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Amundi
ASSET MANAGEMENT

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Risk budgeting and trade sizing: why they matter to multi-asset portfolio construction

Document is for exclusive attention of professional clients, investment service providers, and any other professional of the financial industry

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Editorial

In the current environment of heightened uncertainty, managing a multi-asset portfolio has rarely looked as complex as it does today, especially for those investors looking for an appropriate governance model on which to take investment decisions. The issue is not only to make accurate market forecasts and formulate appropriate investment views, but also to construct an efficient portfolio based on these views within a given risk budget.

Mean-variance optimisation has long been recognised as a standard practice, but, in our view, it can lead to highly concentrated and unstable portfolios. A purely risk-based optimisation also implies regular and strict rebalancing which is hardly suitable for those portfolios where asset allocation is combined with other sources of potential alpha generation.

As a result, risk budgeting techniques have been developed to allow more stable allocations and more robust diversification than mean-variance optimised portfolios. These techniques allow the identification of criteria that investors, we believe, can rely on to choose how to allocate their risk budget and size their trades. Among others, they include the number of investment ideas to be integrated in the portfolio and their diversification potential.

'Effective diversification' is at the core of our approach to portfolio construction. We believe that diversification[1] is effective not only with regard to allocating across asset classes, but also for investing in uncorrelated investment opportunities across themes, asset classes, sectors or regions. With this aim, an active multi-asset investment framework should allocate risk across four pillars: macro strategy, macro hedging, satellite strategies and selection strategies, with the goal of achieving the portfolio's target return or objective.

We consider that the issue of how to size a given trade should be raised not only at the actual time of the investment, but also – and probably more importantly - at an earlier stage. We believe that trade sizing should occur regularly, at least on an annual basis, when the portfolio manager plans the budget of risk of their portfolio for the period ahead. Our analysis will differentiate between a 'Planning-ahead' step and an 'At investing' one. In practice, sizing a trade will imply considering the typical standalone risk of each trade, its correlation with other strategies, together with the investor's level of conviction in the trade. Put together, these factors will set the actual trade size.

Finally, we will argue about the need to implement an advanced risk budgeting technique to enable the whole process. There is no 'one-size-fits-all' strategy for every investment environment and any portfolio allocation has to be a dynamic exercise. Even though history is not predictive of the future, detailed information about past trades and their contribution to portfolio efficiency could be of help for portfolio managers to establish the features of the alpha expected in various strategies, serving as a compass across different market environments. This implies relying on a quantitative framework, including a rich history of past trades to help measure portfolio managers' skills in different areas of expertise, alongside a robust risk and performance system. Asset managers with a long track record of investment decisions can learn from the analysis of past success and can be more knowledgeable when setting future alpha targets and risk budgets.

[1]Diversification does not assure a profit or protect against loss.

1- Setting the scene

"Risk budgeting provides a framework via which portfolio managers can address risk."

1-1- Risk budgeting framework

The importance of risk considerations in asset allocation is well recognised. The base idea is to minimise portfolio risk given a return objective as described in classical portfolio theory. Applying mean-variance optimisation, however, generally can lead to portfolios concentrated in terms of weights and subject to instability.

New risk budgeting techniques have therefore been developed, consisting of setting a target level of risk to be accepted at the portfolio level and allocating this risk across a number of investments with the aim of maximising returns within agreed risk targets. We believe that the main advantages of portfolios built based on this philosophy are the potentially greater stability of the allocation and a **more robust diversification** management than that derived from mean-variance-optimised portfolios.

In our view, **risk budgeting provides a framework via which portfolio managers can address risk.** It helps set guidelines on how much risk needs to be taken to pursue a given target return or excess return, how many strategies are required, the average size of those ideas, and the level of diversification we should be targeting.

It can be applied to all types of strategies, from benchmark aware to absolute return portfolios. So, if we consider, for example, a portfolio whose objective is to generate excess return over a defined benchmark, the focus will be on budgeting the tracking error: in other words, setting the risks of a portfolio against the benchmark. In the case of an absolute return unconstrained portfolio, the target is usually to outperform a cash benchmark and therefore the focus will then be on VaR measures and risk contribution for generating positive returns in any scenario. In any case, **the goal of the risk budget setting process is to provide a framework to best enable the portfolio to outperform a specific reference.**

Risk budgets are not defined as a cap on *ex-ante* risk: the results of risk budgeting should be thought of as guidelines regarding the average level of risk to be taken over time. We know risk and return are linked by a trade-off relationship where the portfolio manager must tolerate higher risk in order to pursue higher return. For a given risk level, a higher return target can be pursued by reaching for higher **Information Ratio**. Potentially this can be pursued in two ways: by being more skilful or by introducing additional, diversified, investment ideas.

"The goal of the risk budget setting process is to provide a framework to best enable the portfolio to outperform a specific reference."

