Deutsche Bank
Wealth Management

September 2019

CIO Special

Strategic Asset Allocation
Robustness amidst uncertainty

Contents

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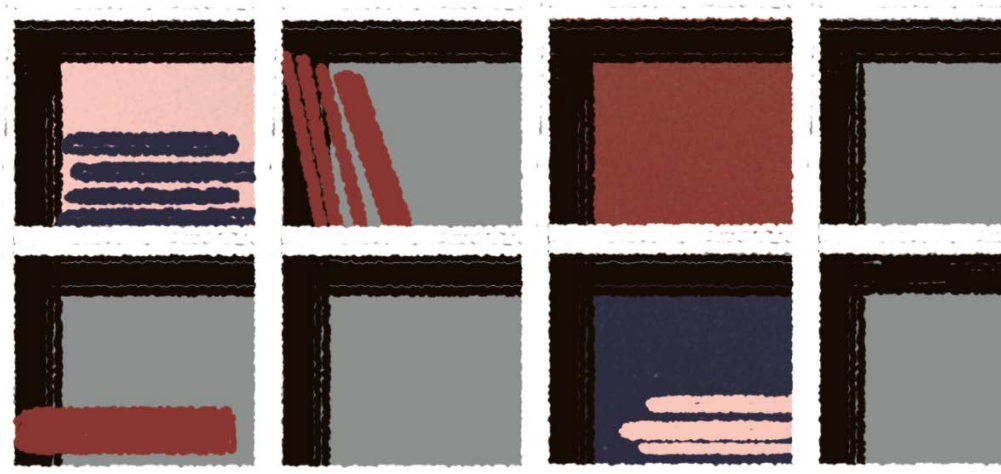
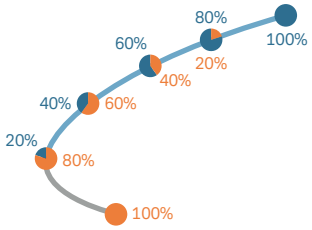


Start with Efficiency

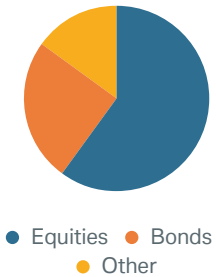
The classical approach to strategic asset allocation (SAA) is to forecast parameters for each asset class.

– returns
– volatility
– correlations

Then calculate which combinations of asset classes offer the highest return for a given level of risk.



And choose an initial SAA with the appropriate level of risk and return.



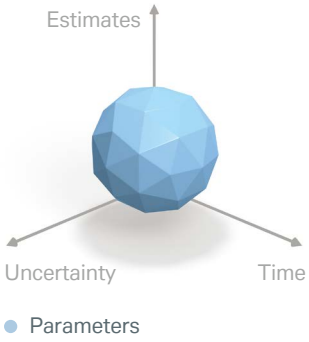
The uncertainty challenge

The classical approach is only the best solution if all these parameters behave exactly as forecast, which is very unlikely.

Some of these parameters are also more predictable than others.

90%*
of performance comes from SAA

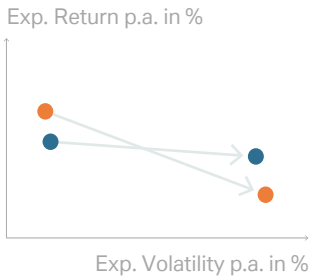
We should take positions where our forecasts are more certain and avoid potentially destabilizing positions where our forecasts are more uncertain.



Focus now on robustness

A more robust approach to SAA means understanding the characteristics of each parameter and how they influence the portfolio optimization process.

– Design SAA to be less sensitive to unstable parameters
– Avoid unbalanced over-optimization based on uncertain forecasts
– Reduce risk of poor results if parameters deviate from our forecast



Four steps for robust SAA

1. Make forecasts, but realize they will be imperfect
2. Understand what we know and what we can't
3. Know how different outcomes could impact portfolios
4. Robustness over efficiency: reduce vulnerability points

* See for example Gary P. Brinson, L. Randolph Hood and Gilbert L. Beebower: Determinants of Portfolio Performance: Financial Analysts Journal, January-February 1995.

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Introduction

We all have to conduct our lives under conditions of some uncertainty, where we have imperfect knowledge of what lies ahead.

