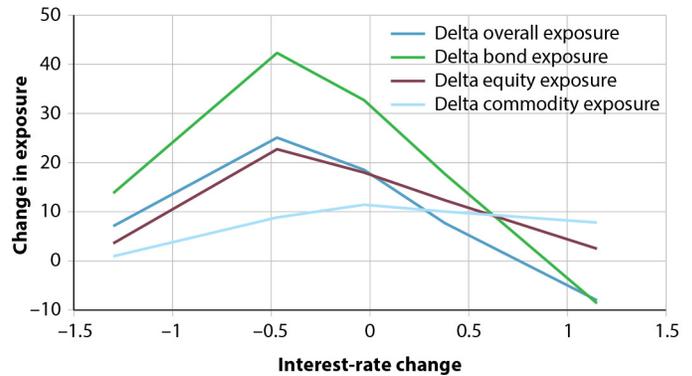
To confirm this supposition, the bottom section of Exhibit 3 and Exhibit 4 show the average exposure of the risk-parity strategy and the asset classes and their percentage change under the different interest-rate scenarios. The percentage change in overall leverage basically correlates inversely with the interest-rate scenarios. Overall leverage decreases as yields rise, primarily due to a reduction in exposure to bonds that tend to receive the heaviest weighting. Conversely, the strategy ratchets up bond exposure and overall leverage the more that yields fall. Note,

however, that bond exposure and overall leverage get increased only mildly in the quintile with the deepest yield reductions. This is due to the elevated market volatility that often accompanies significantly falling yields during a flight to less-risky asset classes. The fact that the risk-parity strategy employs a target risk also reduces overall leverage amid rising volatility. Equity exposure likewise tends to get reduced when market interest rates are rising. As a confirmation of the supposition postulated above that risk parity strategies exploit the diversification potential of commodities the best, Exhibit 5 on the other hand shows a positive correlation between the change in market interest rates and the percentage change in exposure to commodities. This means that when yields are rising, the risk-parity strategy shifts out of bonds and stocks into commodities and on average offsets losses on bonds by reaping gains on commodity positions. This very dynamic shifting between asset classes and the target risk aimed for substantiate the risk-parity strategy's ability to adapt pro-cyclically to the market climate and thus better seize performance opportunities.



**Exhibit 4: Yield Scenarios vs Return Attribution**  
Source: Vescore LTD

In summation, empirical evidence corroborates a negative correlation between the change in the market interest rate and the return on the asset allocation strategies. However, the risk parity strategy consistently earns an excess return relative to the conservative benchmark and on average only suffers a negative six-month return in the quintile of the biggest 20% of yield increases. The aggressive benchmark, due to its lower exposure to bonds by design, exhibits reduced sensitivity to yield movements and thus the best return in the event of sharply rising market interest rates, but in exchange faces significantly elevated loss potential on the riskier stock and commodity asset classes that it is unable to counterbalance, as evidenced by the maximum drawdown.



**Exhibit 5: Interest-Rate-Change vs Change in Exposure**  
Source: Vescore LTD

However, the question of how each asset allocation strategy has historically performed under different yield scenarios is only limitedly meaningful against the backdrop of the current rhetoric from the leading central banks saying that the general interest-rate level might stay low even in the event of rising inflation and accelerating growth data. The more pressing question, then, is how the strategies have performed in explicit relation to inflation and the general economic environment. The next two chapters are devoted to answering that question. To stay within the scope of this article, though, we will confine ourselves to an abbreviated discussion of the facts.

### Inflation vs. deflation – all the same, or indeed different?

Duo cum faciunt idem, non est idem – when two do the same thing, it is never quite the same thing. Analogously to this wise maxim, Exhibit 6, which reflects the situation amid a change in inflation over the preceding six months, shows that the change in inflation basically behaves inversely to economic growth due to the phase shift between the inflation cycle and the economic cycle. In contrast, rising inflation rates have historically been accompanied by rising market interest rates, as one would expect. Hence, it comes as no surprise that inflation-sensitive commodities correlate positively, and deflation-sensitive bonds negatively, with the inflation cycle. A negative correlation holds for stocks as well, which tend to benefit more from falling than rising inflation.