This reflects our belief in the fundamental law of active management defined by Grinold and Kahn, according to which the **Information Ratio is a function of selection skills and number of independent investment opportunities.**

The **Fundamental Law of Active Management** by Grinold and Kahn is designed to assess the value of active management, as expressed by the information ratio, using only two variables. The first is the portfolio manager's 'skill' in selecting securities. In other words, how good is the portfolio manager at forming correct predictions? The second is breadth, i.e., the number of independent investment opportunities. While IC and N are supposed to correspond to independent trade ideas, reality is often different.

$$IR = IC \times \sqrt{N}$$

IR= information ratio
IC= information coefficient or selection skill
N= number of independent investment opportunities

While improving the portfolio manager's selection skills is not straightforward, investors can more easily focus on managing the second variable to seek what we call 'effective diversification'. This is why, as we will show later in this document, our Risk Budgeting application lends a significant importance to estimating how much diversification a given strategy brings to the portfolio.

"We believe diversification is effective not only with regard to allocating across diverse asset classes, but also in relation to investing in several uncorrelated investment opportunities across themes, asset classes, sectors or regions."

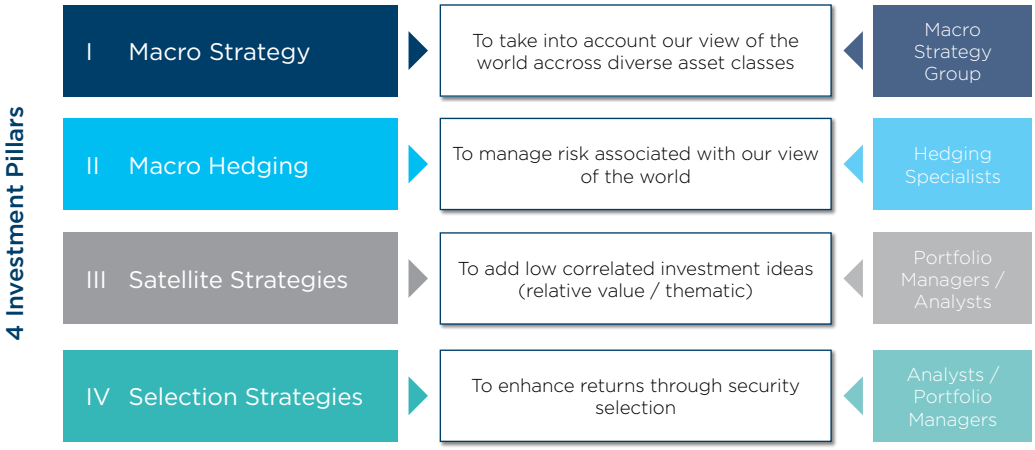
1-2- Effective diversification in an active Multi-Asset investment framework

As correlations between asset classes are inherently unstable and tend to increase during periods of market stress, we believe that **traditional diversification approaches fail** to take into account changing correlations and are not resilient in such periods. One of the key elements of any active Multi-Asset investment process should indeed, in our view, result in achieving 'effective diversification'.

Our long-standing experience in cross-asset investing has helped us identify changes in risk regimes when correlations tend to break down from historical levels. We believe in the need to **diversify beyond 'asset class'** and that portfolios built with **uncorrelated strategies** are, by design, portfolios with a diversification that is more resilient during market stress as well.

We believe diversification is effective not only with regard to allocating across diverse asset classes, but also in relation to investing in several uncorrelated investment opportunities across themes, asset classes, sectors or regions. With this aim, an active Multi-Asset investment framework should allocate risk across four (uncorrelated) investment pillars.

Figure 1. Active risk allocation seeking to diversify risk across independent strategies and skills



Source: Amundi as of 31 August 2020. **For illustrative purposes only.**

I. The **Macro Strategy Pillar** is made up of high conviction asset allocation investments that best represent our 'View of the World'. The portfolio managers identify a 'base case' scenario and select high conviction trades and themes they believe reflect this scenario. The management of this pillar is based on a **top-down, fundamental and macro-driven approach.**
II. The **Macro Hedging Pillar** will have the role of managing tail-risk events or alternative risk scenarios in case the base scenario turns out to be wrong. These positions are

"As they are an important source of diversification for the portfolio, we believe investors should aim to achieve a low level of correlation between the Satellite Strategies and the Macro Strategy pillars."

expected to perform positively during periods of market stress and may comprise derivative positions and/or negatively correlated strategies expected to mitigate specific adverse events or potential scenarios that have been identified.

