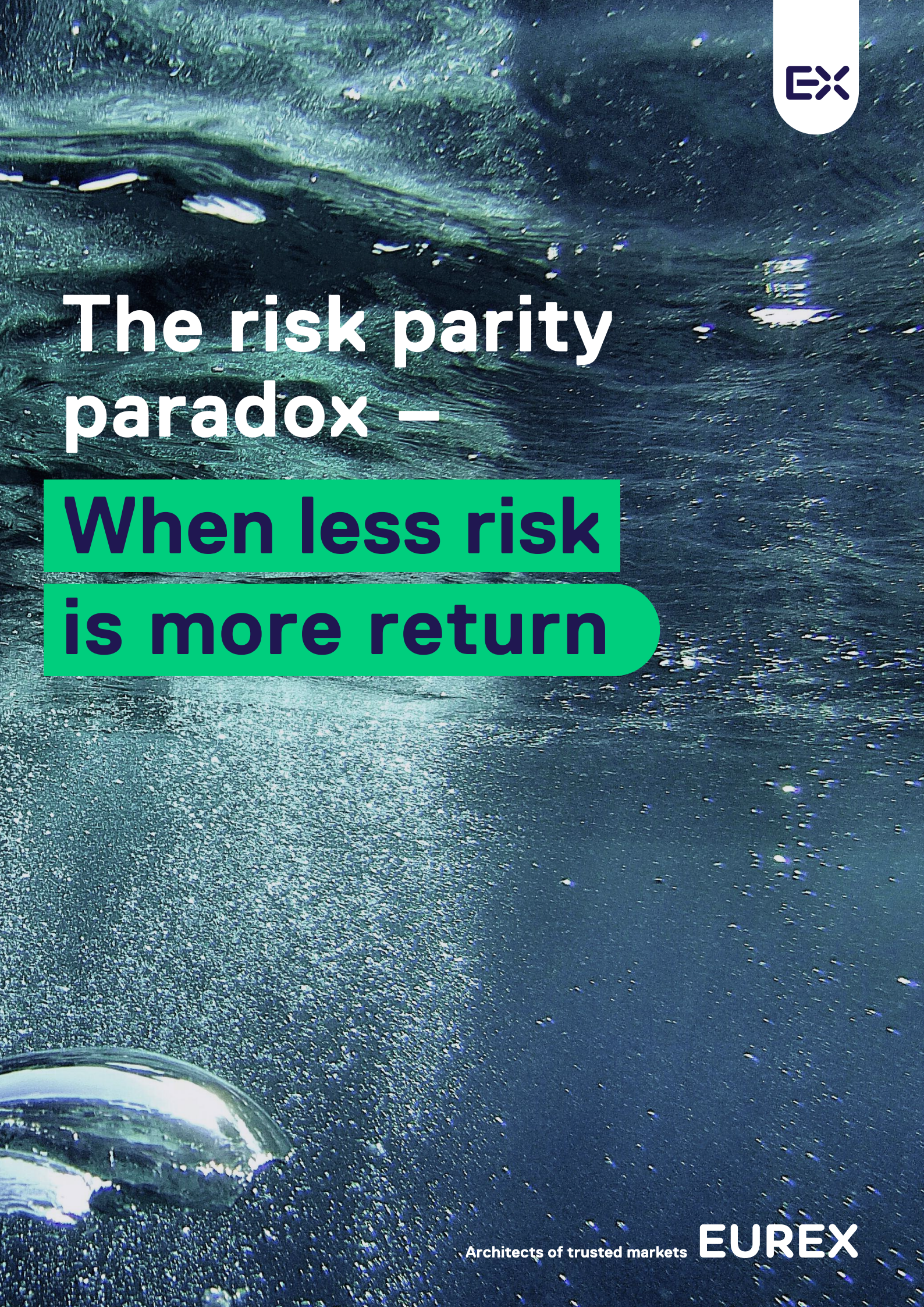
The risk parity paradox –
When less risk is more return
Architects of trusted markets
EUREX

The risk parity paradox – When less risk is more return

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Understanding risk parity and diversification

Less risk, more return - exploring the risk parity paradox

Less risk doesn't have to mean less return. In this paper we explore this statement and delve into the risk parity paradox. Through the simulation of multiple equity and High Yield portfolios, we demonstrate that investors can benefit from uncorrelated sources of return through diversification, thus optimizing risk adjusted returns. Diversifying by targeting risk allocation rather than capital allocation, where the risk contribution of each asset class is matched, is known as risk parity and archives a higher Sharpe ratio. This excess Sharpe ratio can be monetized by introducing leverage. Eurex's Credit Index Futures provide an accessible solution for clients seeking leveraged exposure to High Yield credit markets. Through leverage clients can construct a high return, medium volatility portfolio that has consistently outperformed a STOXX Europe 600 allocation since 2011.