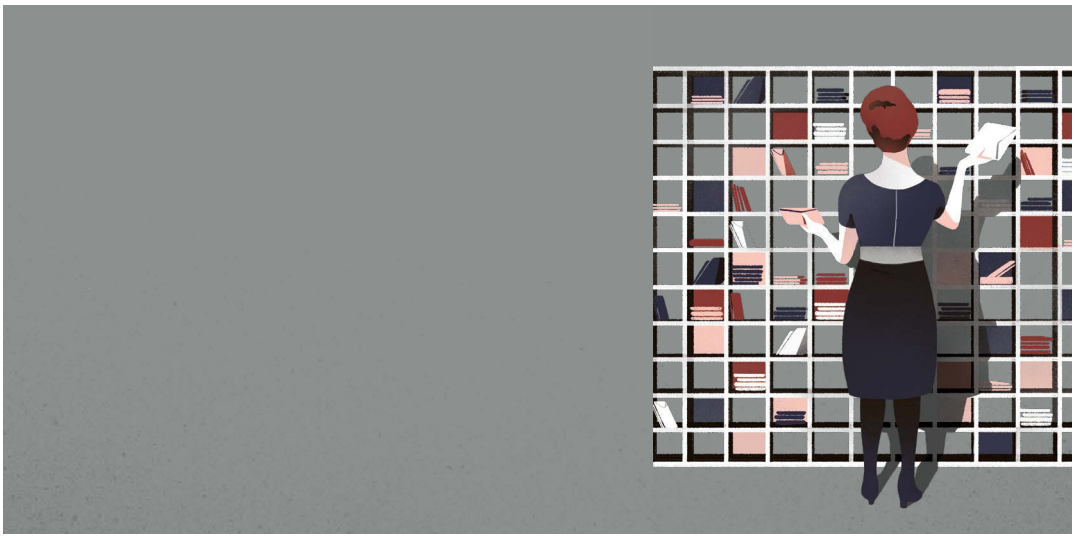
This is certainly true for investors, who are right to be skeptical of any investment approach which claims to know the future in perfect detail. It is a question of likelihood.

Strategic Asset Allocation[1] (SAA) may account for around 90%[2] of a portfolio's long-term returns. Contrary to first impressions, however, an effective SAA does not claim to have perfect knowledge of future asset class returns. Instead, it aims to provide an optimum "opportunity set"[3] for an investor from potential sources of financial rewards. ("Optimum" here refers to maximising return adjusted for risk.) Because of this, an SAA needs to tackle the issue of uncertainty: different sorts of uncertainty will have varying implications for portfolios, and we need to identify where we have useful knowledge and where we do not. We cannot ignore uncertainty.

Strategic asset allocation must address uncertainty – not ignore it

SAA is key to sustainable portfolio returns but is not the end of the story. So while the key first step is to build a robust SAA process, as we set out in Section 1, it can be complemented by other portfolio management techniques. We discuss how we do this in Section 2.

We have now been managing multi-asset portfolios for many years (since 1968) and our investment process has evolved over time to reflect the ever-changing financial environment. Two factors stand out in particular from the last few years. The first is that the continuing low-yield environment underlines the need for SAA. The second is that uncertainty (in its various forms) needs to be addressed explicitly in any SAA – and this is central to our investment process.



[1] Strategic Asset Allocation (SAA) is the long-term allocation of a portfolio's investments between different asset classes in a way that is intended to be optimal for the individual investor through delivering the best possible level of returns for a given level of risk.
[2] See for example Gary P. Brinson, L. Randolph Hood and Gilbert L. Beebower: Determinants of Portfolio Performance: Financial Analysts Journal, January-February 1995.
[3] An "opportunity set" refers to the various possible combinations of assets in the portfolio; one of these will offer the optimum risk/reward basis for an investor.