III. **The Satellite Strategies Pillar** is made up of lowly correlated, relative value trades across asset classes. Responsibility for implementing Satellite Strategies lies within the mandate's investment team, allowing the portfolio managers to use their own expertise to implement their best ideas. Individual Satellite strategies will have different drivers regarding the Macro Strategy positions and will generally be relative value in nature. As they are an important source of diversification for the portfolio, **we believe investors should aim to achieve a low level of correlation between the Satellite Strategies and the Macro Strategy pillars.**

IV. **The Selection Strategies Pillar** is composed of selected bottom-up single security, fund selection or factor investing ideas that aim to deliver alpha independently from the three above-defined pillars. Portfolio managers, specialising by asset class, are responsible for the selection of what they believe are the best ideas within their area of expertise. They collaborate with specialist investment desks globally, including fundamental research analysts, fund research and portfolio managers, to select high conviction ideas. Securities proposed are challenged to show **idiosyncratic features**, true alpha.

The risk budget of a portfolio should be allocated at the portfolio level and across the three different alpha pillars (Macro, Satellite and Selection) to pursue the portfolio's target return. Allocation between the investment pillars depends on the portfolio characteristics and market conditions. For the hedging pillar, investors should rather set a target cost that they are willing to spend to add a potential layer of protection to the portfolio. In other words, the aim is to maximise the amount of portfolio protection for the given cost budget.

Figure 2. Increased conviction on the central scenario and more asymmetry with the alternative ones

70% CENTRAL SCENARIO – *Slow U-shaped recovery*			
Analysis	▪ Short-term lived rebound (Q3), flatter and gradual convergence to pre-crisis levels, with significant divergences on timing. Economic backdrop still in the grip of the pandemic as a vaccine won't be available before H221. ▪ Credit fragmentation and rising default rates ▪ Debt monetisation and ballooning CB balance sheets ▪ Global trade recovers on economies re-opening and is driving the global cycle as well as domestic engines	*Market implications*	▪ Sideways dynamics prevent directional positioning. ▪ In fixed income, be active in duration management (favour US, EU peripherals), prefer carry to beta ▪ Long BBB/BB, very selective on low high-yield rated issuers, cautious on EM FX. USD to be monitored. ▪ In equities, for the rally to continue the widening of the market's breadth beyond the FANGS should be validated. Prefer long-term winners, maintain the tilt to cyclicals ▪ Favour gold on pervasive uncertainty
10% UPSIDE SCENARIO – *V-shaped recovery*			
Analysis	▪ Economic activity recovers to pre-crisis levels by mid-2021 (US, Eurozone), with above-potential growth in H2 2020-H1 2021 ▪ Pandemic almost suppressed with medical treatments for cure and prevention. A vaccine is available H12021 ▪ Monetary and fiscal stimuli feed through to the real economy and financial markets	*Market implications*	▪ Favour risky assets (with a rotation from credit to equity) and commodities (oil) ▪ Prefer linkers ▪ Be cautious on the USD: its structural bear trend starts on rising deficits and interest rates differentials.
20% DOWNSIDE SCENARIO – *Secular stagnation*			
Analysis	▪ Economic relapse (Q4 2020/Q1 2021) ▪ Policy accelerators in place but with diminishing impact: liquidity does not feed through to the real economy and the labour market suffers fading employment benefits ▪ Economic crisis evolves into a financial crisis ▪ Protectionism and deglobalisation accelerate, negatively affecting trade and global value chains	*Market implications*	▪ Favour cash and US Treasuries ▪ Favour gold, CHF, Yen, NZD ▪ Play minimum volatility strategies

Source: Amundi Research as of 31 August 2020. **For illustrative purposes only.**

1-3- The importance of advanced risk budgeting application

As seen in the previous section, in an Active Multi-Asset Investment process, we believe investors should aim to optimise the risk allocated to the investment pillars and individual strategies of a portfolio to obtain the most efficient portfolio.

By **strategy,** we refer to an investment in a single security or a set of securities combined to represent a certain investment decision (i.e., relative value). A strategy can be directional in nature (e.g., long US Equities) or relative value (long Chinese Equities vs short Emerging Markets). It can be implemented using cash securities, derivatives or synthetic positions, which can better allow the portfolio manager to effectively move risk from one strategy to another. It may also be necessary to immunise certain risks within a strategy to be managed as a separate investment decision (e.g., hedging the FX risk of one strategy to be managed by a FX specialist in another strategy).

Investors should consider using some heuristic risk-based solutions with the aim of diversification. Advanced risk budgeting applications are critical to reaching this goal.

"The main principles of the Risk Budgeting application are to support the combination of different strategies in a single portfolio and to effectively monitor the risk, diversification, and the performance of each strategy designed to ensure that alpha generation is repeatable."

The Risk Budgeting application plays a fundamental role when combining investment ideas and strategies. The main principles of the application are to support the combination of different strategies in a single portfolio and to **effectively monitor the risk, diversification, and the performance of each strategy designed to ensure that alpha generation,** which is the excess return resulting from active investing and not attributable to market returns, **is repeatable.**

A Portfolio Construction and Financial Engineering team that supports, and challenges, portfolio managers in their investment decisions is critical to developing and evolving a sophisticated risk budgeting approach. The team helps portfolio managers fully understand the risk they take across different strategies and pillars, the level of diversification across strategies, and the contribution of these strategies to the overall risk and performance of their portfolios. The team also plays an important role in ensuring that the portfolio is aligned with its objectives in terms of risk and diversification, giving it the best opportunity to deliver its target performance.

