WHITE PAPER

MARCH 2019

Creating better outcomes in financial planning

by optimising investment risk and reward using stochastic modelling

SYNAPTIC®
SOFTWARE

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“Think about the most meaningful thing you have ever done. I would wager that it took a measure of risk, uncertainty and hard work to achieve. In this, as with all risk, comes a valuable lesson: to strive for certainty is to doom oneself to mediocrity. Nothing is less safe than playing it safe and nothing guarantees loss like trying to avoid it.”

Taken from Daniel Crosbie’s book,
The Behavioural Investor

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Introduction

What is risk? Some historical context

As practitioners often quote, a great privilege of our industry is to witness the positive impact of financial planning and savings culture on individuals and families. Successful stewardship of financial assets is part of a process that relies ultimately on advisers' ability to harness the phenomenon of asymmetric returns offered by the world's investment markets.

In his book *Against the Gods*[1], Peter L. Bernstein proposes that the success of human ingenuity in modern times comes from the mastery of risk. The mix of science and art practiced by financial planners is an advanced form of that which has driven intellectual development from the explosion of technological, cultural and societal progress in the 17th century during the Enlightenment: 'The revolutionary idea that defines the boundary between modern times and the past is the mastery of risk'.

By defining a 'rational process of risk-taking' the true nature of modern progress was revealed. Modern stochastic techniques can rightfully (in our view) claim to be the fullest expressions of that which has evolved since 1654 when Pascal first introduced the concept of probability as a means of solving problems. Modern students of investment may be more familiar with Nobel Laureate Harry Markovitz[2], whose mathematical insights produced Portfolio Theory with its Efficient Frontier, explaining the enormous benefits of diversification.

Modern investment strategies also capture another pivotal idea from 18th century Swiss mathematician Daniel Bernoulli, who wrote a paper identifying the concept of 'utility' where 'the value of an item must not be based on its price, but on the utility that it yields'[3]. When it comes to decision making and risk assessment, subjectivity is as important as probability. Even though outcomes can be predicted, different people value different outcomes differently. Investors may or may not be comfortable taking on investment risk, based on subjective considerations, usually relating to their existing financial circumstances or their aspirations to grow wealth. In short, this is the familiar territory of advisers undertaking psychometric questionnaires with clients.

In our industry, there is a growing realisation that forward-looking techniques seeking to describe the universe of 'viable' investment outcomes, provide a more reliable methodology for managing investment risk than more traditional analysis predicated on historical returns, including historical volatility. The kind of mathematical analysis referenced above is generated by a stochastic engine comprising of rules that describe the behaviour and inter-relation of the constituents of the model (for example, interest rates or asset class growth rates), coupled with powerful simulation, creating thousands of viable outcomes.

We will see that it is very difficult to predict the outcome of an investment in the short term, but longer term, the power of probability kicks in and we can predict much more accurately. It is a similar explanation as to why a dice may have 1 out of 6 outcomes in a throw, meaning the next throw is impossible to predict. However, throw a dice ten thousand times and the outcome can be predicted with certainty.

[1] Peter L. Bernstein, Against the Gods: The Remarkable Story of Risk. (John Wiley & Sons, 1998).

[2] Harry Markovitz, Portfolio Selection. (Journal of Finance, 1952).

[3] Daniel Bernouilli, Exposition of a New Theory on the Measurement of Risk. (Translated from Latin original by Dr. Louise Sommer, The American University, Washington, D. C., from "Specimen Theoriae Novae de Mensura Sortis,").

The purpose of this paper

Having a well-structured approach to risk profiling and managing investment risk is no longer optional in the MiFID environment. The purpose of this paper is to provide insight into the mechanics of risk and return, on the premise that improved management of investment risk with clients can be delivered through an effective, modern investment strategy. We will cover the following fundamentals:

- Risk profiling of clients
- Building an efficient frontier using 'Value at Risk' measure (rather than volatility)
- The role of asset allocation in forming probability-based models for investment outcomes
- How to measure and compare risk inherent in investment
- The role of risk in retirement planning – longevity of investment and sustainable withdrawals.

The regulatory perspective

MiFID II is a game-changer for the industry in a variety of ways. It gathers up the warnings from multiple thematic reviews imploring advisers to employ better research methodology, and deploring the many instances where research was lacking. The FCA's Thematic Review 16/1[4] was a definitive explanation of the FCA's view that poor due diligence and research, coupled with a lack of 'culture of challenge' result in poor outcomes for consumers.

Cost and risk are two significant areas that due diligence and research should prioritise. You would be forgiven for assuming that many advisers simply do not have the tools to deliver the research that is required. Certainly, the FCA has also regularly warned against the danger of poorly administered tools and conflicts of interest emerging from over-reliance on providers' research, often centred on their own propositions.

Driving up levels of training and professionalism has transformed our industry for the better, but now is the time to heed the many warnings of additional regulatory scrutiny on its way, with its demands for better and more independent due diligence. It is time to ensure that your firm's investment strategies are robust, repeatable and academically sound and appropriately aligned.

The real challenge for many advisers is MiFID II's introduction of the concept of ex-ante and ex-post research, meaning full suitability must be re-established in advance of a transaction and at every review.

A reminder of what MiFID is about when it comes to risk

MiFID II introduces a new requirement for firms to provide retail clients who are receiving an advisory service with a suitability report specifying how the advice given meets the client's circumstances:

- Responsibility to undertake the suitability assessment lies solely with the firm
- Where products are packaged or bundled, there is an obligation to ensure the overall package or bundle is suitable
- Confirming that the suitability assessment relates to buying investments but also to hold or sell recommendations
- Requiring firms to adopt policies and procedures to ensure that they understand the nature, features (including costs and risks) of instruments selected for clients
- Advisers must begin disclosing actual costs and charges associated with client investments, rather than estimates, as well as comparing growth projections with actual performance. Therefore, accurate growth forecasts from a reliable stochastic model become very valuable.

[4] TR16/1: Assessing suitability: Research and due diligence of products and services. (FCA 2016. ttps://www.fca.org.uk/publications/thematic-reviews)

Why has risk profiling and investment risk management become so important?

It's worth remembering that risk has rocketed up the agenda for advisers in recent years for several good reasons. Firstly, professionalism and accountability have improved in the industry, but also the structure of what is referred to as the 'value chain'. The Retail Distribution Review (RDR) was a game-changer in its ambition to remove the influence of commission. Until RDR, product providers controlled the value chain as they controlled payments. The majority of funds went into products that were packaged by insurance companies, who managed the funds on an institutional basis. It was only the advent of technology, platforms and 'open architecture' that enabled advisers to build and maintain portfolios of funds they had chosen. Whilst funds were in institutional care, risk management was at least partly removed from the adviser's remit.

An additional factor was the advent of pension freedoms following George Osborne's reforms in 2015. By removing the 'compulsory purchase' annuity, funds that would have otherwise been used to buy annuities can now remain invested. The fact that these funds were (and are) relied upon to fund retirement, means the ability to accurately predict their performance has become more critical than ever. (There is more later about the need to take investment risk in retirement.)

The final piston driving this particular engine is the demographic bulge, representing the cohort of post-war boomers arriving at retirement in numbers, having enjoyed free education, cheap housing, secure jobs and often far more substantial pension arrangements.

For these reasons, it's never been a better time to be an adviser, but risk profiling and management of investment risk has become more important than ever.

This white paper outlines how a suitable framework can be created to support an adviser's recommendations, and why firms need to ensure they have access to the best risk tools as part of their advice process.

Investment strategy: the Attitude to Risk Questionnaire

The industry has developed a very competent framework to marry the individual circumstances of a client to an appropriate investment strategy. The first part of the process is the evaluation of the client's risk tolerance using an Attitude to Risk Questionnaire (ATRQ):

- Using a reputable questionnaire ensures you are imposing an objective framework over what is inherently subjective
- The reason it works is due to the psychometric dimension of the questionnaire, tying the results of a single respondent into a wider population using statistical techniques.
- All the main issues relating to investment are covered in the questionnaire – this will help you structure responses into a format to demonstrate compliance.
- Compliance officers always remind us that the process is not a 'sausage machine', churning out identical outputs, but the result should be used as the basis of a conversation.