01

Strategic asset allocation: anticipating the future

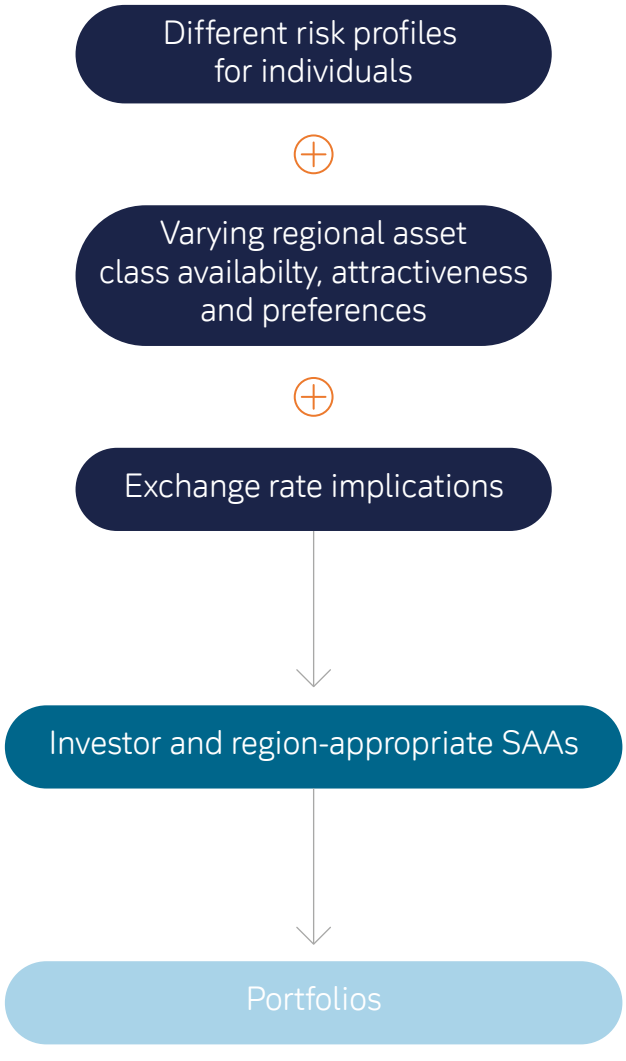
The key driver of portfolio performance

Strategic asset allocation is the long-term allocation of an investor's portfolio between different asset classes – equities, fixed income, alternative investments, cash and foreign exchange (FX). Its aim is to achieve the maximum long-term overall investment return for a given set of investor preferences, which will include various aspects of risk. This is done by achieving the optimum mix (i.e. weighting) of financial assets in a portfolio.

This may sound like an abstract exercise, but strategic asset allocation can have profound implications – positive or negative – for portfolios. Frequently-referenced studies show that on average around 90% of a portfolio's long-term returns can be explained by strategic asset allocation[4] (alternative sources of return, such as market timing and individual securities selection, are less reliable on a long-term basis). So this is something that it is very important to get right.

Figure 1: Why we have multiple SAAs

Source: Deutsche Bank AG. Data as of August 18, 2019.



[4] The reasons for the importance of SAA can be summarized as follows. First, tactical (shorter-term) decisions can be right or wrong. But if we stay around the SAA, these tactical decisions may largely offset each other over time. Second, relative estimation errors on the expected returns tend to be smaller over time, in essence because returns are scaled with time, but volatility increases with the square root of time. Third, the estimation of capital market parameters may be more robust on broader asset classes (as tend to be used in an SAA) as errors around narrower asset class definitions may cancel out. As referenced above, the calculation approach behind the 90% estimation can be found in Gary P. Brinson, L. Randolph Hood and Gilbert L. Beebower: Determinants of Portfolio Performance: Financial Analysts Journal, January-February 1995.

No "one size fits all"

To be clear: there is no "one size fits all" strategic asset allocation. This is for multiple reasons. As is well accepted, investors have both different objectives and different behavioural characteristics and therefore investment preferences – in terms of acceptance of risk in its various forms[5]. This means that many investment strategies are offered in different variants: the most common have labels such as "income", "balanced", "growth" and so on, dependent on risk levels – with different investment allocations for each.

But investors not only have different investment preferences – they also start from different places. Investors in different locations have access to rather different sets of investable assets (consider the importance of municipal bonds in the U.S., for example, or restrictions on direct investment in some emerging equity markets). Their investment preferences may also be shaped by tax considerations, which vary by country. And – most importantly – investors have to consider the potentially major implications and risk factor resulting from one particular risk factor – FX – for their overall investment returns. These differences are summarize in Figure 1 above. In short, different strategic asset allocations are needed for different investor locations.

Anticipating the future

Strategic asset allocation is focused on delivering the best possible future returns for a given level of risk (or other constraint). To do this, we need to make a judgement about what will happen over the intended time frame of the investment (10 years). Even for the most theoretical calculation, we need to know a lot. The basic parameters that we need to know include the following:

1. The expected return[6] of each of the asset classes included in the portfolio;
2. The expected volatility[7] of each of the asset classes included; and
3. Their expected correlations[8] (i.e. how they move relative to each other)

If we know these factors exactly, investors can optimize their portfolios according to a number of established allocation techniques, for example around the "efficient frontier" (see Box 2 on page 7).

But how much can we realistically predict these parameters returns, volatility and correlations? The answer is that, using our long-term forecasting techniques (Box 1) we can create a realistic starting framework for the SAA discussion – which we can then develop further.