This makes this approach substantially different from optimising solely at the security or at asset class level and it allows the tilting of the allocation of risk and hence of potential return to the pillars and ideas expected to offer the most opportunities.

2- Key principles for an effective trade sizing process

2-1- Sizing to achieve effective diversification

Diversification plays a key role in this investment process, and, as such, it is central to the risk budget setting process. We believe effective **diversification among strategies can be achieved in three ways.**

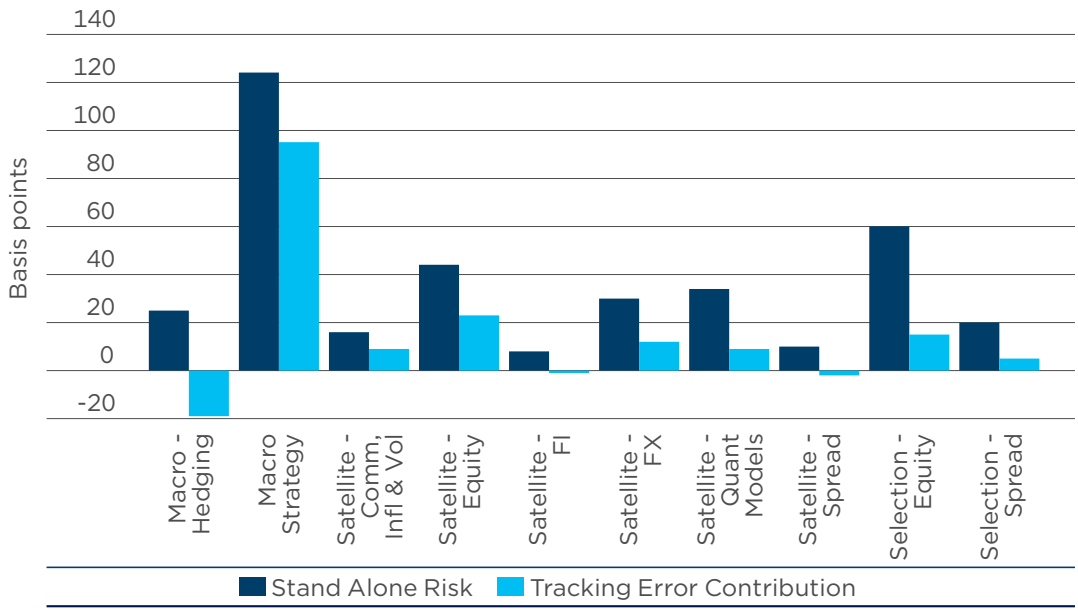
Figure 3. Factors relevant in the sizing process to achieve effective diversification

Source: Amundi as of 31 August 2020. **For illustrative purposes only.**

1. **Through idea generation and the number of open strategies.** All else being equal, the higher the number of strategies in a portfolio, the greater the level of diversification. However, there is a trade-off between idea generation and idea quality. The greater the number of ideas, the harder it is to dedicate time to each individual idea (initial investment case and position management through the life of the strategy) and the higher the risk of deterioration in the quality of ideas. It is therefore important to target a level of idea generation that can potentially bring diversification benefits without diminishing the potential impact of adding too many new ideas onto the portfolio's return.
2. **The dispersion in sizes of the open strategies.** The portfolio will be more diversified if strategies have similar sizes, in risk terms. On the other hand, if a small number of strategies are much larger than the rest, the risk will be more concentrated in these and the potential benefit of diversification coming from additional strategies will be limited. For this reason, investors should target a risk skyline that is reasonably well spread across strategies.

"Investors should target a risk skyline that is reasonably well spread across strategies."

Figure 4. A risk skyline reasonably well spread across strategies



Source: Amundi as of 31 August 2020. **For illustrative purposes only, and not referring to any specific product or strategy.**

3. **Correlation.** The higher the average correlation between strategies, the more concentrated the risk of the portfolio. Investors should therefore target a low correlation, on average, in order to maximise the potential benefit of diversification. On the opposite side, a significantly negative correlation could suggest a good use of hedging strategies or reflect inefficiencies in the construction of the portfolio. In an extreme case, if there is a large negative correlation between strategies, this might suggest that an investor is paying twice for offsetting positions.

Figure 5. 3-year ex-ante Correlation Matrix from Risk Budgeting: seeking effective diversification in an Active Multi-Asset investment framework in a Balanced Conservative portfolio

	Macro Strategy	Macro Hedging	Satellite	Selection
Macro Strategy	1.00	-0.51	0.22	0.27
Macro Hedging	-0.51	1.00	-0.35	-0.16
Satellite	0.22	-0.35	1.00	0.20
Selection	0.27	-0.16	0.20	1.00

Source: Amundi as of 31 August 2020. **For illustrative purposes only.**

Each of the above three characteristics will be taken into consideration to different extents depending on the pillar on which investors are focusing, the specific portfolio process, and the individuals involved.

