



TIME TO GET A GRIP ON ASSET ALLOCATION

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Executive summary

- GRIP is a new, state-of-the-art, intelligent portfolio construction process. The name is an abbreviation of: Group Risk in Portfolios.
- Unlike traditional asset allocation, which assigns weights to different asset classes regardless of risk, GRIP focuses on the risk contribution of clusters of assets or strategies to the overall portfolio.
- This proprietary methodology can result in portfolio allocations that are truly diversified
 - with less extreme weights and risk allocations, and a higher number of uncorrelated exposures.
- GRIP is flexible. It can be tailored to individual clients' needs and targets, while ensuring consistency across risk profiles, regions and currencies.
- The GRIP approach does not only work to allocate between asset classes, but can also be applied to risk factor strategies, tactical decision making and smart-beta strategies.
- The result is a whole new perspective on constructing strategic multi asset portfolios.

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What's wrong with the traditional way of asset allocating?

Asset allocation used to be about simple diversification – for example, an allocation of 40 per cent in equities versus 60 per cent in bonds. The problem with this approach is that portfolios could still contain a huge amount of risk as diversification is achieved only at the capital allocation level. In the allocation above the risk contribution from the equity exposure is around 90 per cent.

To address this problem, along came Harry Markowitz in the 1950s and modern portfolio theory was born. These days mean-variance optimisation is regarded as the fundamental framework in portfolio construction. Markowitz's approach was the first to offer a quantitative insight into the trade-off investors face between returns and risk.

Diversification could now be shown to improve the trade-off between returns and risk – by optimising a portfolio along a so-called efficient frontier. But the reality is that even this approach can underperform the most basic diversification strategies – for example, equal weights in all asset classes.¹

The major shortcoming of mean-variance optimisation is that it is highly sensitive to inputs, with slight adjustments in parameters leading to dramatic changes in the optimal portfolio composition. And the most important input, expected returns, is the hardest to forecast of all. In practice, the potential benefits of diversification are often more than offset by estimation errors.

Therefore a new approach that improves upon Markowitz is crucial. After all, asset allocation is still the main driver of investment performance, with numerous academic studies suggest that long-term asset allocation explains more than 90 per cent of portfolio returns.

Get a GRIP on the problem

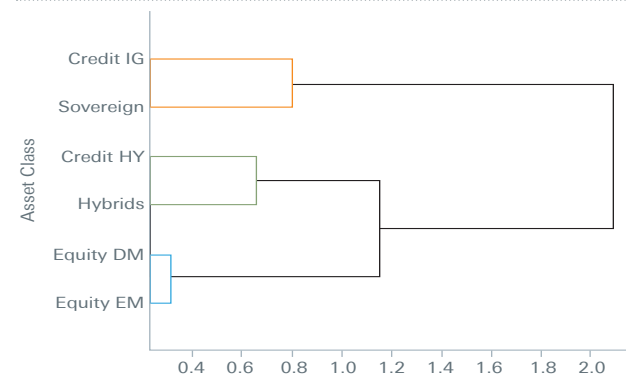
The key thing GRIP does differently to traditional approaches is focus on the risk contribution of assets or strategies to the overall portfolio. What it is trying to avoid is seemingly diversified portfolios suffering from surprisingly high risk concentrations. And in addition to traditional risk parity strategies GRIP utilises other information in the correlation matrix of the investment universe.

The first step in this process is to cluster asset classes together. This is done using a so-called proper distance metric, based on pairwise correlations. A correlation distance of zero means that asset classes are perfectly positively correlated. A measure of one means they are perfectly negatively correlated.

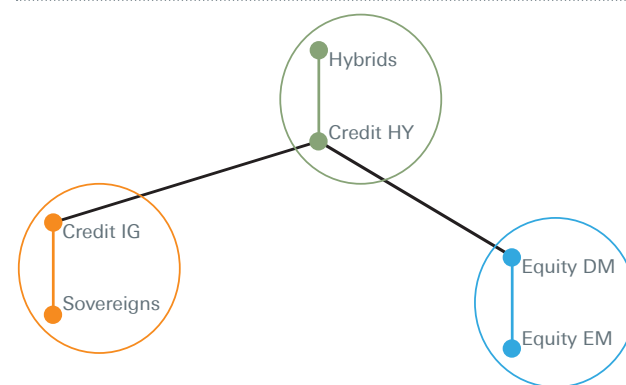
Something called a hierarchical clustering algorithm is then used to come up with specific asset class groups. The idea is to sort, then cluster together, the most comparable sources of risk. The two images below visualise the groupings for a simplified six-asset case study, based on developed and developing market equities, rates, investment grade and high yield credit, and hybrids.