The role of corporate bonds in portfolios

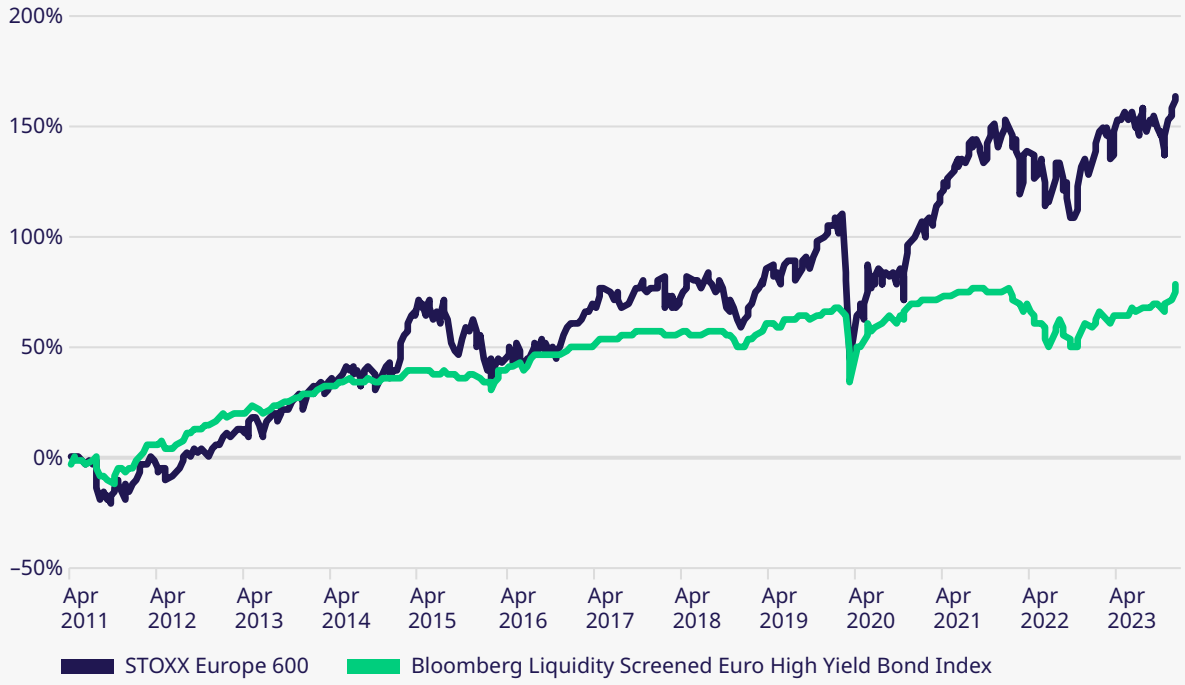
Corporate bonds – navigating complexity and returns

Historically, corporate bonds have struggled to find their place in European retail portfolios and retirement savings products.[1, 2] Access, embedded optionality and differences in tranche seniority, collateralization, and coupon types can make investing in corporate debt a complex exercise, as these factors are critical in determining risk and return profiles. Additionally, the fragmented nature of credit markets in where and how they trade further complicates the landscape.

For some clients, the complexity and comparatively lower returns of corporate bonds raises questions if the asset class is even worth the effort and has the capacity to generate sufficient returns to justify divestments from equities. Given their lower-risk profile, due to seniority over equity-holders, corporate bonds typically offer lower expected returns.[3] Historical performance data in Figure 1 demonstrates this. Even small incremental differences in returns can significantly impact total return over time due to compounding effects.