For example, in the Macro Strategy pillar, the investment ideas will be based on the main scenario assessment occurring within a Multi-Asset Macro Strategy Group dedicated to this pillar. This group consists of the most senior members of a Multi-Asset investment team, as well as members from the Research Department, and is responsible for defining the central scenario and alternative scenarios. It reflects the view of the world, leveraging on analysis of the economic and investment markets conditions. In this process, it is likely to hold a relatively small number of high conviction ideas in the Macro Strategy and they would likely have a higher level of correlation, as all linked to a central scenario.

"The Satellite pillar usually has a larger number of strategies and typically has a lower correlation on average with the other pillars."

The Satellite pillar usually has a larger number of strategies and typically has a lower correlation on average with the other pillars. Satellite Strategies should be sponsored by individual portfolio managers and therefore be more influenced by individual managers' styles.

For example, one portfolio manager may have many investment ideas with relatively higher turnover while another may have fewer ideas but hold them longer. Some investment areas within the Satellite Pillar may have a large breadth of ideas, such as FX pairs, while the universe of potential strategies is much smaller in others, such as in credit markets, which offer fewer investible, liquid instruments. **This shows the importance of tailoring the characteristics to the PM's investment style as well as the available universe of potential strategies.**

As we have noted previously, the need for 'effective diversification' in an active Multi-Asset investment framework means developing a way to measure the effect will prove important. We have created a metric called the **Concentration Ratio** which is **a measure of interdependence between the strategies in a portfolio** that allows investors to see how much of the concentration, or inversely how much diversification, can come from strategy correlation and how much can come from differences in position sizing.

The Ratio usually ranges from one to zero, but it can also be negative. A value of one suggests that there is only one independent investment opportunity in the portfolio. A value of zero suggests that all strategies are uncorrelated with each other and have the same size in terms of standalone risk. A negative value suggests hedging plays an important role or, perhaps, that there are inefficiencies in the construction of the portfolio.

Let us now describe how trade sizing could work, first at the planning ahead step and then at the time of investing.

2-2- Planning ahead stage: setting the target return and the risk budget

At the beginning of each year, the target return and risk budget for a portfolio are agreed between the head of desk, lead portfolio manager(s) and the Portfolio Construction team with the aim of meeting the portfolio's investment objectives.

"The risk budget is allocated across the investment pillars based on the portfolio's constraints and objectives."

As part of this process**, the risk budget is allocated across the investment pillars based on the portfolio's constraints and objectives**. A risk budget is determined for each of the three alpha pillars. For the Hedging pillar, investors rather set a target cost that they are willing to spend to add a potential layer of protection to the portfolio. In other words, the aim is to maximise the amount of portfolio protection for the given cost budget.

In this planning phase, the open dialogue between the teams may allow participants to understand if the portfolio has budgeted the appropriate amount of risk needed to generate the target return through a sufficient number of diversified ideas. The objective is ultimately to achieve stable excess returns over time and in different market environments.

Let us take a hypothetical example to illustrate how a formalised framework — which we insist should be used as a guideline and not a prescription — can help portfolio managers determine the risk budget and target return for a portfolio.

Figure 6. Hypothetical example of trade sizing in a multiple-pillar approach

		Trade level			Pillar level		
Pillar	Avg No. trades	Avg Standalone Risk	Avg Correlation with other trades	Avg. Standalone IR	IR	Target Tracking Error Risk	Target Excess Return
Macro	16	0.15%	0.15	0.25	0.55	1.10%	0.60%
Satellite	30	0.10%	0.10	0.15	0.42	1.10%	0.45%
Selection	5	0.40%	0.10	0.30	0.57	1.05%	0.60%
Portfolio					0.54	2.05%	1.10%

Observed for each trade on average

Implied for the pillar when all trades are in place

Source: Amundi as of 31 August 2020. **For illustrative purposes only.**

The inputs in calculating the risk budgets include:

- **The average number of strategies,** which is the number of individual investment ideas at any given time. If the trade horizon is short, it will mean more idea generation is required, keeping other inputs constant. For example, in the Satellites pillar, if the average horizon is four months (turnover of three times per year), 90 trade ideas per year will be required to have an average of 30 at any one time.
- **Average standalone risk,** or the expected average volatility of each trade idea. This is a useful metric when PMs are sizing new trades.
- **Target concentration:** The lower the target concentration ratio, the greater the expected diversification within the pillar. For instance, the goal of the Satellites pillar is to add diversification, so a lower concentration ratio will be targeted.

With a given number of strategies, their average size and target concentration ratio, a risk budget can be calculated.