Box 1

Estimating long-term asset class returns

We cannot know exact future asset class returns. But broad expectations of long-term returns must inform asset allocation decisions. Many factors influence such expectations and views on how to incorporate them in SAA increasingly use a multi-faceted risk/return assessment – looking at possible structural changes in the asset class, as well as current market expectations.

Combining these factors means that we can estimate expected returns over a longer term (10-year or other) horizon for a range of sub-asset classes and geographic regions, all relevant for the SAA process.

Continued on following page.

[5] Consider for example systematic volatility risk (due to overall movements in the market) and downside risk (risk of actual returns being lower than expected returns) – different concepts which need to be approached differently. See Section 2.
[6] The return of an investment is the net profit over a given period, either gross or net of costs.
[7] Volatility is the degree of variation of an asset class or individual security over a period of time: it can either be historic or expected.
[8] Correlation is how two asset classes or individual securities move in relation to each other. A correlation of 1 means they move in exactly the same way. Zero correlation means that there is no observable relationship.

Box 1 continued

Our long-term forecasts for fixed income returns, for example, draw on two different approaches. First, we look at the current yield curve for each market (yields vs. time to maturity). Returns deduced from this analysis – our initial "expectations" need to be refined, for example to take account of rating changes (i.e. upgrades/downgrades) and defaults. This "steady state" approach is complemented by an "expectation hypothesis" where we consider the market expectations.

Forecasting: matching theory with reality

But while such long-term forecasts provide a useful starting framework, we cannot know for certain the future returns, volatility and correlations of any asset class. This will come as no surprise. As was noted in the introduction to this report, we all have to conduct our lives – financial or otherwise – under conditions of some uncertainty where we have imperfect knowledge of what lies ahead.

History also teaches us that we ignore such forecast uncertainties in portfolio allocation at our peril. Even slight deviations in these estimates of returns, volatility and correlations from the eventual outturn can result in very different "optimal" portfolios – and, therefore, when these forecasts are not met, sub-optimal results.

To cope with these challenges, we may have two instinctive responses:

– First, to simplify the basic assumptions and content behind their model (or investment process) to make it easier to apply it to observed investment reality (and to manage it in future).

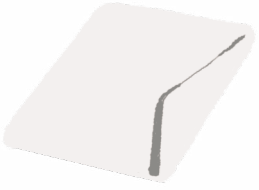
– Second, to understand the nature of uncertainty and to attempt to include it in their investment process. The aim here must be to manage uncertainty in a positive way, rather than simply accept it.

This is not an "either-or" choice between the two.

Simplifying reality to create a workable theoretical model is an accepted part of many social sciences (such as economics) and also some natural sciences too. Simplifications in investment models can take various forms, as we discuss in Box 2 below.

But, as we know from experience, simplification can have particular dangers in investment situations. Even small variations in outturns from expectations (for example, concerning correlations between assets) can result in quite different investment outcomes. These outcomes may deviate from expectation not just by a matter of degree – they may go in completely different directions. So this in area that we need to treat with great care.

We would therefore strongly argue that modelling needs to be combined with the second option – understanding the nature of uncertainty and what this means for the investment process. This needs to be done as an integral part of the investment process, not as a cursory add on.



Box 2

Modelling for portfolio optimization – forms of simplification

For the last six decades or so, asset allocation has had as its historical starting point the idea of the "efficient frontier[9]" - the set of portfolios that offer the highest expected return for a given level of risk. This was then linked to the concept of a global market portfolio[10]. weighted according to the total global capitalization of the individual asset classes (e.g. the Black-Litterman model), in order to derive implicit returns because expected returns are so difficult to forecast precisely.

But, despite the longevity of these concepts, this global market portfolio is not completely straightforward to define. In reality, you have decide which asset classes you want to allocate between, and which you want to exclude due to either accessibility or liquidity (one initial form of simplification). The relative size of asset classes also changes over time as they wax or wane in importance. As we noted above, investors in the real world also face individual investment constraints and preferences that will make investing in this global market portfolio impossible and probably sub-optimal.

Even given these caveats, the concept of an "efficient frontier" can be an effective starting point to systematically assess the relevant information on asset classes. We can then take various approaches to using this information. If we decide that we cannot predict returns (the first challenge highlighted above), for example, then we may be tempted to follow a "risk parity" approach which focuses on leveraging up or down different investment class allocations to achieve the same risk level. Or, if we decide we cannot understand future trends in correlations or volatility (our two other forecasting challenges) then we can create models that try to side-step these considerations.