Another important point is that a single client can only have one risk profile. They may have different parts of their financial plan with different objectives and timelines that are aligned to different risk strategies, but the 'attitude' part of their profile is shown by research to be quite consistent over time. The FCA has warned that a client should not be invested in a risk strategy beyond their stated level of comfort (attitude to risk), but that level of comfort is not the score from the questionnaire, it is the level that is agreed with the adviser through discussion, arriving at the point of 'informed consent'. You can discuss the individual questions and responses and the adviser should use the discussion to inform the customer on the nature of risk and reward, and the trend for investments to increase in the longer term. All should be carefully documented.

As they stand, the rules provide a proven and effective governance model. If, throughout the investment journey, a client experiences losses that he or she felt were not correctly explained, or that they did not understand, then it's likely the adviser will be culpable. It may be that one or more elements of the risk tolerance 'trinity' have been judged incorrectly:

Definitions[5]

Risk tolerance is the measure of how much investment risk the client is willing and able to take.

Attitude to risk is the client's psychological willingness to take risk, measured by the scoring from the psychometric questionnaire.

Need to take risk is the client's need to take risk to earn their required return, based on their investment goals and time horizon. This is expertly assessed by the adviser in a context of goals, financial resources and time horizon for investment.

[5] Taken from A2Risk Guide to Use. (A2R March 2018).

Capacity for Loss is the client's financial ability to bear risk and cope with adverse outcomes. It relates to investment horizon and the level of income, assets and liabilities. FCA policy also describes Capacity for Loss as the amount that a client can 'afford to lose before having a material impact on [their] standard of living'.

The expert assessment of the adviser, through fact finding, knowledge of the client's circumstances and, increasingly, use of cash-flow models provides the Capacity for Loss. This is the lynch-pin of advice and compliance.

Need to take risk is measured by the advisers themselves by evaluating clients' investment goals, time horizon and the financial resources at their disposal.

Reconciling attitude to risk, Capacity for Loss and the need to take risk is a key role of the adviser, and an area where substantial value can be added.

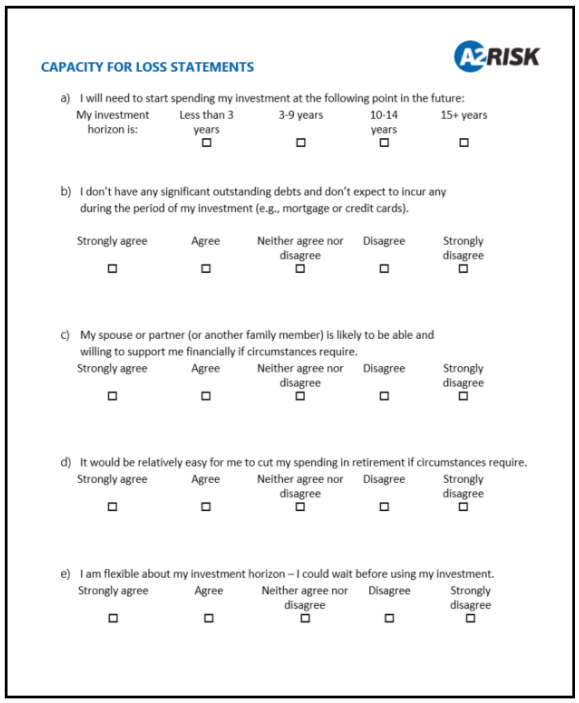
Consideration of term

Term changes everything, including Capacity for Loss. The higher the Capacity for Loss, the higher the investment risk they can afford to take. Investment risk diminishes as the term extends, as 'Sequence of Return Risk' is mitigated.

Why do product providers recommend portfolios with high equity content to 'Cautious' investors? When a fair assumption can be made regarding the long-term commitment to the term by the client, often the case in pensions recommendations, this can be deemed suitable. On the Royal London website, portfolios with high equity content are indicated as suitable for Cautious investors.

Establishing the client's long-term commitment to their investment term, in conjunction with the A2R questionnaire, will qualify the role of term in increasing Capacity for Loss. It is appropriate therefore for a Balanced investor normally looking for a Value at Risk measure (over 12 months) of no greater than 15% (loss in a bad year) to be able to tolerate a 'riskier' portfolio with a Value at Risk measure of 20% or more. More of this later.

The additional questions are shown below. It is not scored in the way an ATRQ is as there is greater reliance on the judgement of the adviser. This secondary questionnaire therefore offers structure to the discussion and implies a format for recording the adviser's final recommendation on risk.



CAPACITY FOR LOSS STATEMENTS

A2RISK

a) I will need to start spending my investment at the following point in the future:

My investment horizon is:	Less than 3 years	3-9 years	10-14 years	15+ years
	☐	☐	☐	☐

b) I don't have any significant outstanding debts and don't expect to incur any during the period of my investment (e.g., mortgage or credit cards).

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
☐	☐	☐	☐	☐

c) My spouse or partner (or another family member) is likely to be able and willing to support me financially if circumstances require.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
☐	☐	☐	☐	☐

d) It would be relatively easy for me to cut my spending in retirement if circumstances require.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
☐	☐	☐	☐	☐

e) I am flexible about my investment horizon – I could wait before using my investment.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
☐	☐	☐	☐	☐

Customers have a lower Capacity for Loss when some or all of the following apply:

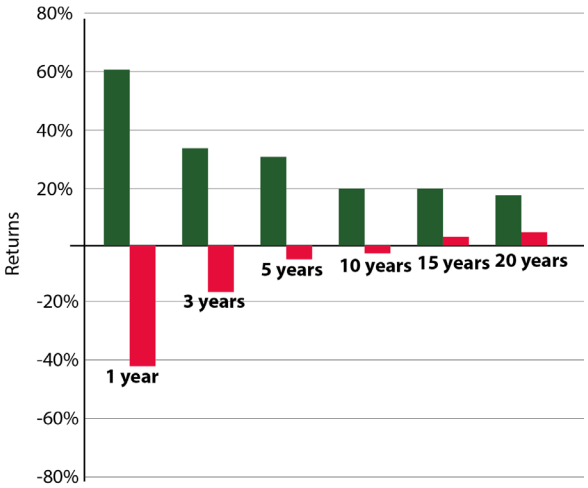
- They have no way to replenish their capital (for example, no longer earning)
- They rely on the investment for income in order to meet expenditure
- They have a short investment horizon (losses are unlikely to be recouped prior to crystallisation)
- They are exposing a large part of their available assets to the risk of a fall.

How does this work?

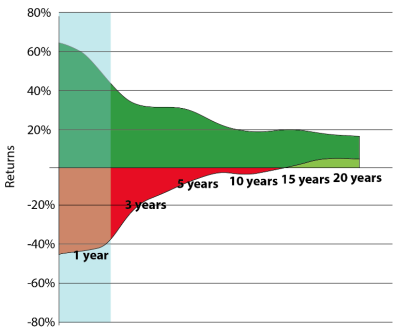
Over short time periods, an index such as a FTSE or S&P can deliver exceptionally high or low returns. If we look at the **S&P 500**, 1973 – 2016, the worst 1-year rolling return was -43% (to month ending February 2009). The best was +61% return (to month ending June 1983).

However, the worst 20-year rolling return was 6.4% (gain, to May 1979). The best rolling 20-year period delivered an average of 18% a year (to March 2000). So, you could argue that if you are definitely going to be invested for 20 years, Capacity for Loss is irrelevant. The trouble is, that is not how compliance works!