In the Dendrogram the distance between the clustered data points is visualised. Likewise, the Minimum Spanning Tree, with weight of each edge equal to the corresponding correlation distance, offers further insights. Both methods show, for example, that credit investment grade is closer to sovereigns, from a correlation distance point of view, than developed market equities.

Dendrogram of cluster formation²



Minimum spanning tree²



The clustering results are finally used to rearrange the correlation matrix in a quasi-diagonal format. And it is worth mentioning again that although the example above focuses on correlation distances to define asset class clusters, this optimisation technique is not limited by this one criteria. Assets could be grouped by other common risk factors, such as carry, momentum or volatility.

The next step is using these clusters to create diversified risk allocations, employing what is known as a risk parity approach – the idea that each asset contributes the same amount to the overall portfolio risk. But unlike traditional methods, GRIP uses the previously defined clusters in order to seek parity of risk contributions from groups instead of individual assets.

How this overcomes the problem of a traditional risk parity framework can be shown as follows. Suppose a cross-asset risk parity optimisation is run on a broad universe that includes the STOXX Europe 600. If the MSCI Europe index is then added into the mix, the portfolio would seem to be exposed to similar risk factors, but there is suddenly a much bigger allocation to European equities. A clustering approach, on the other hand, can help prevent optimisation results having regional biases and asset class concentrations.

The stacked area charts below visualise the results for a universe of 13 traditional sub-asset classes³ that are clustered in five groups for a range of target volatilities, starting from equities in dark blue to fixed income (bright blue) to alternatives (amber). The Y-axis is the

percentage weight and the X-axis the percentage target volatility of the asset allocation.

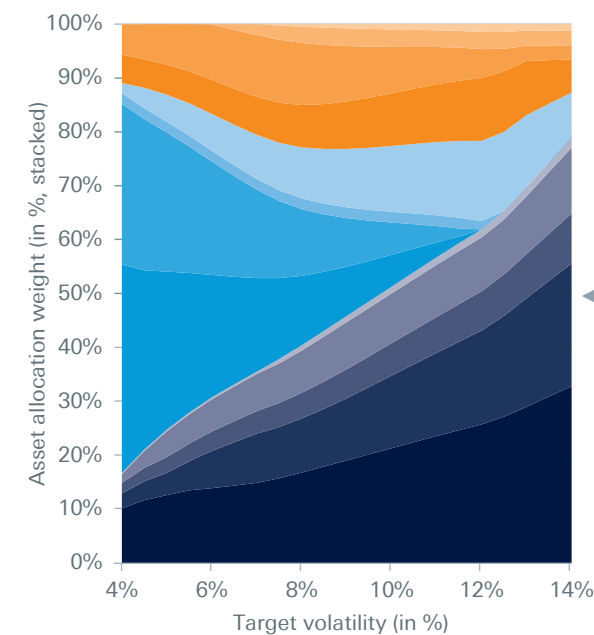
The chart on the left shows an asset allocation by risk profile, and on the right a risk allocation by risk profile. It can be seen from the former that a target volatility of eight per cent equates to about a 40 per cent asset allocation to equities. But from the right hand chart it is clear that only 75 per cent of the risk is associated with equities in this allocation opposed to the 90 per cent in the simple 40/60 portfolio.

Further analysis, outlined in the next section, shows that by moving beyond the usual risk parity framework it is possible to construct allocations that are diversified from a capital allocation as well as risk contribution perspective, with a higher number of uncorrelated exposures, and less extreme weights and risk allocations.