Up to this point, the question of uncertainty regarding the parameters is treated in rather a black-or-white manner: either we know (exactly) or we don't know at all and avoid using these parameters in portfolio construction. But the point is that, for any such modelling to be effective, it needs to be complemented by a deeper assessment of the nature of uncertainty. We cannot avoid this. We need to know how it effects the variables under consideration and also must be explicit about the areas where we are less confident in our assessment – and therefore seek to avoid overcommitting. We think that this is a better way to achieve a robust portfolio construction, where we can make informed judgements on trade-offs between "investment efficiency" (optimal risk/return) and "robustness" (impact on the risk/return of a portfolio, if the capital market assumptions are wrong).

Understanding the nature of uncertainty

Uncertainty is a lack of complete knowledge about future events. If the uncertainty is high, we would expect a whole range of different future scenarios with a significant likelihood.

The distribution of the likelihood of possible future scenarios varies in terms of extent and the resulting implications. In the context of investment, the uncertainty of the individual parameters differs between individual assets and asset combinations. It strongly depends on the nature of the parameter and is quite different in nature for expected returns, volatility (which cannot by nature be negative) and correlations (which are not independent from each other).

What is also clear is that the uncertainty of individual parameters (e.g. growth, volatility correlations) will have a very specific impact on the relative attractiveness of different allocations which we can assess through looking at the implications of different sets of outcomes. So while we cannot be completely sure of the future, we can use a partial assessment of the future (focusing on those

[9] The efficient frontier is visualised on chart plotting investments' expected return on one axis vs. standard deviation (as a measure of risk) on the other. At the efficient frontier, a portfolio cannot deliver higher returns without an increase in risk.
[10] The global market portfolio consists, in theory, of all the different asset classes in the world, weighted by the size of each asset class across all global financial markets. In practice, this global market portfolio is impossible to invest in.

areas that we understand better) to understand the likely robustness of portfolios to possible future events – and thus create a range of strategic asset allocations that should perform better over time.

Robustness is a key word here and needs to be a part of how strategic asset allocation performance targets are described. In the real world, we are likely to be willing to trade a small element of theoretical efficiency to help ensure that the actual return on a portfolio will not be too different from the predicted one. So, for example, if the theoretical optimal allocation of each possible parameter set is predicted to deliver a return of 5%, in reality we may want to focus instead on how to achieve a return of 4%, if the benefit is a significantly reduced chance of undershooting this target. How we do this is to systematically use all relevant information (within the "efficient frontier" framework briefly described above), and then we use our knowledge of uncertainty to, for example, avoid overcommitting to areas where we don't have sufficient confidence on the information provided. If understood – and not ignored – uncertainty can then be used to our advantage.

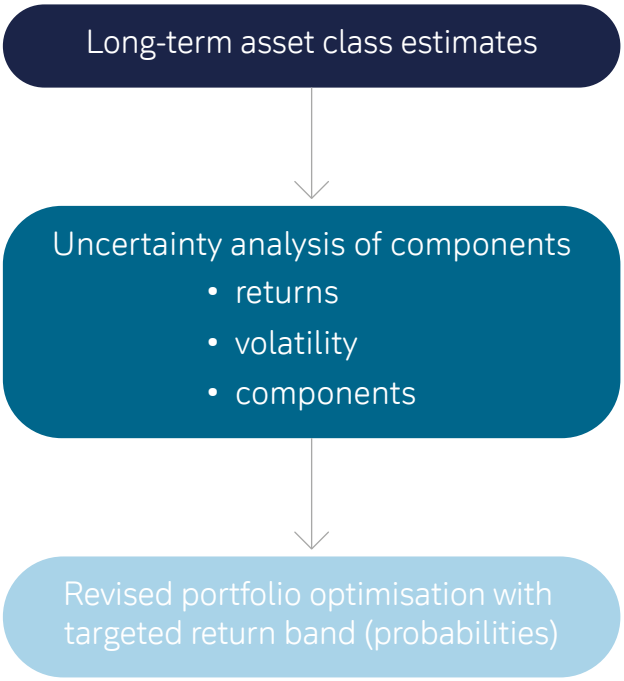
In summary: over the long term, robustness in a portfolio beats efficiency. To achieve robustness, we must take into account all the information about capital market parameters (our market views), but also estimate the remaining uncertainty on the level of individual parameters. Then we must use this knowledge to make sure that the SAA does not rely too much on parameters that are particularly uncertain - making portfolios vulnerable to reversals if our view is wrong. This is the key to achieving robustness.

SAAs evolve

One final point is worth making about SAA. This is that although an SAA is intended to be held long-term, it may evolve. Over time asset classes change in relative importance and also in terms of composition. Our SAA modelling must reflect this. So we regularly review our SAA: one issue, for example, would be how to reflect the growing importance of emerging market fixed income markets.