Rolling Stock Market returns
The beauty of asymmetric investment returns over time



Rolling Stock Market returns / S&P 500 historic data
The beauty of asymmetric investment risk and return over time



Capacity for Loss.
Period of investment term for which Synaptic Risk Rating is relevant and crucial for compliance and informed consent

The Ombudsman doesn't adjudicate on the ability of any sector, strategy or index to achieve profitability in the long term, despite often doing so. They adjudicate on the experience of loss in the short term (Capacity for Loss). It may be appropriate to take on risk for the long term, but the risks need to be clearly explained and understood.

The A2R ATRQ has proven itself over many years and is widely used, owing to its role as the designated questionnaire accompanying Moody's risk model.

Academic research has interrogated the questionnaire's population sample to provide scoring alignment with appropriate risk categories, which can then be mapped to suitable investments.

Following implied criticism in the influential report in 2018 by ex-regulator Rory Percival[6], who suggested that an 'average' client should appear at the average position of all ATRQs, the methodology was modified to address the cohort of population more likely to access advice, disregarding the risk-averse, lower earning segment of society (defined as earning less than £25k). This had the result of making the ATRQ perform more consistently with Rory Percival's view.

[6] Rory Percival. An ex-regulator's guide to Risk Profiling Tools. (Rory Percival Training and Consultancy Ltd, Sept 2018).

A2R ATRQ questions

01) People who know me would describe me as a cautious person.
02) I feel comfortable about investing in the stock market.
03) I generally look for safer investments, even if that means lower returns.
04) Usually it takes me a long time to make up my mind on investment decisions.
05) I associate the word "risk" with the idea of "opportunity".
06) I generally prefer bank deposits to riskier investments.
07) I find investment matters easy to understand.
08) I'm willing to take substantial investment risk to earn substantial returns.
09) I've little experience of investing in stocks and shares.
10) I tend to be anxious about the investment decisions I've made.
11) I'd rather take my chances with higher risk investments than increase the amount I'm saving.
12) I'm concerned by the volatility of stock market investments.

The adjacent risk categories can be discussed with the client and the client may choose to opt for a higher or lower category than assigned by the ATRQ. The discussion and agreed category should be documented by the adviser.

The ATRQ score and ATRQ category then provide a starting point for suggesting a portfolio and level of investment risk that might be suitable for the client.

A2R ATRQ Attitude to Risk categories and descriptions

The description is based on 'playing back' the types of responses the client would have had to make to the ATRQ statements to get a score that fits in that category.

ATRQ category descriptions

Description: Very Cautious and Cautious Investors
Cautious Investors... tend to regard themselves as cautious people and view risk negatively rather than as a source of opportunity. They typically have little or no experience of investment and do not find investment matters easy to understand. They can take a long time to make investment decisions and tend to be anxious about any investment decisions they have made. They typically look for safer investments rather than seeking higher returns. They are not comfortable about investing in the stock market and typically prefer bank deposits to riskier investments.

Description: Moderately Cautious Investors
Moderately Cautious Investors... tend to regard themselves as quite cautious people and are inclined to view risk negatively rather than as a source of opportunity. They typically have limited experience of investment and do not find investment matters particularly easy to understand. They can take a fairly long time to make investment decisions and can be somewhat anxious about investment decisions they have made. They are inclined to look for safer investments rather than seeking higher returns. They are not particularly comfortable about investing in the stock market and tend to prefer bank deposits to riskier investments. They may be willing to take some risk, once the relationship between risk and higher returns has been explained to them.

Description: Balanced Investors

Balanced Investors… do not particularly regard themselves as cautious people and have no strong positive or negative associations with the notion of taking risk. They will typically have some experience of investment and a degree of understanding of investment matters. They will usually make investment decisions reasonably quickly and don't tend to be particularly anxious about investment decisions they have made. They can be inclined to look for safer investments rather than higher returns, but understand that investment risk may be required to meet their investment goals. While they will take investment risk, they are still not particularly comfortable with investing in the stock market and get more comfort from bank deposits than riskier investments.

Description: Moderately Adventurous Investors

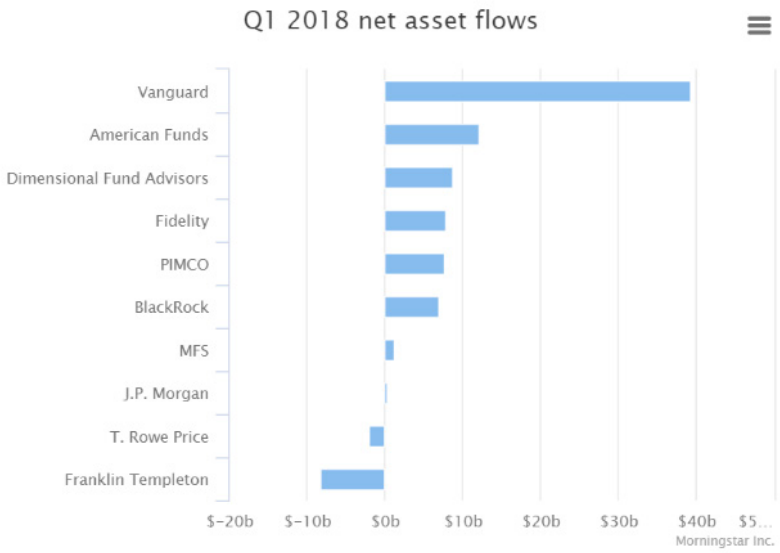
Moderately Adventurous Investors… do not typically regard themselves as cautious people and are inclined to view risk as a source of opportunity rather than as a threat. They generally have significant experience of investment and find investment matters fairly easy to understand. They tend to make investment decisions relatively quickly and are not usually particularly anxious about the investment decisions they have made. They typically look for higher returns rather than safer investments. They are reasonably comfortable about investing in the stock market and typically prefer riskier, but higher returning investments to keeping money in bank deposits.

Description: Adventurous and Very Adventurous Investors

Adventurous Investors… do not typically regard themselves as cautious people and usually view risk as a source of opportunity rather than as a threat. They generally have substantial experience of investment and find investment matters easy to understand. They tend to make investment decisions quite quickly and are not generally anxious about the investment decisions they have made. They typically look for higher returns rather than safer investments. They are comfortable investing in the stock market and prefer riskier, but higher returning investments to keeping money in bank deposits.

Asset allocation using probability-based forecasts. Why stochastic

It is generally accepted, backed up by numerous studies[7], that asset allocation drives investment returns. The incredible success of Vanguard (over 50% fund inflows in the US H1 2018) attests to the wisdom of retail investors who aim to capture the market return, rather that speculate in individual stocks.



Markovitz[8] illustrated the power of diversification in portfolio construction and proved that a portfolio can be optimised via its allocation to different asset classes to achieve the maximum return for minimum risk. Modern techniques, such as the stochastic modelling provided by Moody's, have taken this further by developing more sophisticated, stochastic techniques for projecting asset class growth and inter-relationship of asset classes in different market conditions.

A stochastic model has sophisticated rules (equations) that describe the behaviour of the constituents of economies across the world (including interest rates and inflation), determining how the system is expected to behave over the long term. What gives the stochastic model its power is the technique of building a mathematical simulation on top of the rules that creates thousands of 'viable' scenarios. It is the probability-based distribution of these results that we use to inform our investment decisions.

[7] Gary P. Brinson, CFA, Randolph Hood, and Gilbert L. Beebower (known collectively as BHB). Determinants of Portfolio Performance. (Financial Analysts Journal).

[8] Harry Markowitz, Portfolio Selection: Efficient Diversification of Investments. (New York: John Wiley & Sons. 1959)

Where do Strategic Asset Allocations come from?

By running thousands of possible portfolios through the Moody's engine, we can identify the optimum candidate portfolios when it comes to risk-and-reward, and use these asset allocations as models for clients. We call these optimum portfolios our strategic asset allocations, and these strategic asset allocations define the risk categories that align with our risk profiling methodology, from Cautious through to Adventurous.