[1] https://www.bafin.de/SharedDocs/Veroeffentlichungen/EN/Fachartikel/2021/fa_bj_2104_Unternehmensanleihen_Kleinanleger_en.html
[2] https://www.europeanissuers.eu/docs/view/6644d133512ab-en
[3] https://business.columbia.edu/sites/default/files-efs/pubfiles/25988/Bekaert_risk%26return.pdf

Figure 1: Equity and Credit cumulative returns since 2011



Source: Bloomberg LP, Eurex Calculations

For investors seeking higher returns, going out along the credit risk curve presents potential solutions. Short-term High Yield and Emerging Market Sovereign Credit have considerably higher yields than lower risk Investment Grade Debt.[4] They have broadly exhibited systematically higher Sharpe ratios than their equity counterparts, particularly in times of stable P/E multiples.[5,6] However, these instruments are still senior to the corresponding equity, and the corresponding lower return of unlevered credit instruments often diminish their attractiveness in the context of compounding effects. Despite maintaining higher returns relative to volatility, the differential versus the sustained higher returns of equities only widens, as evidence in Figure 1.

Diversifying a portion of the portfolio into Fixed Income as an asset class is well known to improve the risk-adjusted returns of equity allocations. Diversification, often hailed as the only free lunch in investing, allows investors to take advantage of uncorrelated sources of return. It not only mitigates risks but also optimizes the return per unit of risk involved.[7,8,9]

While diversification into lower return assets increases the risk-adjusted expected returns, it unfortunately reduces the overall expected return as well. Allocating to lower risk assets necessarily reduces the overall expected returns, as less risk is involved.

But this is not where the power of diversification lies in the first place. Rather, the meat on the bone of the free lunch is that we can include uncorrelated drivers of returns. Here, leverage comes into play:

Leverage has the power to supercharge assets with low returns but attractive Sharpe ratios, as we can essentially add return, while sacrificing Sharpe. Each turn of leverage adds the excess returns over the cost of funding and increases volatility by the full volatility of the asset.

[4] https://www.allianzgi.com/en/insights/outlook-and-commentary/case-short-duration-high-yield-bonds
[5] https://www.tiaa.org/public/pdf/enduring_case_for_high_yield_bonds.pdf
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[9] Leverage Aversion and Risk Parity: Financial Analysts Journal: Vol 68, No 1 (tandfonline.com)