Figure 2: Creating the SAAs

Source: Deutsche Bank AG.
Data as of August 18, 2019.



02

Additional steps

Complementing SAA with Tactical asset allocation (TAA)

As we noted above, Strategic Asset Allocation (SAA) is key to long-term portfolio performance; it may account for over 90% of portfolio performance. SAA is intended to be long-term and needs to be tailored to different geographical and other investor needs.

SAA is central to our process but shorter-term Tactical Asset Allocation (TAA) can be useful

SAA is central to our asset allocation process and our view of the future. But there may also be a need to temporarily change asset allocation weights in portfolios to reflect shorter-term market developments. This is what we call tactical asset allocation (TAA)[11], and would normally involve investment decisions made on a 1-3-month time horizon or sometimes longer. TAA should not be confused with very short-term trade ideas.

TAA, like SAA, involves taking a view on likely future developments. But the time horizon for these developments is shorter and TAA views, rather than being a long-term forecast of returns and risks, are more a shorter-term assessment of market and asset class direction.

The way in which we assess TAA options therefore needs to mix qualitative and quantitative assessment in a rather different way.

For TAA, we favour a three-pillar approach as follows.

In Pillar 1 – Expert judgment we draw on the views of our in-house experts, independently, on possible TAA changes. This allows us to draw on several different dimensions of expertise – be they geographical, asset classes or functionally-based.

In Pillar 2 – Asset scoring, looking at a range of economic and market indicators in a structured way helps us to identify dynamics and future trends in each asset class. Macroeconomic factors, valuations and technical market analysis[12] are all under the microscope.

In Pillar 3 – Risk scenarios assessment we maintain models on the macro environment, data "surprises" (meeting/missing expectations), risk perceptions and, rather differently, a "regime" indicator that should alert asset allocators to major structural changes in the investment environment.

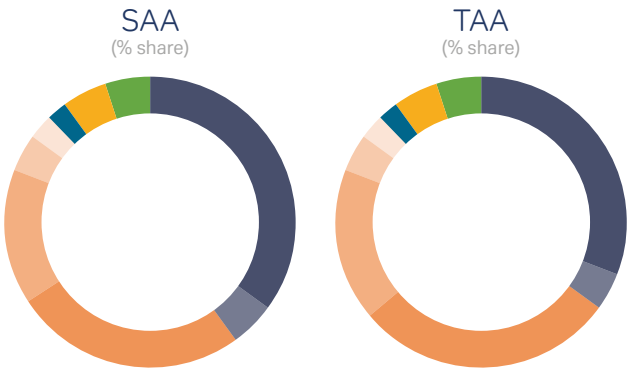
These three pillars are aggregated to establish TAA changes that can then be implemented in individual regional portfolios. In practice, these TAA may be sustained in portfolios for several months or more – worries about future trends in the equity market being reflected in a lowering of the weighting for equities, for instance – see example on the next page.

[11] Tactical asset allocation (TAA) makes short and medium-term changes to an investor's strategic asset allocation in an attempt to gain from expected market developments. TAA changes are relative to the existing SAA and allocations should over time gravitate back to those in the SAA.

[12] Technical market analysis looks at past market data (around price or volume) in an attempt to predict short-term future market developments.

Figure 3: TAA changes – an example

Source: Deutsche Bank AG. Example allocation only. Asset classes and allocations will vary between regions and different SAA.



Asset class	SAA (% share)	TAA change (%)	TAA (% share)
Equity total	40.0		35.0
DM equity	35.0	-4.0	31.0
EM equity	5.0	-1.0	4.0
Fixed Income total	48.0		53.0
FI government	26.0	+3.0	29.0
FI corporates	15.0	+2.0	17.0
FI high yield	4.0		4.0
FI EM	3.0		3.0
Commodities	2.0		2.0
Alternatives	5.0		5.0
Cash	5.0		5.0
Total	100.0		100.0

TAA CHANGE OBJECTIVE:

Tactically derisk by allocation shifts resulting in 11% p.a. (relative) reduced portfolio volatility

Further improving return vs. risk

There is another possible approach to improving the robustness of portfolios - in other words returns vs. risk. A cost-efficient systematic hedging process can be designed to allow an increase in higher-yielding assets for a given downside risk. Once again, we return to the issues of judging probabilities around future returns, and using them to allow better control of the structural market risks of investment strategies. Market models around future returns must capture significant characteristics such as "fat tails" (extreme market outcomes) and unstable correlations between asset classes. Hedging strategies then offer up new opportunities, especially for investors with long-term time horizons. For example, systematic hedging – what we call "risk return engineering" – may allow investors to substantially expand equity exposure within a portfolio while maintaining a comparable risk budget. In the current market environment, with longer phases of lower implied and realized (historic) volatility on equity markets, this approach may be especially attractive.