This pronounced difference in the behaviour of the individual asset classes during the different stages of the evolution of inflation changes provides the dynamic risk-parity strategy with an ideal foundation for exploiting its full potential. Exhibit 6 and Exhibit 7 verify that the risk-parity strategy delivered a

		Deflation or falling inflation			Rising inflation	
		1. Quintile	2. Quintile	3. Quintile	4. Quintile	5. Quintile
<b>Market environment and prices</b>	Change in interest rate	-0.3%	-0.2%	-0.2%	0.1%	0.3%
	Change in inflation	-2.0%	-0.6%	-0.1%	0.5%	1.9%
	Change in GDP growth	1.2%	0.2%	-0.3%	0.0%	-0.9%
	Return on bonds (10-year)	3.0%	2.3%	1.8%	-0.1%	-1.3%
	Return on stocks (SPX)	7.6%	6.5%	3.7%	3.3%	-0.7%
	Return on commodities	-3.8%	3.2%	2.8%	10.4%	16.3%
<b>Total return and return attribution</b>	Risk parity (RP)	3.4%	4.8%	4.0%	3.7%	2.9%
	Conservative benchmark (CB)	3.5%	3.3%	2.3%	2.5%	0.5%
	Aggressive benchmark (AB)	2.7%	3.2%	2.2%	3.4%	2.0%
	RP bonds	1.7%	1.6%	1.5%	-0.3%	-1.3%
	CB bonds	1.6%	1.2%	0.9%	-0.1%	-1.1%
	AB bonds	0.9%	0.7%	0.5%	-0.1%	-0.6%
	RP stocks	1.8%	1.9%	1.4%	1.4%	0.0%
	CB stocks	2.4%	1.8%	1.2%	1.6%	0.0%
	AB stocks	2.6%	2.0%	1.3%	1.7%	0.0%
	RP commodities	-0.1%	1.1%	1.1%	2.5%	4.3%
	CB commodities	-0.5%	0.3%	0.3%	1.0%	1.5%
	AB commodities	-0.8%	0.5%	0.4%	1.7%	2.6%
<b>Exposure data</b>	Overall exposure RP	2.2	2.6	2.4	2.4	2.1
	Bond exposure RP	1.6	1.9	1.7	1.8	1.5
	Equity exposure RP	0.3	0.4	0.3	0.3	0.3
	Commodity exposure RP	0.3	0.3	0.3	0.3	0.2
	Delta overall exposure RP	17.0%	19.1%	9.1%	8.3%	-3.2%
	Delta bond exposure RP	24.2%	25.9%	25.2%	24.4%	-1.8%
	Delta equity exposure RP	21.7%	32.2%	1.1%	1.2%	2.9%
	Delta commodity exposure RP	19.5%	14.2%	4.8%	4.3%	-3.7%

### Exhibit 6: Inflation vs Deflation

Source: Vescore LTD

positive return across all inflation phases and consistently earned an excess return relative to both benchmark portfolios. On the whole, phases of sharply spiking and plummeting inflation pose a relatively challenging environment also for the risk-parity portfolio. However, a comparison of the percentage change in exposure shows that by dynamically adjusting the inflation-sensitive commodity and deflation-sensitive bond asset classes, the risk-parity strategy was able to avoid major risks and at the same time was capable of seizing return opportunities. So although the risk parity strategy was the one that lost the most on equity exposure during periods of spiking inflation, it was the one

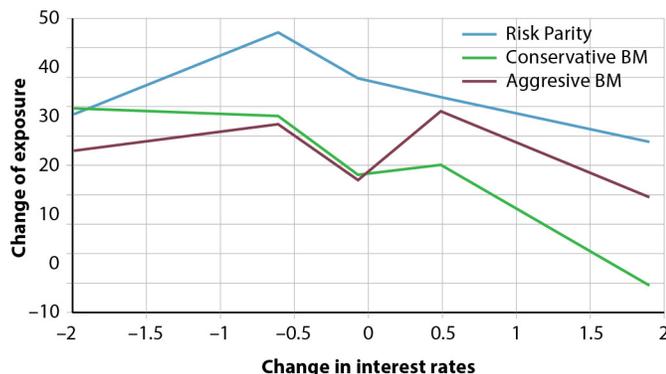


Exhibit 7: Change in Inflation vs Return Behavior

Source: Vescore LTD

that best offset those losses via gains on commodity exposure.