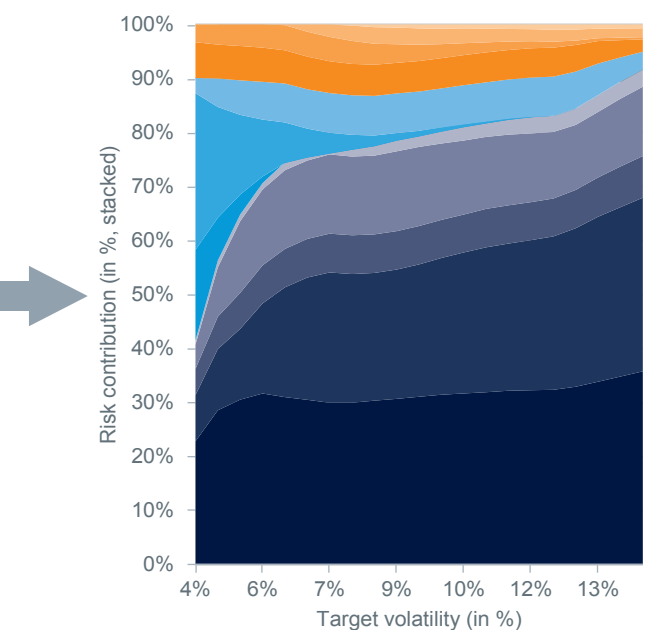
And at the same time all of this can be achieved while offering a huge degree of flexibility. In the case of the strategic asset allocation, above, for example, GRIP was calibrated to only hold long-only positions and ensure that the overall portfolio volatility equalled a given target. But it is possible to add further rules or constraints based on the risk profile, investment, or practical needs of a client.

In addition, the methodology can be applied to tactical decision making as well as strategic asset allocation. GRIP can also be used when clients have employed alternative risk premia (ARP) and smart beta strategies. GRIP even works on single stock portfolios.

Asset allocation by risk profile²



Risk allocation by risk profile²



For illustrative purposes only.

³S&P 500, STOXX Europe 600, Topix, MSCI AC Asia ex. Japan, MSCI EM Latin America, Bloomberg Barclays US Treasury, Bloomberg Barclays US Corporates, US Cash LIBOR 3-months, JPMorgan EMBI Global, Bloomberg Barclays US High Yield, S&P/LSTA Leveraged Loan, UBS Thomson Reuters Global Hedged Convertible Bonds, Bloomberg Commodity

¹ The risk calculation is based on a split between the EURO STOXX 50 and the Bloomberg Barclays Global Aggregate index.

² Source: Deutsche Asset Management, January 2018

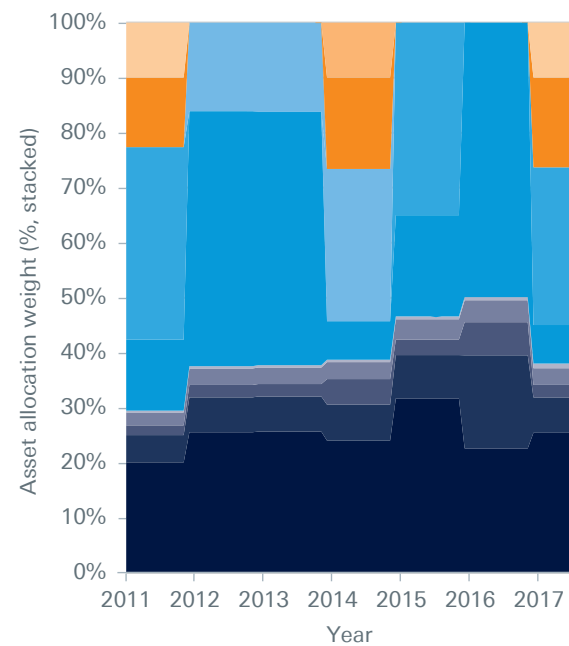
What are the results in practice?

Having explained how GRIP works, the following section looks at how effective this new risk-based approach to diversification performs in practice. First of all, what does a hypothetical GRIP portfolio look like in terms of asset allocation?

The charts below give a good illustration, showing the mean-variance optimal asset allocation on a monthly basis for the same 13 asset classes used above from 2011 to September 2017. The stacked areas show the weightings as a percentage on the Y-axis. On the left is a traditional risk parity portfolio while on the right is the GRIP group risk parity portfolio.