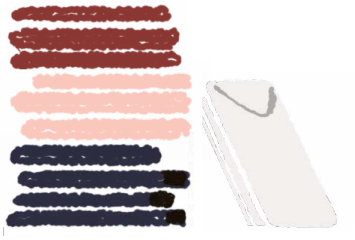
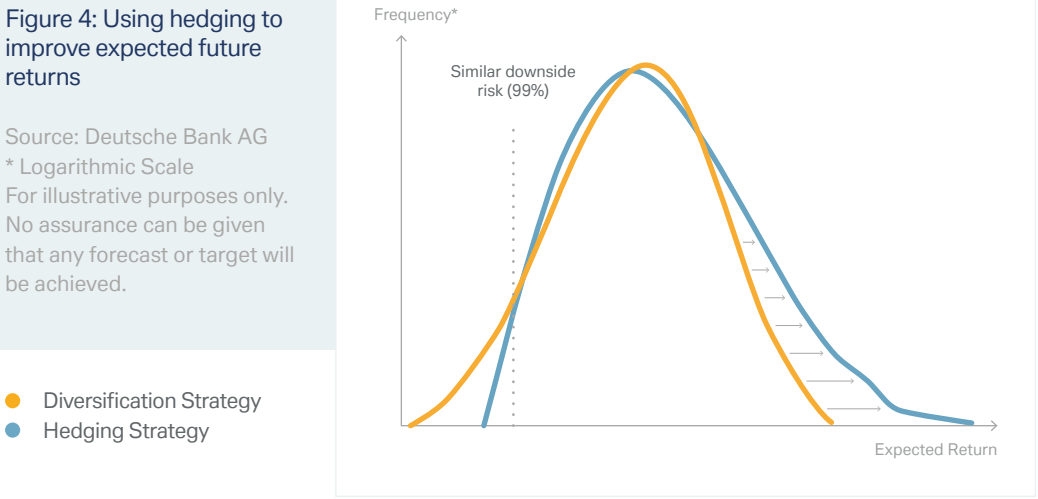


Figure 4: Using hedging to improve expected future returns

Source: Deutsche Bank AG
* Logarithmic Scale
For illustrative purposes only. No assurance can be given that any forecast or target will be achieved.



Continuously improve via separate quality checks

Looking beyond the overall performance of individual portfolios, it remains important to measure the results and implications of tactical asset allocation (TAA) decisions. We have to assess the results of previous allocation decisions and also the possible risks associated with allocation changes currently under consideration: allocation changes can, sometimes unintentionally, concentrate risk on particular asset classes. We also have a separate investment quality management (IQM) function, independent of the investment process, to monitor performance and processes both across regions and for single portfolios.

Transparency is key at all parts of the investment process, to allow you to address, fix or replace those parts that are failing (models or humans). In part, this is like a civil engineering problem, looking at support and stresses in complex structures; sometimes, however, it may be more like trying to draw lessons from a form of biological evolution. Market relationships will change and any asset allocation, like a biological organism, will need to adapt to cope with them. The intention is to create a continuous feedback loop – to make sure that we capture and resolve any potential problems and to allow everyone to learn and improve. This holds true from the original SAA decision makers to all others involved in the investment process.