A2R has developed and tested their questionnaire, in conjunction with Moody's, to ensure that the risk categories align with the strategic asset allocations in the investment range that Moody's consider appropriate for retail clients.

In broad terms, a Cautious strategy is one where a client can lose up to 5% in a bad year, a Balanced strategy can lose up to 15%, and an adventurous strategy can lose up to 25%. These probabilities are reached using a consistent methodology that has proven very accurate over many years.

Until recently, stochastic tools were not available to advisers, who were forced to employ less sophisticated risk analysis. This meant they could not educate and inform their clients to the implications of risk to the standard that is demanded by regulation. Those who adopt stochastic measures are acknowledging that a probability based approached in the only sensible way to consider investment outcomes. There isn't really any other possible way of measuring future outcomes.

We have touched upon the reasons why firms need to have a far more robust risk management than in previous (regulatory) eras, and with it, the ability to illustrate the risk and return dynamics to allow for 'informed consent' to be achieved.

There are two reliable methods for illustrating investment risk:

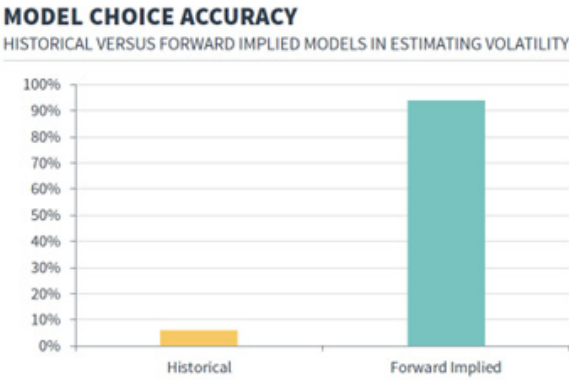
1. Analysis of historical (past performance) data, including volatility

2. Forward-looking mathematical models that ascribe probability to the full range of 'viable' outcomes.

This is a huge area of study, but increasingly the second approach is gaining favour, for several good reasons:

1. Investments run on a forward-looking basis tend to be more effective.

For example, a study in 2003[9], looked at 18 different papers which had sought to forecast volatility, comparing historical analysis with 'forward implied' techniques. (See below). Reliance on historical data will tend to lead to an increased concentration of asset classes that have performed well historically, but are likely to suffer more in the coming short term. (Rules in stochastic engine apply regression to the mean).



[9] Poon & Granger, Forecasting Volatility in Financial Markets. Summarised findings of 18 papers on forecasting volatility. June 2003.

2. Volatility-based analysis is less effective than stochastic forecasting at capturing trend.

There are many good examples. Consider the experience of the Nikkei that suffered an extended bear market from 1989 to 2012. In 1960 who would have dreamt that gilt yields could reach 17% and equity yields 12%? Would a strategy based on back testing have predicted this could have been a risk, and would investors using this strategy have been prepared for this possibility? Equity markets can, and do, fall by 70% and more[10].

3. As we have seen, regulation is increasingly reliant on the setting of objectives and using asset growth forecasts to predict likely investment performance against those objectives.

The only practical approach is to ascribe probability of outcome, which allows for the full range of possible outcomes to occur. Research in recent years on 'sequence risk' exposes the limitations of using linear assumptions, or deterministic models. For example, if poor returns occur in the first 10 years of the retirement term, the overall impact is greater on the success of the strategy than if losses occur later in the term. This is due to due to the obvious impact of loss of compounded interest. Basically, any average that is deterministically applied will fall short of the requirements in today's compliance best practice.

Moody's Analytics and Synaptic Research

The stochastic model that we reference in this paper is the Moody's proprietary engine, which is integrated into the Synaptic Modeller tool. By accessing projections from the engine, advisers have access to all the metrics they need to prove Suitability and reassure clients with their expertise.

This investment risk management approach offers:

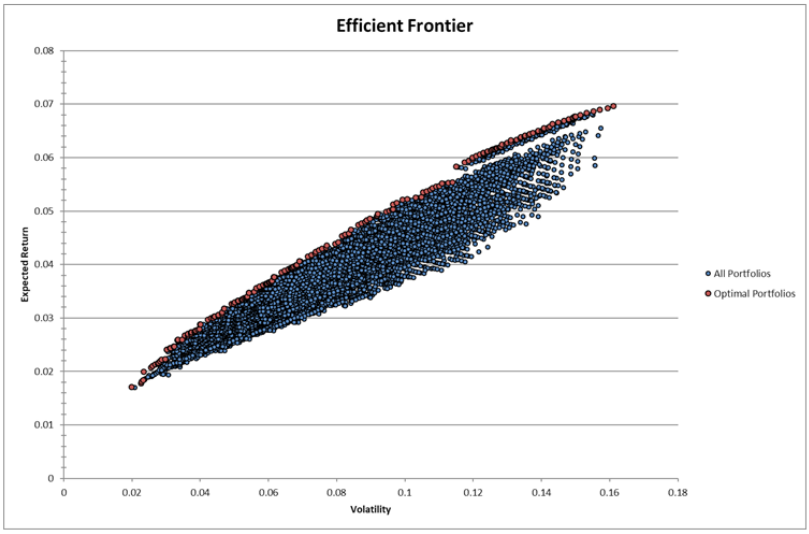
- A consistent and proven approach to balancing risk and return
- The extent to which losses in a bad year (1 in 20) will fall, allowing the adviser to accommodate the client's Capacity for Loss with the chosen investment
- Reliable, research-based portfolio growth rate assumptions, that will allow a realistic plan to be formulated in line with objectives.

How is a strategic asset allocation created?

The graph on the page opposite shows an output from a Moody's simulation, part of the process to define the Level 1, Cautious Portfolio in the new Synaptic 1-10 range.

Moody's: 'For Portfolio 1 we had four candidates, including Portfolio 'test 10' with the risk/return characteristics indicated (i.e. target was 4.4% 1-year VAR (Value at Risk @95%), this was lower and had the better projected return).'

[10] This example is provided by Moody's in their document Introduction to Stochastic Modelling in Personal Financial Planning. (Moody's Analytics 2013).



Cash	60%
UK Corporate Bonds	30%
Property	0%
UK Equity	5%
Global Equity ex UK	5%
US Equity	0%
Emerging Markets Equity	0%

To identify the Synaptic Risk strategic asset allocation boundaries, Moody's uses six core asset classes (although the Synaptic version of the engine can process up to 22 asset classes including various fixed income asset classes including high yield corporate bonds and index-linked bonds, global equities, commodities, infrastructure and hedge funds).

Asset split name	Asset split type	Term	Cash	UK Corporate Bonds	UK Equities	Global Equities (ex UK)	Emerging Markets Equities	Global Property
Very Cautious	Strategic	10	60	30		5	3	2
Cautious	Strategic	10	40	45		15		
Moderately Cautious (Low End)	Strategic	10	40	10		40		10
Moderately Cautious (High End)	Strategic	10	30	15		45	1	9
Balanced (Low End)	Strategic	10	30	5		55	1	9
Balanced (High End)	Strategic	10	20		10	55		15
Moderately Adventurous (Low End)	Strategic	10	20		5	70	1	4
Moderately Adventurous (High End)	Strategic	10	10		5	70	7	8
Adventurous		10			20	70	4	6
Very Adventurous		10			10	75	15	