Clearly the asset allocation is more stable using the GRIP methodology. But focusing on the asset allocation only can be beside the point. What matters is the

Mean-variance optimal asset allocation over time⁵

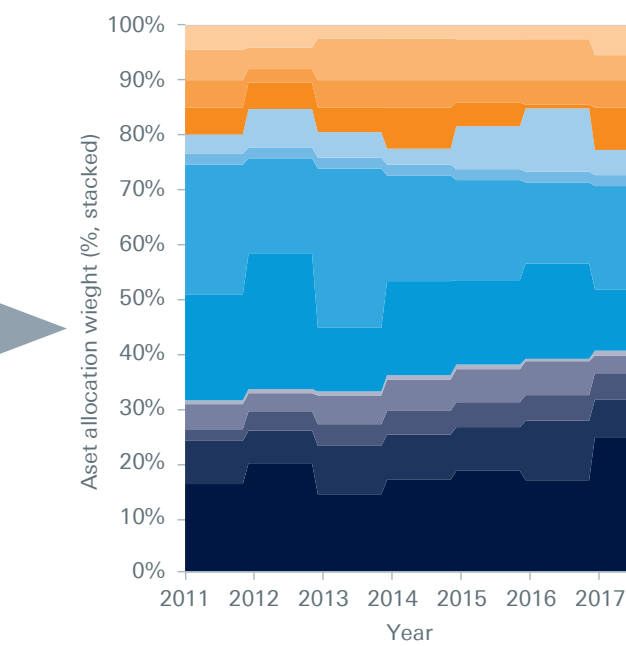


likelihood of hidden portfolio concentrations, which could potentially lead to unexpectedly large losses.

This is assessed by taking 520 weekly data points between 2008 and 2017 for each index in order to calibrate the risk estimators. A balanced risk target of nine per cent is used. Then, the optimisation was run annually and the allocations rebalanced monthly.

So what concentrations arise and how do they compare between GRIP – which combines asset and risk allocations – and other methodologies, such as pure risk parity (RP) or the traditional mean-variance approach (MV)⁴?

Group risk parity optimal asset allocation over time⁵



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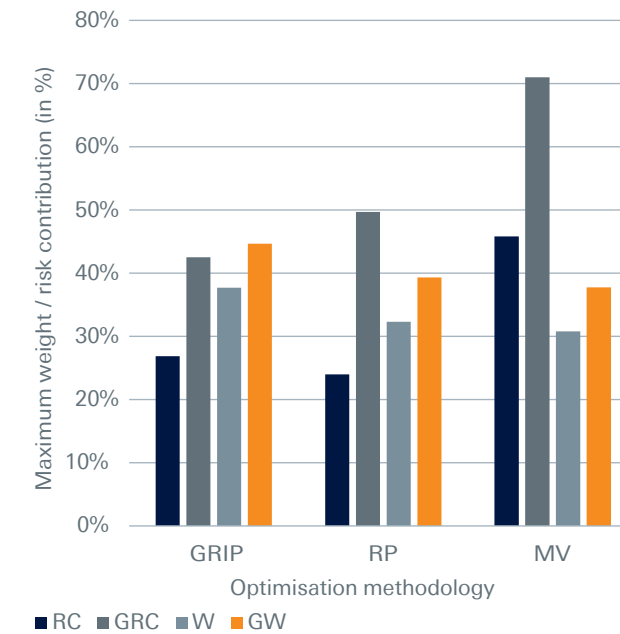
No assurance can be given that the GRIP construction process will perform better than other methodologies.

⁴ The mean-variance optimisation requires expected returns as additional inputs. For illustrative purposes, we use a simple 12-month price momentum as return projection.

⁵ Source: Deutsche Asset Management, January 2018

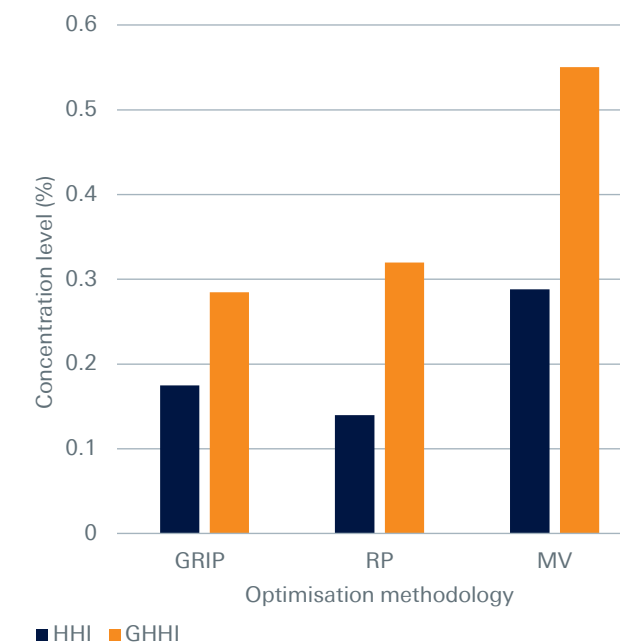
The higher the bars in chart below the higher the concentration risk (RC) and group risk (GRC), and weight (W) and group weight (GW). GRIP compares reasonably well on a group risk basis.