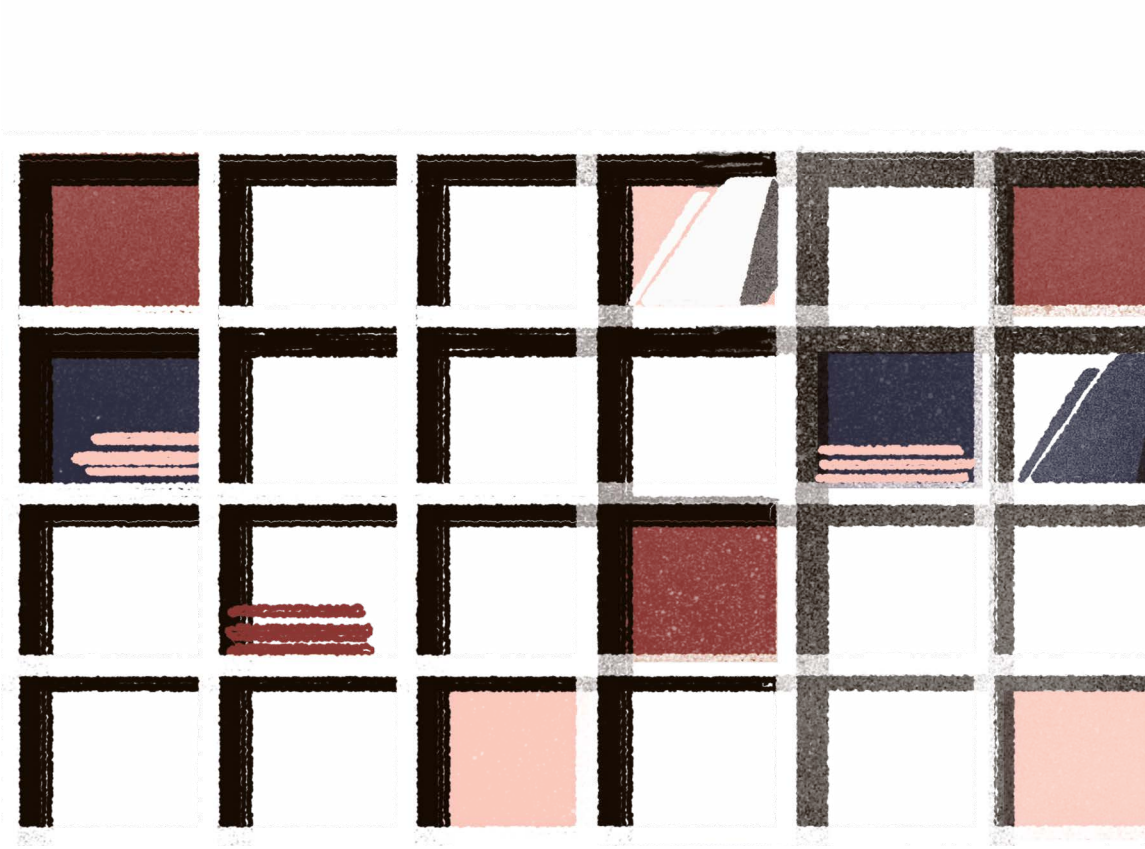
03

Conclusion

Strategic asset allocation (SAA) is the cornerstone of any investment process that can deliver sustained performance. SAA is, in essence, about establishing the optimum "opportunity set"[13] of investable assets for an investor. When we talk about an "opportunity set" we imply a view about the future which must be, by its very nature, imprecise and uncertain.

Lack of perfect knowledge about the future however increases the need for an effective SAA, rather than making it redundant. In fact, SAA may account for around 90% of a portfolio's long-term returns. This means that the SAA process must seek to understand uncertainty and its implications. So what we do is, first, establish a framework for long-term asset class returns and, second, analyse uncertainty itself. The key point is that while we cannot be completely certain about the future, some elements of uncertainty can be effectively analysed and the results used to build robust SAA, designed to have a high probability of delivering returns within a given deviation from the optimum result. Analysis of uncertainty will also suggest areas where overcommitting on the basis of investment views is unwise. The key, like many areas of life, is to understand what we know and what we cannot know.

Robust asset allocation needs to be driven by a rigorous and consistent approach – and it is important to apply this rigorous and consistent approach to uncertainty, as well as to better-known investment relationships. It also needs to be implemented in a way that is flexible enough to meet a range of regional or individual needs. Our strategic asset allocation process is designed to do exactly this.



[13] An "opportunity set" refers to the various possible combinations of assets in the portfolio; one of these will offer the optimum risk/reward basis for an investor.

Glossary

Correlation is a statistical measure of how two securities (or other variables) move in relation to each other.

The efficient frontier is determined by the set of portfolios that offer the highest level of expected return for a given level of risk or the lowest level of risk for a given level of expected return.

An emerging market (EM) is a country that has some characteristics of a developed market in terms of market efficiency, liquidity and other factors, but does not meet standards to be a developed market.

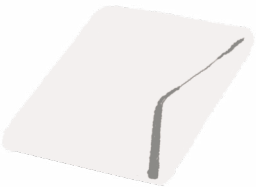
High yield (HY) bonds are high-paying bonds with a lower credit rating than investment-grade corporate bonds, Treasury bonds and municipal bonds.

An investment grade (IG) rating by a rating agency such as Standard & Poor's indicates that a bond has a relatively low risk of default.

A strategic asset allocation process involves setting preferred allocations for asset classes on a medium to long-term time horizon.

A tactical asset allocation approach changes allocations to benefit from shorter-term market moves.

Volatility is the degree of variation of a trading-price series over time.



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029097.091819