In the hypothetical example summarised in the table presented above, risk is evenly spread across the three alpha- generating pillars (into risk budgets of 1.05% or 1.10%). **The next stage is to translate the risk budget for the pillar to a target return.** This can be done by calculating a target information ratio for each pillar. When determining this assumption, investors can set an average Information Ratio (IR) — a positive figure, as portfolio managers are expected to deliver positive performance — for each individual strategy. The IR per idea is similar to the Information Coefficient, but, when combined with the portfolio or pillar IR, investors should not assume independence of strategies. Instead, using the Concentration Ratio or another measure of interdependence between the strategies could prove more appropriate.

Regarding **the Macro Strategy pillar,** as discussed in previous pages, **it is likely to have a relatively small number of high conviction ideas with a higher level of concentration.** Investors should also tend to target a higher level of risk-adjusted return when allowing strong resources to generating ideas on this pillar.

In contrast, **risk budgets on satellite strategies are set assuming a larger number of smaller strategies** with a low level of concentration, as the aim of this pillar is to enhance diversification.

Likewise, the Selection pillar will normally include a small number of strategies, each containing a number of holdings. These strategies are usually made up of a basket of equities, bonds or mutual funds with the objective of outperforming a relevant market index. The Information Ratio investors can target for them can potentially be higher than for the other pillars, as each strategy is already expected to be well diversified.

"The Hit Ratio is a measure of the percentage of winning strategies and the Win/Loss Ratio is calculated as the average return of the winning strategies divided by the average return of the losing strategies."

Once the risk budgets and target returns have been determined for each pillar, they are translated to the overall portfolio level using the same process. The risk budget and target return of the portfolio depend on the results at the pillar level, an estimated target diversification between the pillars, and the inclusion of a 'transfer coefficient'. This reflects the fact that investors will not always be successful in reaching target returns across all pillars. Hence, only a portion (two-thirds in the example below) of the pillar targets expect to be captured into the annual target return for the portfolio.

Investors then can validate that the portfolio objectives are being met and that the levels of risk budget and target return are appropriate and achievable using some common estimates of manager skill. **The Hit Ratio is a measure of the percentage of winning strategies and the Win/Loss Ratio is calculated as the average return of the winning strategies divided by the average return of the losing strategies.**

Assuming a hit ratio of 50% (average level of skill at picking winning ideas), and an average turnover of strategies, we can back out an implied Win/Loss ratio from the calculated target return and validate that the target returns and target Information Ratios are achievable for the given level of risk budget. **The rationale behind this validation is that, even with average success in picking winning ideas, an accurate position management and stop-loss disciplines may allow investors to achieve asymmetry between winning and losing ideas.**

For example, given the inputs in the table below, we calculate a hypothetical Win/Loss ratio of 1.22.

Target Return	1.10%
Target No. Strategies	51
Average Holding Period	6 Months
Hit Ratio	50%
Expected Win Loss Ratio	**1.22**

"The size of a trade should depend on the standalone risk of the trade, its correlation with the rest of the portfolio and the level of conviction about it."

2-3- Trade sizing at the time of investing

At the time of investing, the size of the trade will essentially depend on:

- **The standalone risk of the trade:** what is the amount of risk generated by the trade in terms of units of volatility;
- **The correlation of the new idea with the rest of the portfolio;**
- **The conviction level of the trade,** which is itself a function of the manager's confidence in the capacity of the trade to generate return for the portfolio, and of market conditions.

Figure 7. Sizing at the time of investing - level of conviction, an example

EM DEBT	VIEW					CONVICTION	ACTIVE TRADES
Region/Type	--	-	=	+	++	Level (1-4)	
EM GBI Local (unhedged USD)					x	2	
EMBI Global (hard currency)					x	3	+1% EMBI Index
Overall EM DEBT					x	2	

Source: Amundi as of 31 August 2020. **For illustrative purposes only.**

The last element is very relevant, as confidence in the capacity of a given strategy to deliver performance tends to diminish in changing market conditions: for instance, when the market is undergoing a rotation from a momentum-driven to a value-driven market leadership.

The answer is more uncertain in periods of market stress, as:

- On the one hand, they are associated with high market volatility and therefore a given trade may generate a higher level of risk for the portfolio;

- On the other, they can offer particularly attractive investment opportunities due to price dislocations, leading to higher risk-taking on the part of the manager.

In the case of a benchmark aware portfolio, the budget of directional risk in the Macro Strategy will be a function of the team's conviction in their view on the markets.

Different models of risk sentiment can be used to evaluate whether the period is appropriate to accept a higher risk budget for the portfolio and potentially increase the size of the trade. In this approach, risk assessment monitoring aims to assess market risk on a multi-pillar approach. For each pillar, specific tools can be used to come up with a final risk score ranging from 0% to 100%.