### Expansion vs. contraction – what impact does the economic cycle exert?

In Exhibit 9, a comparison of the change in economic growth data with the change in the interest-rate level and the inflation environment verifies that the dynamics are only partially congruent. For instance, a pickup in the economic cycle has historically been accompanied by elevated market interest rates, but no systematic correlation is evident with regard to changes on the inflation front. The commodities asset class as well does

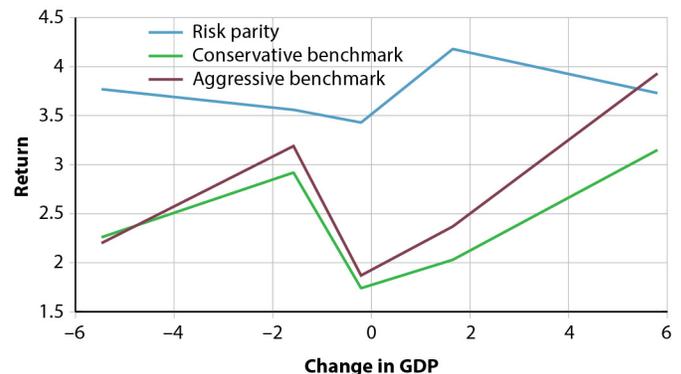


Exhibit 8: Change in Economic Growth vs Return Behavior

Source: Vescore LTD

not exhibit considerably varying return characteristics across the different stages of the economic cycle. Stocks, in contrast, tend to benefit from accelerating economic growth. The risky asset classes' positive return across the different stages of the economic cycle has historically given the individual asset allocation strategies a stable return profile. Only bonds have come under pressure amid accelerating economic growth momentum, due to rising market interest rates. Exhibit 8 verifies that the risk-parity strategy was the one that mastered the different growth scenarios the best. Given its robust performance across all change-in-growth quintiles, the risk-parity strategy exhibits stable return behaviour and consistently outperformed the benchmark strategies in most instances. It was only during periods of particularly strong economic expansion that a relatively less positive equity return attribution enabled the aggressive benchmark to catch up with the risk-parity strategy. The risk-parity strategy's consistent performance across the economic cycle is also the reason why it is laconically called an all-weather portfolio. The benchmark portfolios exhibit greater sensitivity to economic growth and thus react more strongly to fluctuations in economic activity.

## Conclusion

By means of an empirical analysis that takes the USA as an example, this article has demonstrated that a simple risk-parity strategy can pay off in an environment of rising market interest rates and stands up well against classical capitalisation-weighted portfolios, even when the high-yield phase of the 1970s is factored in. When the increase in market interest rates proceeds in an orderly manner, i.e. when it is coupled with moderately rising inflation and gradual economic growth, the risk-parity strategy achieves the best risk/return profile. This added value

is attributable to two reasons. First, the high dynamism of the risk-parity strategy better exploits the diversifying characteristics of the different asset classes. Second, thanks to the target risk, the overall portfolio exposure continually adapts to the current risk climate and thus reacts pro-cyclically to opportunities. On average, the risk-parity strategy outperforms the conservative benchmark, even amid abrupt spikes in market interest rates. However, an aggressive benchmark with a lower investment allocation to bonds is also able to generate an excess return in such a yield environment. But that strategy's higher tolerance for risk results in a lower return in the event of falling market interest rates and in significantly greater loss potential as measured by the maximum drawdown.

Despite this favourable finding, it should be noted that although the risk-parity strategy is the one that profits the most from bonds when yields fall, it is also the one that suffers the most from losses on bonds when yields rise. The risk-parity strategy's attractive risk/return profile is primarily attributable to the fact that stocks and especially commodities were able to offset the bond-loss phases. This serves as a clear reminder that risk-parity strategies exhibit more-than-negligible sensitivity to bonds. This can become problematic particularly in the event of interest-rate shocks like the ones in 1994 or 2013, when the correlations between asset classes suddenly spike and curtail the diversification potential within the portfolio. To mitigate the impact of such events, it appears advisable to additionally steer a risk-parity strategy's bond exposure using factors that are not directly taken into account in the balancing of risks. We are leaving this point open to be addressed in future Research Note articles.