Comparison of extreme allocations⁵



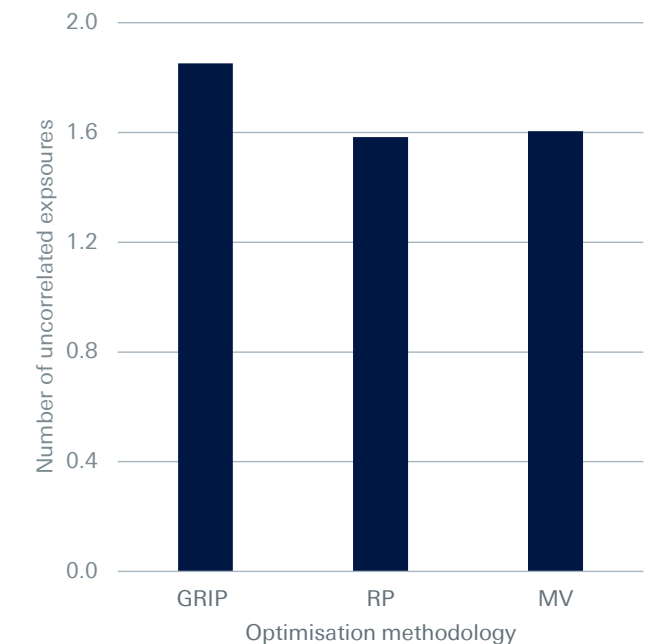
But within these allocations, are there any extreme concentrations to look out for? This can be tested using a Herfindahl-Hirschman-Index, as shown below. The higher the bars the higher the concentration, and again the GRP methodology (GRIP) looks favourable on a HHI and group HHI basis.

Comparison of concentrations⁵



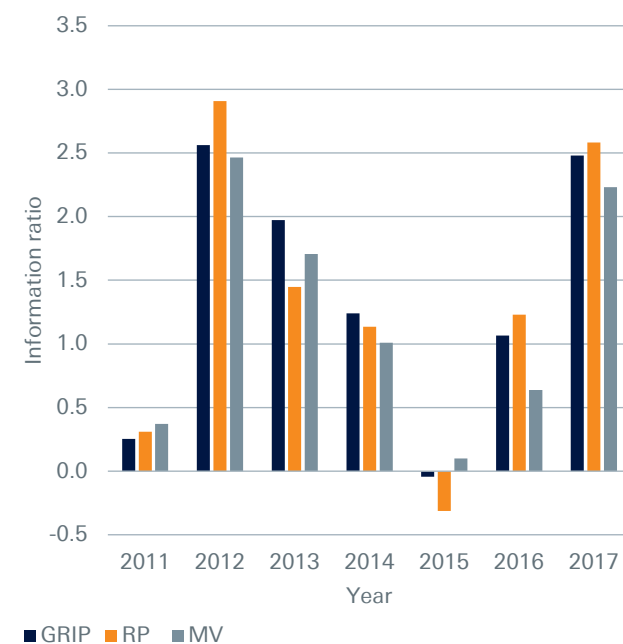
Another way to test for unwanted concentrations is to look for them from the opposite side – that is, to see how many uncorrelated exposures there are in a portfolio. The more the better. So-called principal component analysis is the way to check this. In the bar chart below, the number of uncorrelated exposures is shown on the Y-axis.

Comparison of uncorrelated exposures⁵



As well as being less concentrated, our analysis shows that a GRIP portfolio outperforms the traditional risk parity and mean-variance optimal allocations in absolute and risk-adjusted terms. The final two charts on the next page show the annual information ratios (total return divided by volatility) and the performance of the three optimisation techniques from 2011 to September 2017.

No assurance can be given that the GRIP construction process will perform better than other methodologies.

Comparison of annual information ratios⁶Comparison of performance over time^{6, 7}

⁶ Source: Deutsche Asset Management, January 2018
⁷ Past performance is not indicative of future performance.

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