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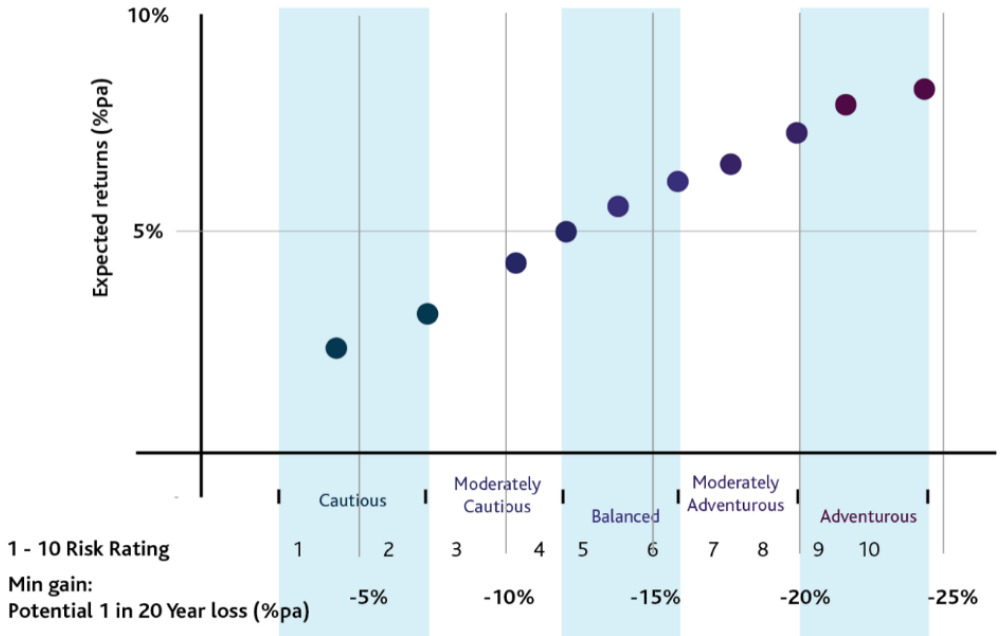
Running these strategic asset allocations back through the model on a quarterly basis creates our efficient frontier risk-based metrics, as follows:

Asset allocation name	Term	Type	Min Gain	Max Gain	Mean Gain	Attitude to Risk	Risk Rating
Very Cautious	10	Strategic	-4.4	10.15	2.43	Very Cautious	1
Cautious	10	Strategic	-7.2	13.29	2.95	Cautious	2
Moderately Cautious (Low End)	10	Strategic	-10.35	19.35	4.74	Moderately Cautious (Low End)	3
Moderately Cautious (High End)	10	Strategic	-11.96	21.86	5.11	Moderately Cautious (High End)	4
Balanced (Low End)	10	Strategic	-13.83	24.75	5.69	Balanced (Low End)	5
Balanced (High End)	10	Strategic	-15.96	27.31	6.17	Balanced (High End)	6
Moderately Adventurous (Low End)	10	Strategic	-17.48	30.58	6.59	Moderately Adventurous (Low End)	7
Moderately Adventurous (High End)	10	Strategic	-19.91	32.85	7.05	Moderately Adventurous (High End)	8
Adventurous	10	Strategic	-21.94	34.72	7.32	Adventurous	9
Very Adventurous	10	Strategic	-24.77	36.7	7.62	Very Adventurous	10

The efficient frontier for the Moody's / Synaptic model has the advantage of being constructed around potential loss over a 12-month period (Value at Risk), rather than the more usual volatility bands.

Synaptic Risk Ratings - graph showing efficient frontier using Moody's VAR (1 in 20 Year Loss %pa) / Min Gain as boundaries



What does the Moody's Risk profile give you?

Any investment you may be advising on can be projected using the Moody's risk framework, as applied to the asset allocation of the fund or portfolio. The resultant risk profile can be compared to the model in each case, meaning you now have an objective, consistent and credible methodology for assessing risk.

For compliance purposes, the primary concern is evidencing that clients' Capacity for Loss is accommodated within the risk profiles of the investments that are recommended. Advisers should always remember that it is the plan that is Suitable, not the investment. The investment is the vehicle that helps meet the objectives of the plan.

Compliance is achieved by recording the risk profile of an investment, specifically the 'minimum gain' value – measuring the extent of loss in a 'bad year' – to show that the investment risk profile is within the tolerance levels defined by the investment strategy.

A further advantage of working with the Moody's methodology is the provision of an accurate growth assumption. The ability to identify growth rates using a consistent approach across any and all investments is very important. It is the 'Average gain', provided in every Moody's risk profile that fulfils this role.

To help understand the outputs from Synaptic Modeller, first consider the graph below, showing the results of our simulation, recording all the investment outcomes (x-axis) against the frequency they occurred.

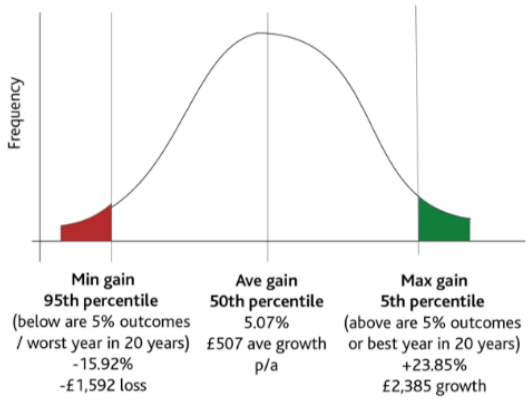
With a normal distribution, roughly 95% of outcomes occur within two standard deviations, so what we are looking at is a slightly narrower range of 90% (rather than 95%).

We look at the ninety fifth percentile to take our measure of projected portfolio loss (left hand side of the first graph). The greater the inherent risk in the portfolio, the greater the projected potential loss. This is a forecast of viable outcomes not, as with most approaches available to advisers, one based on past performance.

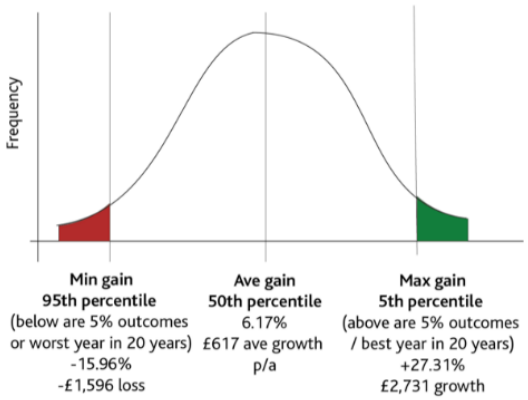
The regulatory approach is to ensure that losses 'along the way' are expected and acceptable to the client. This is the only way they will remain committed to the strategy and stay invested for the term. Behavioural analysis shows that investors tend to invest when markets are 'healthy' and sell when confidence is low. This means they are buying high and selling low. As we cannot know where we are in a cycle, we have to allow time for the trend towards market growth to take control, which is why you should never invest for the short term. Some studies show that the longer the term, the less significant the 'entry price' becomes anyway.

Using outputs from Synaptic Modeller, the second and third pair of graphs illustrate the alignment of our investment strategy or model (as defined by our Strategic Asset Allocations), with the projections from our investment portfolio. Users quickly gain familiarity with the model, and risk becomes a concept that can easily be explained to clients and evidenced for compliance.

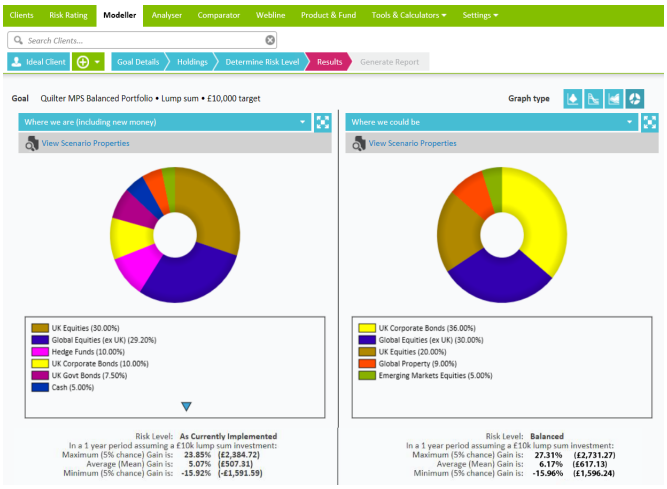
Distribution of investment returns from simulation applied to Quilter MPS Balanced. 10 yr term. £10k.