Figure 8. Risk assessment of market conditions

Current Assessment & Dynamic Evolution							
Pillar	Instrument	Signal's frequency	Current reading	Low	Yearly range	High	Yearly Trend
Risk Sentiment	*Mood ON Mood OFF indicator*	Daily	61%	60%		81%	
Technicals	*Financial Conditions*	Daily	49%	5%		81%	
Fundamental & Valuation	*Cross Asset Sentinels*	Daily	29%	13%		49%	
Economic Backdrop	*US real monetary accelerator*	Quarterly	39%	16%		39%	
Overall Assessment	*avg. Of the 4 Indicators*	Daily	45%	29%		60%	

Source: Amundi Research as of 31 August 2020. **For illustrative purposes only.**

The overall assessment is made of the above four components:

- Mood On - Mood Off indicator reflects investors' risk sentiment;
- Financial conditions indicator looks at the investors positioning and flows on various assets for providing confidence behind a given position;
- Cross Asset Sentinels model that helps to evaluate and assess the pass-through of tighter financial conditions into currency, corporate markets, as well as fundamentals and multiples on equities;
- The US real monetary accelerator that is used to track leverage, money velocity and real delta based on the Fed funds rate.

3- Sizing a trade in practice

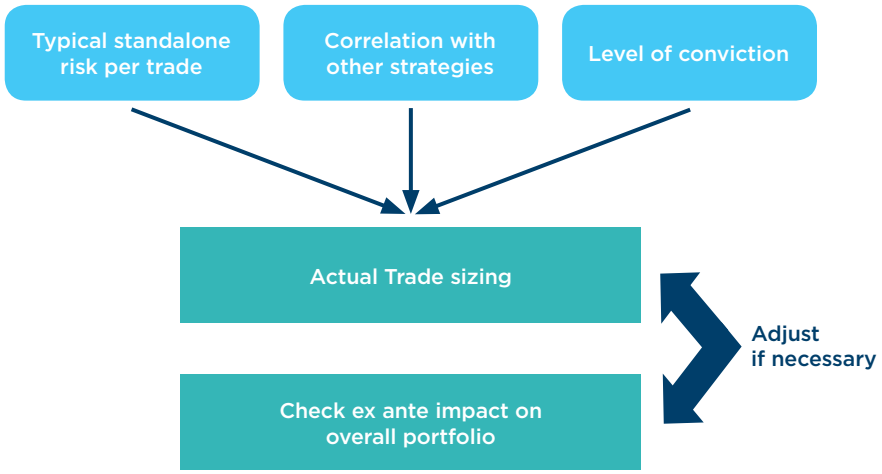
3-1 Adding a trade in a portfolio

Risk budgeting tools can perform pre-trade analysis to evaluate the potential impact of the new strategy on an existing portfolio, checking the correlation of the new strategy with the market and with other strategies already included in the portfolio. This analysis is comprised of the following three steps:

- **Estimate the correlation of a new proposed strategy** with the major asset classes to check its adequacy to the portfolio.
- **Assess whether the new strategy is correlated with the current ones** and with the Macro pillar which typically includes directional strategies. This can be done through a simulation of the impact of the new strategy on the existing portfolio at pillar level and against the other strategies.
- **The final step consists of defining the correct size for the trade.** This should be done, as mentioned earlier, based on a heuristic process instead of an optimisation method. An advanced risk budgeting system can help investors to conduct simulations in which

the portfolio manager can check the standalone risk of each simulated strategy and its impact on the overall risk of the portfolio. The sizing process is completed when the portfolio manager feels comfortable with the level of standalone risk reached, given the fund objective, the positions already present in the portfolio as well as market conditions.

Figure 9. Trade Sizing in practice



Source: Amundi as of 31 August 2020. **For illustrative purposes only.**

Let us illustrate how this process could work in the case of adding a new strategy to the Satellite pillar of an absolute return portfolio with the suggested introduction of a FTSE100 vs FTSE250 strategy. This strategy would be representative of a positive view on UK large caps vs small caps, consistent with an expectation of depreciation of sterling that would benefit large exporting companies over smaller domestic companies.

In this hypothetical example, the initial weight to the UK strategy, suggested at 3%, generated a standalone risk of 17 bps. This looked disproportionate relative to the other trade sizes, and it has been considered appropriate to halve the trade size to reflect a more average conviction on the trade. The final proposal was for a size: +1.50% (FTSE 250) / -1.50% (FTSE 100). This had a standalone risk of 5-10 bps of volatility.

The table below exhibits its correlation with the pillars, illustrating its high diversification potential.

Figure 10. Correlation of the FTSE100 vs. FTSE250 strategy to existing strategies

FTSE 100 vs 250	1.00
Macro Strategy	0.00
Macro Hedging	-0.01
Satellite	-0.10
Selection	0.13

Source: Amundi as of 31 August 2020. **For illustrative purposes only.**

The portfolio manager, based on the other risks in the portfolios, may decide if the standalone risk generated by the strategy is appropriate or not. If it's the latter, he/she may need to re-size the position.