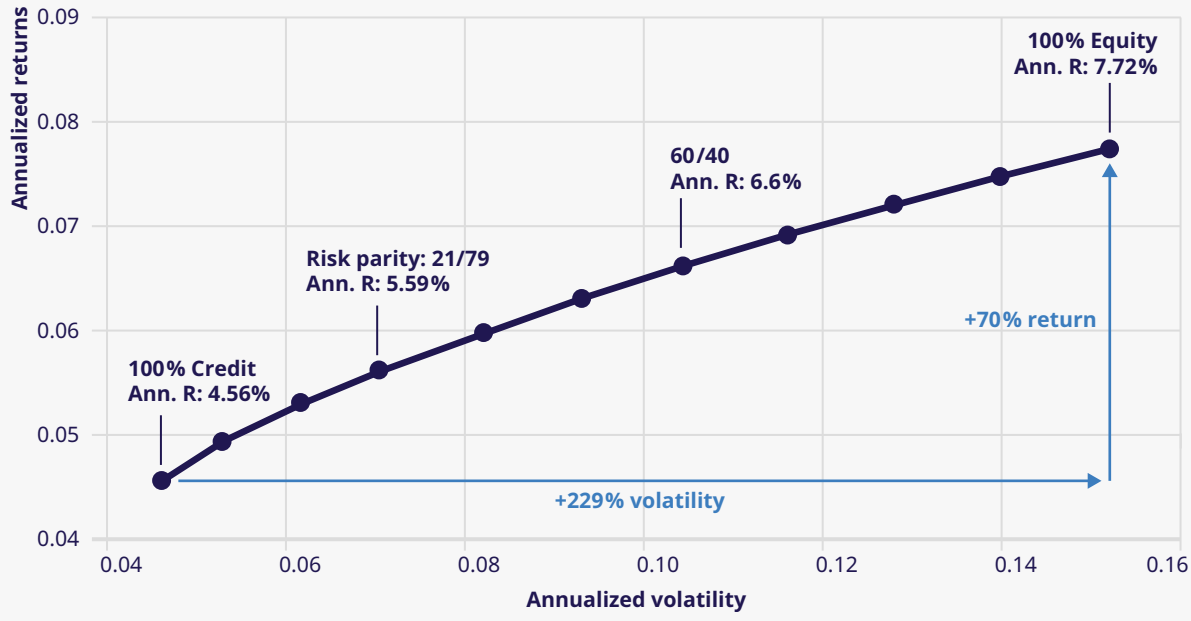
Leveraging Eurex Credit Index Futures

Harnessing leverage – Eurex Credit Index Futures for enhanced returns

Credit futures provide a cost-efficient access point to leveraged credit markets. These futures are unfunded instruments with low margin requirements (1%–3%) that have broadly diversified credit indices as underlying. This enables significant leverage, which amplifies both potential returns and associated risks. A 1% increase in the EUR IG Futures corresponds to around EUR 1.6k in value, which will be netted against the ~3k (50x leverage) margin position, translating to ~50% return on the margin posted. But how can investors incorporate leveraged credit into their portfolios to balance risk and return efficiently? Historical data in Figure 2 demonstrates that while a 100% STOXX Europe 600 portfolio offers higher returns, integrating bonds substantially reduces volatility. However, investors sacrifice some degree of return. Holding a 100% equity portfolio since 2011 yielded an average annualized 90 days logarithmic return of 0.07 (8% simple return) at an average annualized 90d volatility of 15%. A portfolio 100% invested in the Bloomberg Liquidity Screened Euro High Yield Bond Index generated a return of 0.04 (5%) at a much lower volatility of 5%. Over the same period, the often-favored 60/40 allocation improves returns per unit of volatility, resulting in average log returns of 0.06 (7%) with a volatility of 10%. This is in part driven by the attractive risk return characteristics of the High Yield bonds.

In this paper, we opted for a 90-day averaged annual return and volatility, as different regimes can be observed at one rate level, influenced by the structure of the curve. Using an overall approach could lead to biased results.

Figure 2: Risk & Return for various portfolios



Source: Eurex calculation

But how do we find the optimal ratio for equities and bonds? For one, volatility levels of both asset classes are quite different. An allocation of 60% or more in equities will produce more than 83% of the overall portfolio's risk. The risk contribution of a two-asset portfolio is given by

$$RC_1 = \frac{w_1^2\sigma_1^2 + \rho w_1 w_2 \sigma_1 \sigma_2}{w_1^2\sigma_1^2 + 2\rho w_1 w_2 \sigma_1 \sigma_2 + w_2^2\sigma_2^2}, \quad RC_2 = 1 - RC_1$$

$$\frac{0.6^2 \times 0.17^2 + 0.6 \times 0.4 \times 0.6 \times 0.17 \times 0.07}{0.6^2 \times 0.17^2 + 0.4^2 \times 0.07^2 + 2 \times 0.6 \times 0.4 \times 0.6 \times 0.17 \times 0.07} = 0.83$$

This reduces the risk-offsetting effects of the bonds, as they are just not volatile enough to counter the equity-driven variation.

Risk parity allocation is specifically solving for this volatility. Risk parity portfolios target risk allocation, rather than capital allocation, by matching the risk contributed by each asset class within the portfolio. They start with a significantly lower exposure to equities to increase the share of lower volatility assets to balance the overall risk profile.[7,8]

Optimizing portfolio performance

Balancing risk and return – strategies for optimal portfolio construction

We looked at a portfolio that consists of 71% High Yield bonds and 29% equities, which is roughly the ratio which ensures that both asset classes contribute equally to the portfolio's overall risk.

$$\frac{0.29^2 \times 0.17^2 + 0.29 \times 0.71 \times 0.6 \times 0.17 \times 0.07}{0.29^2 \times 0.17^2 + 0.71^2 \times 0.07^2 + 2 \times 0.29 \times 0.71 \times 0.6 \times 0.17 \times 0.07} = 0.5$$