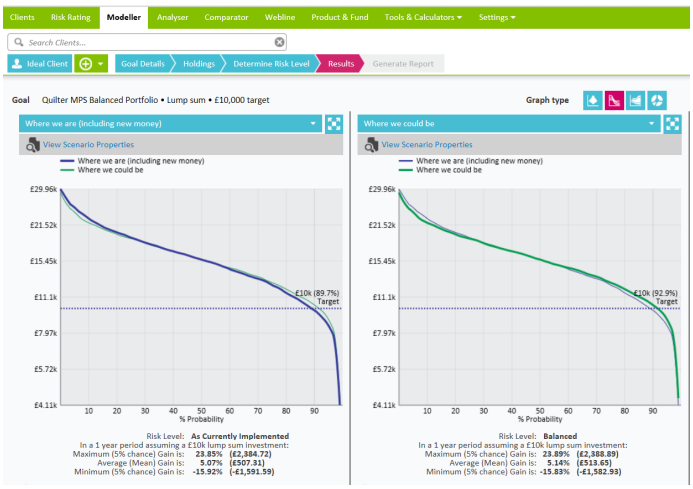


Distribution of investment returns from simulation applied to Balanced (hi end) Strategy. 10 yr term. £10k.



Both screens below show the analysis of our client's investment on the left, to be compared on the right with the analysis of the Strategic Asset Allocation for the appropriate Risk Category, in this case Balanced (hi end) in our 1-10 range, level 6.





Asset allocation becomes a prism to evaluate any and every portfolio

In Synaptic literature, you will see a wide range of fund groups who have participated in our risk rating. The Synaptic Risk Ratings are calculated by verifying the asset allocation of the investment with the asset manager, and projecting using the Moody's stochastic engine. This is mapped to the Moody's efficient frontier, giving us a risk profile that can be correctly mapped to the risk appetite of the client. The Strategic Asset Allocations have been developed to align perfectly with the ATRQ provided.

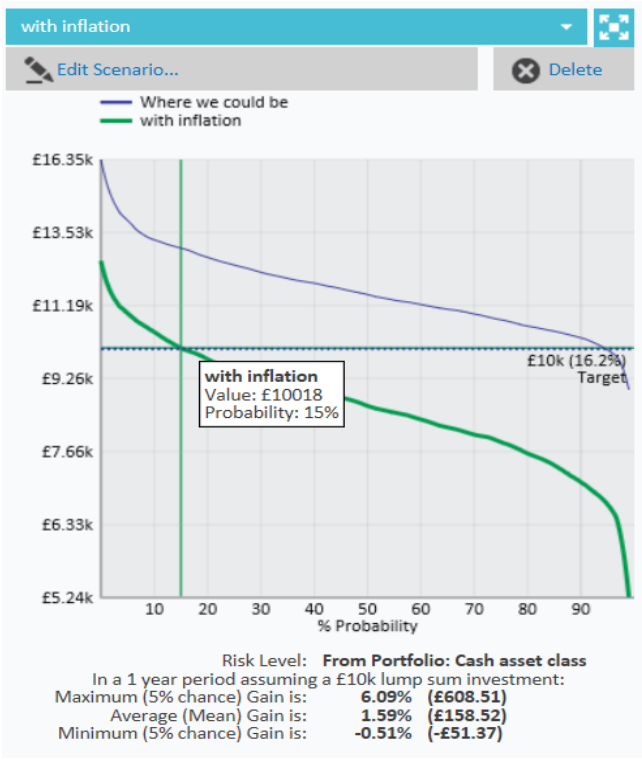
See below for an example of how the risk metrics make up the Synaptic risk ratings for Brewin Dolphin MPS portfolios. The 'min gain' is used to map to the boundaries of the risk categories. It is also the Value at Risk which must be matched to the client's Capacity for Loss.

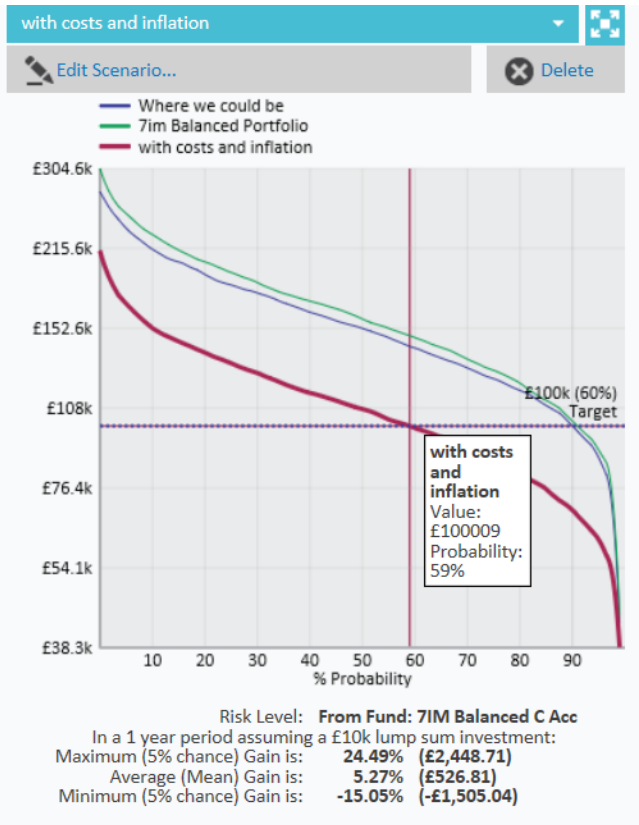
Asset allocation name	Term	Type	Min Gain	Max Gain	Mean Gain	Attitude to Risk	Risk Rating
Brewin Dolphin Cautious MPS	10	Strategic	-10.7	17.35	3.73	Moderately Cautious (High End)	4
Brewin Dolphin Cautious MPS	10	Tactical	-10.91	17.91	3.87	Moderately Cautious (High End)	4
Brewin Dolphin Income MPS	10	Strategic	-14.06	21.32	4.54	Balanced (High End)	6
Brewin Dolphin Income MPS	10	Tactical	-14.45	22	4.68	Balanced (High End)	6
Brewin Dolphin Balanced MPS	10	Strategic	-15.38	23.47	5.11	Balanced (High End)	6
Brewin Dolphin Balanced MPS	10	Tactical	-15.82	24.21	5.24	Balanced (High End)	6
Brewin Dolphin Growth MPS	10	Strategic	-18.11	27.73	5.87	Moderately Adventurous (High End)	8
Brewin Dolphin Growth MPS	10	Tactical	-18.85	28.44	5.98	Moderately Adventurous (High End)	8

Another great benefit of working with Moody's stochastic model is the ability to model inflation

This is a challenge for advisers who are more used to using deterministic assumptions for inflation. There is no simplistic approach that works for modelling inflation, and unfortunately, illustrations that accurately capture inflation are not useful sales aids! It is helpful to show the likely impact of inflation on a cash holding as a point of comparison.

This focusses the mind on the value of investment as a means of protecting wealth over the long term. Moody's calculate the impact of inflation historically to average 4.5% loss per year, in any 10-year period. The illustration here indicates an 85% likelihood of losing money on a 10-year cash investment (without costs). The average return in the model at £8.6k is not as bad as in real life, as we are using the investment definition of cash as short dated bonds (1-year government bonds which have a greater growth potential than cash in the bank).





Putting it all together, for research purposes you can combine the projections of the asset allocations that underpin your advice. We are looking at the Strategic Asset Allocation, the allocation of the recommended investment, and we are overlaying costs and inflation for the full, compliant picture.

The next results graphically illustrate the value of advice – an 85% chance of losing money has become a 60% chance of making money. Now if some charges could be shaved off, the picture starts to look more like our nominal projection (over 90% chance of gains). But that is another story.