Application to institutional investors

Let us now conclude with a few recommendations to institutional investors looking to set up or improve their risk budgeting and trade sizing process.

The first step is to formalise investment beliefs and to identify intended sources of alpha. Based on which asset classes and types of investment decisions do they believe they are able to add value? How many — preferably independent — return sources are they aiming for? Are they able to conduct active asset allocation? Moreover, what about security or manager selection regarding the different asset classes in their universe?

"In the case of large investors heavily invested in their own markets, the potential for outperformance can typically be higher on foreign than on domestic assets, where the capacity to tactically modify the structure of a portfolio is limited by capacity or institutional constraints."

We presented our recommendations on how to define a return target for an institutional portfolio in one of our earlier publications[1]. As mentioned in this article, in the case of large investors heavily invested in their own markets, the potential for outperformance can typically be higher on foreign than on domestic assets, where the capacity to tactically modify the structure of a portfolio is limited by capacity or institutional constraints.

Even if we are aware that history is not a certain guide to the future, we still recommend investors analyse their historical trades, either implemented by themselves or by their external managers, to determine more precisely the characteristics of the alpha expected in various strategies. This implies relying on a quantitative framework, along with a robust risk and performance system:

- Estimates of the historical volatilities and correlations of the strategies implemented, having in mind that they should primarily help identify strategies with potential diversification.
- A capacity to conduct scenario simulations, integrated with current portfolio positions.

Based on these elements, investors are advised to identify the typical standalone risks they feel comfortable implementing based on their expectations for financial markets and their degree of conviction of the envisaged strategies for the periods ahead. We believe this should be done at least once a year — for instance, at the start of a new exercise.

[1]See "Setting objectives for your asset allocation", Asset Allocation Advisory, Amundi Discussion Paper, March 2018.

Conclusions

Risk considerations are unanimously considered as extremely important in portfolio construction, but how to concretely allocate a risk budget to different strategies and how to decide on the size of a strategy are among the most difficult challenges faced by portfolio management.

Mean-variance optimisation has long been recognised as a standard practice, but it can lead to high levels of concentration in terms of weights and to unstable portfolios. As a result, the last decade has seen the development of risk budgeting techniques that allow better stability of the allocation and more robust diversification than mean-variance optimised portfolios, and the recommendations we have proposed in this paper are based on such techniques. They allow the identification of criteria that we believe investors should rely on to decide on how to allocate their risk budget and how to size their trades. These include, in particular, the number of investment ideas to be integrated in the portfolio and their diversification potential, in terms of correlation and size dispersion that can be translated into an indicator called Concentration Ratio.

Our recommendation is also that such risk budgeting exercises be applied both at the initial stage of portfolio construction and be conducted on a regular basis — for instance, once a year — and at the time of implementing each strategy. This should be based on a close dialogue between portfolio managers and portfolio construction analysts who can simulate the impact of the envisaged strategies on the overall portfolio risk. We also consider that such a risk budgeting exercise has to be adapted to the investment process and the specific objectives of the portfolio. Moreover, continuous analysis should be conducted through the life of the portfolio of how it is actually aligned with the risk budget, how effectively it is diversified, and, of course, whether it is performing in line with expectations.

"Our recommendation is that such risk budgeting exercises be applied both at the initial stage of portfolio construction and be conducted on a regular basis — for instance, once a year — and at the time of implementing each strategy."

This makes this approach substantially different from optimising solely at the security or at the asset class level, and it allows for the tilting of the allocation of risk and hence of potential return to the pillars and ideas expected to offer the most opportunities.

There is obviously no single strategy that works in every investment environment and, as a result, portfolio allocation has to be a dynamic exercise. Detailed information about past trades and how they interact to contribute to portfolio efficiency can serve as a compass for portfolio managers across all types of market environments. This naturally requires a rich history of past trades to help measure portfolio managers' skills in different areas of expertise.

Asset managers that can count on a long record of every single investment decision have a relative advantage regarding how to analyse past success and set future alpha targets and risk budgets.

Definitions

- **Alpha:** The additional return above the expected return of the beta-adjusted market return; a positive alpha suggests risk-adjusted value is added by the money manager compared with the index.
- **Correlation:** The degree of association between two or more variables; in finance, it is the degree to which assets or asset class prices have moved in relation to each other. Correlation is expressed by a correlation coefficient that ranges from -1 (always move in opposite direction) through 0 (absolutely independent) to 1 (always move in the same direction).
- **Hit Ratio:** The hit ratio is the ratio between winning and losing investment ideas.
- **Information Ratio:** A measure of portfolio management's performance against risk and return relative to a benchmark or alternative measure.
- **Sharpe ratio:** A measure of excess return per unit of risk, as defined by standard deviation. A higher Sharpe ratio suggests better risk-adjusted performance.
- **Tracking error:** A measure of how closely a portfolio follows the index to which it is benchmarked.

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