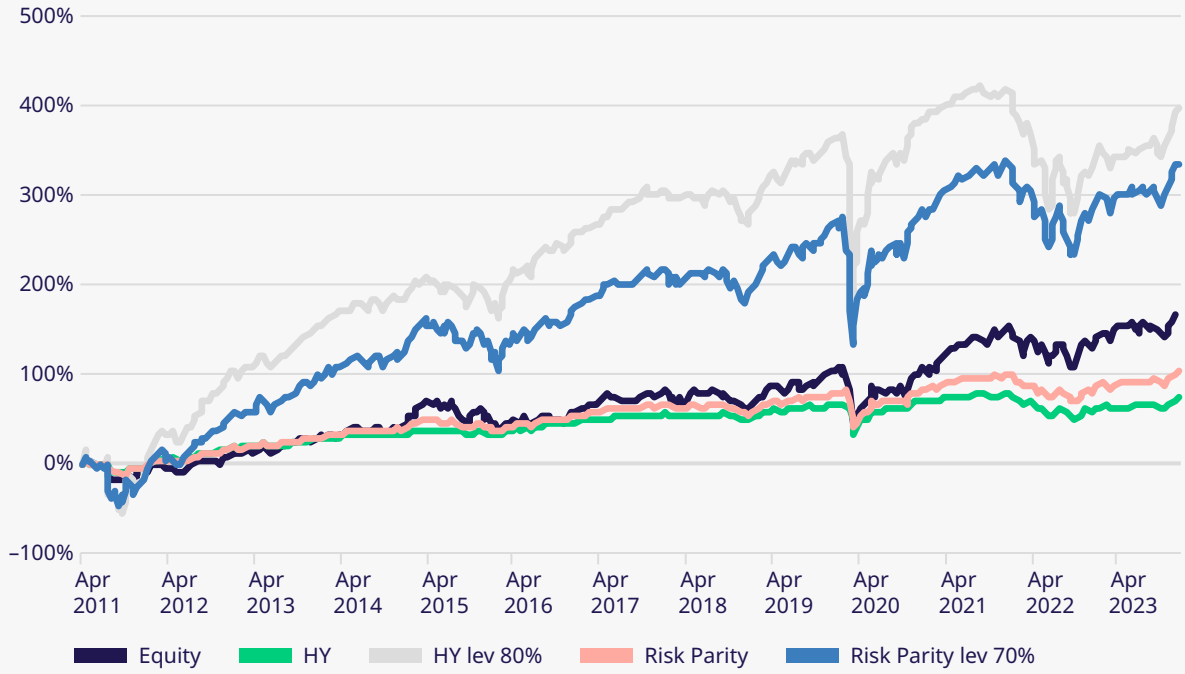
Since 2011, this risk parity portfolio achieved an annualized return and volatility of 0.05 (6%) and 7%, respectively. This comes down to an annual Sharpe ratio of 0.75, demonstrating efficient risk-adjusted returns.

These portfolios may need to be levered to achieve target returns. Low-return-high-Sharpe assets will naturally be overweighted, reducing expected returns, as shown in Figure 2. Leveraging a diversified portfolio can achieve better expected returns to simply increasing risk asset allocation, without binding funds, while potentially offering higher risk-adjusted returns. This approach allows investors to maintain a diverse asset base with better return potential, rather than sacrificing diversification benefits.

We illustrate this concept in Figure 3. Consider a €100 mio investment, of which 70% is borrowed capital. By investing this into a risk parity portfolio, we archive an annualized volatility of 15%, a level similar to an all-equity portfolio. This leveraged approach yields an annualized return of 12%, outperforming the 8% and 5.6% return of an all-equity and unlevered risk parity strategy. By applying 80% leverage to an all-High-Yield portfolio, investors attained a volatility profile similar to that of an equity portfolio. With that the portfolio's return increased to 13%, yielding an annualized Sharpe Ratio of 0.8.

[7] JOI-QIAN.indd (panagora.com)
[8] https://www.aqr.com/-/media/AQR/Documents/Insights/White-Papers/Understanding-Risk-Parity.pdf