The recommendation here was using a 10-year projection with 1.1% costs (adviser charges, platform and fund). Remember the 'min gain value' is our Value at Risk amount, the extent of the losses expected in a 'bad year', defined as 1 in 20 (5%) – enabling us to make our Capacity for Loss assessment with credible values. The blue line shows the projected returns of our strategic Balanced allocation. The green line shows the asset allocation of our recommended investment. The red line is the latter but includes costs and inflation.

What credentials does Moody's have?

Over £25 trillion of insurance and pension assets and liabilities are managed with the support of Moody's products and services. Its customers include over 60% of top global insurers on the Global Fortune 500. This market share continues to grow. Moody's is very influential at institutional level and, through Synaptic, their popularity is growing amongst advisers.

How to approach risk in the context of retirement planning

The majority of us will be familiar now with the starting point for most discussions of this kind – the Bengen 4% rule [11]. This research was a landmark in establishing a new kind of calculation, but Bengen's research only dealt with US historical returns, and our intention here is to outline how Bengen's approach might be applied in a UK retirement context today, using modern stochastic techniques.

Firstly, the use of cash-flow plans

As readers will know, cash-flow models are prescribed for Defined Benefit (DB) transfers, but in his recent report *'An-ex-regulator's guide to cash-flow planning'*, Rory Percival explains why cash-flow plans should be taking centre stage in a wider context of advice:

- 'Cash-flow planning can be about any form of income and outgoings and does not have to be related to the client's overall position.' A cash-flow plan need not be a holistic view of a client's finances.
- The second point is that the cash-flow plan can, and should, establish the Capacity for Loss for most clients In fact, writes the author 'it should be the main way of assessing Capacity for Loss for most clients.' Capacity for Loss is the lynchpin of compliance and meeting the funding requirement for future income is central to any plan. An adviser needs to make an expert, objective assessment of Capacity for Loss, or using its FCA definition, identify the level at which loss may make a 'material impact on the standard of living'.

Synaptic users can use growth assumptions from the Synaptic Risk profile, but the calculations remain deterministic.

[11] Bengen, William P. "Determining Withdrawal Rates Using Historical Data". Journal of Financial Planning, Oct 1994).

Use of stochastic modelling in retirement planning

To illustrate the dynamics of risk over the period of a client's retirement, we ran some scenarios in Synaptic Modeller, a tool that accesses the Moody's stochastic model. We looked at the probability of success for a couple who are approaching retirement (age 59), looking to retire at 65, and we are modelling to try and understand what investment strategy to apply to ISA holdings that have accumulated over the years (so no tax implications). As our clients have their bills covered with pension income and state income, this is purely discretionary spend. Our client and his wife both have a Balanced risk profile, so it will be difficult to recommend a solution that takes them over this threshold. The research however, points to the need to take risk on.

These illustrations are 'real' so include outcomes across the full range of viable variants for inflation and interest rates. One advantage of the stochastic approach is the built-in stress testing.

The percentage withdrawal rate is an 'initial withdrawal rate', which is subject to an annual uplift of 2.7% (current CPI) to maintain purchasing power.

In our graph, the green line represents the probability-based outcomes for the Balanced portfolio in our C.I.P, (projections are calculated using asset allocation). The red line represents the projections from our C.I.P.'s adventurous strategy, and the blue line is Cautious.

We are aiming for a nominal £50k remainder in the pot at 95 years old as our definition of success.
Here are the results. Probability of success (£50k remaining) from our scenario:

STRATEGY / WITHDRAWAL RATE	2%	4%	6%
CAUTIOUS	34%	0	0
BALANCED	73%	32%	8%
ADVENTUROUS	76%	53%	33%

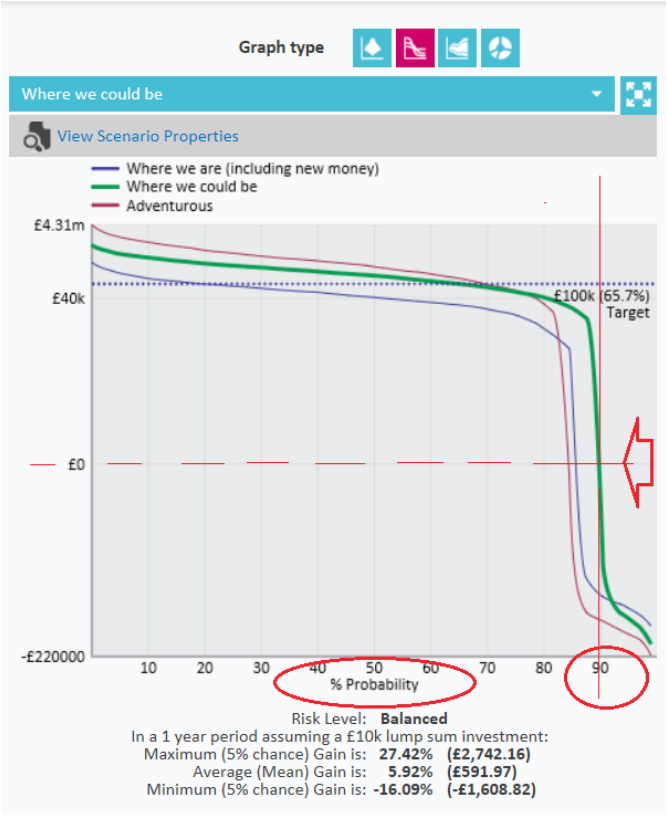
RISK LEVEL	10% BEST OUTCOMES	10% WORST OUTCOMES	RANGE (90TH TO 10TH PERCENTILES)
CAUTIOUS	>£9.6k	<-£43.8k	£54k
BALANCED	>£129k	<-£35k	£165k
ADVENTUROUS	>£432k	<-£48k	£480k

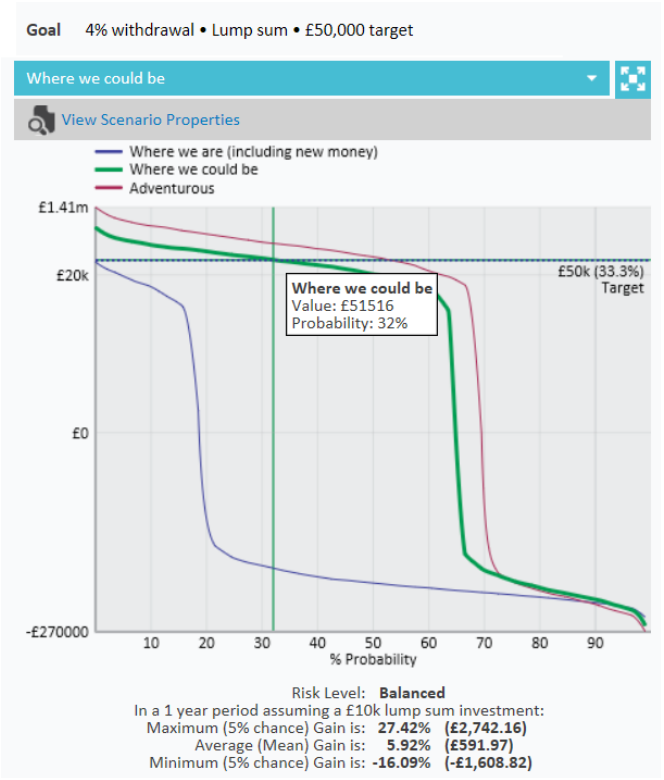
This is what the graph looks like, mapping investment outcomes from the simulation per £100k invested against probability for the three strategies.

Conclusions for sustainable withdrawal on our example

It can be inferred from our research that a 'safe initial withdrawal rate' would be significantly less than the 4-6% that is likely to be recommended to the client. Looking at the £0 final fund value, I can see a Balanced strategy would suggest a 65% chance of success for the strategy to last the distance. Remember that Bengen didn't allow for costs, where we have allowed 1%.

What really hits home is the impact of inflation. If we were to run the scenario on a nominal basis the results are obviously very different. The temptation is to show the nominal projections to the client - 85-90% chance of success - but this would be half the story.