		Contraction			Expansion	
		1. Quintile	2. Quintile	3. Quintile	4. Quintile	5. Quintile
<b>Market environment and prices</b>	Change in interest rate	-0.2%	-0.1%	-0.1%	-0.1%	0.1%
	Change in inflation	-0.2%	0.0%	0.3%	-0.1%	-0.3%
	Change in GDP growth	-5.5%	-1.6%	-0.2%	1.6%	5.8%
	Return on bonds (10-year)	2.2%	1.4%	1.3%	1.0%	-0.2%
	Return on stocks (SPX)	1.5%	5.2%	2.8%	3.5%	7.4%
	Return on commodities	6.8%	6.6%	4.5%	4.8%	6.1%
<b>Total return and return attribution</b>	Risk parity (RP)	3.8%	3.6%	3.4%	4.2%	3.7%
	Conservative benchmark (CB)	2.3%	2.9%	1.7%	2.0%	3.2%
	Aggressive benchmark (AB)	2.2%	3.2%	1.9%	2.4%	3.9%
	RP bonds	0.6%	0.4%	1.2%	1.2%	-0.2%
	CB bonds	1.1%	0.7%	0.5%	0.2%	-0.1%
	AB bonds	0.6%	0.4%	0.3%	0.1%	-0.1%
	RP stocks	0.8%	1.3%	1.0%	1.4%	2.0%
	CB stocks	0.5%	1.6%	0.8%	1.4%	2.7%
	AB stocks	0.6%	1.7%	0.9%	1.5%	3.0%
	RP commodities	2.4%	1.9%	1.3%	1.5%	1.9%
	CB commodities	0.6%	0.6%	0.4%	0.4%	0.6%
	AB commodities	1.0%	1.1%	0.7%	0.7%	1.0%
<b>Exposure data</b>	Overall exposure RP	2.1	2.3	2.5	2.6	2.0
	Bond exposure RP	1.5	1.8	1.8	2.0	1.4
	Equity exposure RP	0.3	0.3	0.3	0.3	0.3
	Commodity exposure RP	0.3	0.3	0.3	0.3	0.3
	Delta overall exposure RP	12.0%	6.1%	7.6%	10.5%	14.2%
	Delta bond exposure RP	28.7%	12.7%	12.0%	25.1%	19.3%
	Delta equity exposure RP	8.4%	16.4%	5.5%	7.4%	21.4%
	Delta commodity exposure RP	-2.6%	11.9%	7.7%	2.0%	20.0%

## Exhibit 9: Expansion Vs. Contraction

Source: Vescore LTD

## Authors' Bios



**Fabian Dori, M.A. HSG, CFA, FRM**  
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Fabian Dori was appointed Head of Notenstein Private Bank's Investment House unit in March 2015. From February 2013 to February 2015 he was a Member of the Executive Board of 1741 Asset Management AG, responsible for portfolio management. Previously he was a Member of Senior Management in the Asset Management division of Wegelin & Co. Private Bankers, where he was responsible for the management of quantitative multi-asset-class strategies. Fabian Dori holds a master's degree in quantitative economics & finance from the University of St. Gallen and is a certified Financial Risk Manager and CFA.



**Manuel Krieger, M.A. HSG**  
**Entrepreneur**  
**Financial Consultant**  
**Independent**

Manuel Krieger is an independent entrepreneur and financial consultant. Until Mid-2014 he was overseeing the multi-asset class portfolio management at 1741 Asset Management Ltd. He was a member of the Global Risk Diversification portfolio management team, as well as the fund manager of the 1741 Diversified Trends fund. Before joining 1741 in 2012, he was portfolio manager at Wegelin & Co. Private Bankers. Manuel Krieger has a Master's degree in Information Management from the University of Fribourg and was awarded top honors for his master thesis in the area of artificial intelligence. Manuel Krieger also holds a master's degree in Finance from the University of St. Gallen.



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Urs Schubiger work at Achievement LLC. Until Septmeber 2015, he was Head Managed Futures & Indexing at Vescore Ltd and Chief Investment Officer at 1741 Asset Management Ltd. Between 2009 and 2012, he was head of Research, Modelling & Technology with Asset Management at Wegelin & Co. Private Bankers. Before moving to Wegelin & Co., he worked as a quantitative analyst in research and portfolio management for the US Equity Statistical Arbitrage Group of UBS O'Connor in Chicago. Urs holds a master's degree in mathematics from the Swiss Federal Institute of Technology (ETH) in Zurich and a master's degree in law from the University of Basel.



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Daniel Torgler is Head Managed Futures and member of the senior management at Vescore Ltd. Before taking on this responsibility, he was Head Managed Futures at 1741 Asset Management Ltd and lead portfolio manager of the 1741 Diversified Trends and 1741 Global Risk Diversification fund. Before joining 1741 Asset Management Ltd. in 2012, he was a research analyst at Man Investments in Switzerland and the UK, a credit analyst in leveraged finance at Pemba Credit Advisers, and a portfolio manager at Wegelin & Co. Private Bankers.