Figure 3: Cumulative return of levered and unlevered portfolios



Source: Eurex calculations

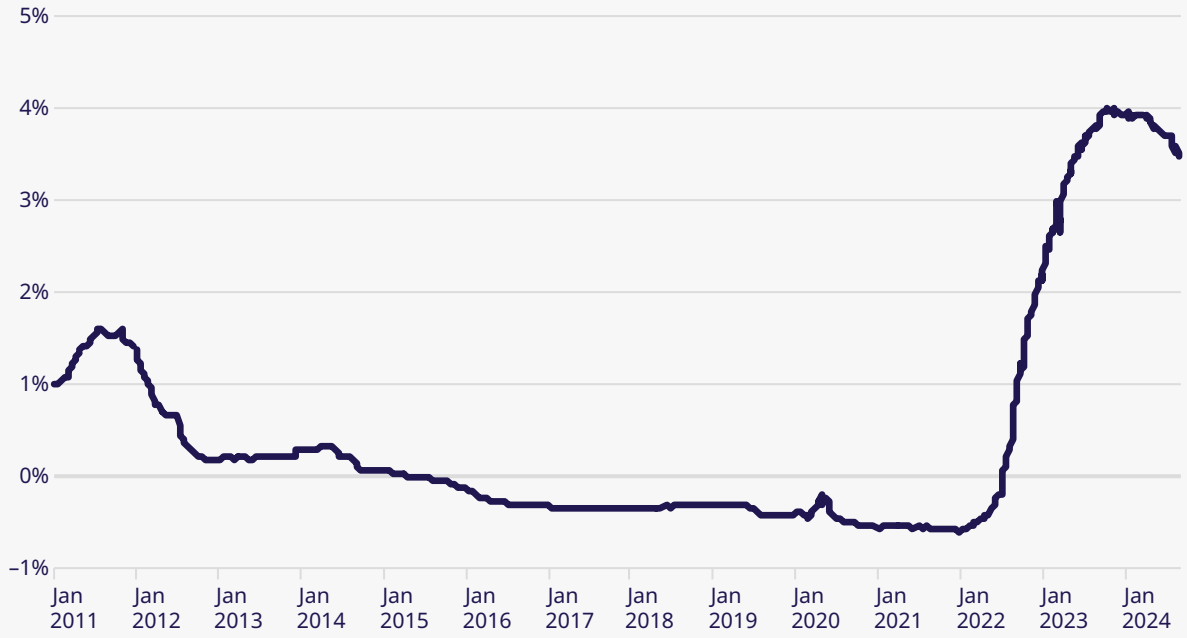
Table 1: Risk metrics

Portfolios	Volatility	Sharpe	Sortino	Max. Drawdown	99.5% VaR	cVaR
STOXX Europe 600	15%	0.49	0.38	–18%	–7%	–12%
HY	5%	0.92	0.50	–10%	–4%	–7%
HY 80% lev	14%	0.80	0.35	–30%	–20%	–25%
Risk Parity	7%	0.75	0.52	–11%	–5%	–8%
Risk Parity 70% lev	15%	0.71	0.44	–22%	–14%	–17%

Analyzing the risk table further underscores the advantage of diversification. Overall levered and unlevered HY and risk parity portfolios offer improved risk adjusted returns as indicated by the Sharpe and Sortino ratio. Adding leverage to match the equity's portfolio volatility greatly increases the 99.5% VaR but at 75% and 70% borrowed funds the Sortino ratio still hovers around or above that of an all-equity portfolio.

The attractiveness of leveraged strategies is particularly pronounced in low-interest-rate environments. As shown in Figure 4, the portfolios simulated in this analysis were subject to historically high interest rates, what further underscores the results. As we look towards the future, the current macroeconomic landscape suggests a potential shift. Central banks have signaled a possible easing of monetary policies, with anticipated rate cuts. Lower borrowing costs would directly impact portfolio performance.

Figure 4: 3 Month Euribor Rate



Source: Bloomberg

The optimization of portfolios to efficiently balance risk and returns remains a central challenge for investors. Traditional 60/40 allocation strategies offer advantages over equity portfolios, but they may not fully exploit the potential for optimal risk-adjusted returns. Unlevered but especially levered risk parity approaches, open promising opportunities to enhance risk-return profiles. Ultimately, optimal portfolio construction remains an evolving field, where the goal is not just to maximize returns but to do so in a manner that aligns with individual risk tolerance.

About Eurex

Eurex stands for the leading European derivatives exchange and – with Eurex Clearing – one of the leading central counterparties globally. Being architects of trusted markets characterized by market liquidity, efficiency and integrity, we provide our customers with innovative solutions to seamlessly manage risk. On the trading side, we mastermind the most efficient derivatives landscape by pioneering ingenious products and infrastructures as well as by building 'smart' into technology – offering a global product range, operating the most liquid fixed income markets in Europe and featuring open and low-cost electronic access. As central counterparty, Eurex Clearing builds trusted relationships with and amongst market participants, enabling effective risk management and delivering high efficiencies to clients.

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Further information

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2 https://www.europeanissuers.eu/docs/view/6644d133512ab-en

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