The range of possible outcomes is large (we have shown the range for 90% of the outcomes in the table). Clearly a plan will need to be carefully monitored, because adjustments can and should be made depending on the sequence of returns in the early years. If all is well, more money will be able to be extracted, but a poor sequence of returns initially will necessitate a constriction of the withdrawal rate and recovery time for the fund.

A major concern of course is the cognitive ability of the client in later years, so the due diligence and research needs to be very thorough, including understanding of how the reviews will be undertaken. The sensible approach here is to work with a Withdrawal Statement that sets out the expectations and rules to address different market conditions. This is also the best way to demonstrate the suitability of the plan, as the rules will be designed to prevent the depletion of the principal and breach of the client's Capacity for Loss.

There are many interesting considerations that come out of this research, for example how different asset allocations and investment styles might work; whether the use of natural yield to determine withdrawal rates might help, and allowing the asset classes to drift, which also provides some really interesting results and options for the adviser.

Moody's overview of sustainable retirement income

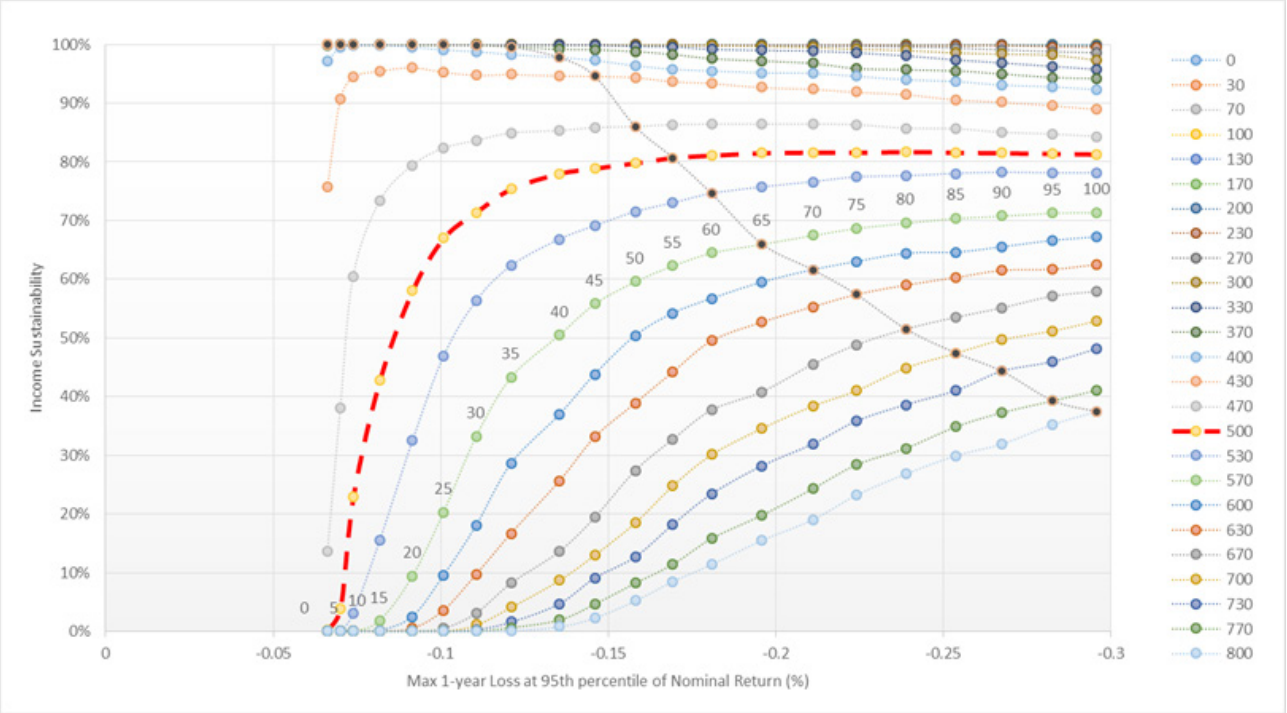
There is one graph that beautifully captures the role of investment risk, impact of withdrawal and probability of success, shown below. For those not familiar with the Moody's methodology, the 'y' axis on the left represents probability of success.

So greater than 80% chance of success (income sustainability over 25 years) for everything:

- With a greater investment risk than -0.1, which is equivalent to a portfolio with Moderately Cautious risk profile (loss of up to 10% of portfolio in a bad (1 in 20) year).
- Drawing down 5% or less of portfolio (adjusted for inflation). The 0-800 are bps i.e. 400 is 4%. Notice also that the classic 4% level of income will return a 90% chance of success if the funds are invested above Moderately Cautious Strategy.

In summary – investment risk is obligatory for meeting most retirement needs!

Moody's 2-risk chart. Decumulation Strategies



What's shown?

25-year retirement decumulation projections for portfolios ranging from 0% to 100% equity, for a range of fixed income levels.

The Strategic Asset Allocations (SAAs) used are a blend of Equity (70% Global ex UK; 30% UK) and UK Fixed Income. EBR (Equity Backing Ratio, i.e. proportion of equity) is stepped in 5% increments from 0% to 100% - shown on the chart as points.

For each set of SAAs, we run a decumulation scenario with fixed income level ranging from 0% to 8% of the initial fund. Lines show constant income levels, as specified in the RH legend: 0bps, 30bps, 70bps, 100bps, 130 bps and so on.

For reference, the current single life fixed annuity rate is about 5.0% for a 65-year-old – shown as a red dashed line.

On the y axis is income sustainability, i.e. probability of maintaining the stated income to age 90.

On the x axis is max 1yr 95% var. That is, the maximum 1-year loss at the 1 in 20 level over the investment horizon. This loss reflects losses on the fund due to investment returns only and does not reflect the income cashflows.

What does it mean?

This is a '2-risk' chart showing two of the principle sources of investment risk for decumulation investors: shortfall risk, as represented on the y-axis in terms of "income sustainability", and "market risk" represented on the x axis as the 'potential 1-year loss'.

Use of Retirement Withdrawal Statements

Synaptic recommends the use of retirement withdrawal statements to anticipate the various market conditions. Abraham Okusanya has written a fantastic book, Beyond the 4% Rule[12], that explains the maths and the various rules that can be applied in more detail than we have room for here.

To make a withdrawal statement work, the adviser should establish the probability-based parameters for success or failure (easy with the Moody's model), and document the likely responses. The latter will include several simple rules that can be applied, for example the expectation of increasing the withdrawal rate by inflation, except when the portfolio has lost 10% over any 12-month period. Inflation increases are then resumed when the portfolio has regained the former valuation. The rules to address different market conditions are also the best way to demonstrate the suitability of the plan, as the rules will be designed to prevent the depletion of the principal and breach of the client's Capacity for Loss.

[12] Abraham Okusanya, Beyond the 4% Rule. (CreateSpace Independent Publishing Platform. 5 Mar. 2018)

Conclusion

Having a well-structured approach to risk profiling and managing investment risk is no longer optional in the MiFID environment. Understanding the mechanics of risk and return will help you deliver an effective and modern strategy to your clients.

Synaptic's software can support you in:

- Risk profiling your clients;
- Delivering an efficient frontier using 'Value at Risk' measures (rather than volatility);
- Measuring and comparing risk inherent in investment;
- Managing risk in retirement planning – including the longevity of investment and sustainable withdrawals.

Adopting risk management tools will help you streamline your advice process, allowing you to offer consistent and accurate advice where outcomes are predictable.

About Synaptic

Synaptic delivers peace of mind for advice suitability while providing better financial outcomes.

Synaptic has over 20 years' financial research experience, providing access to a wide range of financial planning, research, reporting and compliance software solutions to professional advisers and brokers. Over 50% of the UK's financial advisers use one of Synaptic Software's financial planning tools.

We offer a collection of software products and services to support the investment and protection markets, helping our clients to recommend, quote and transact millions of decisions that are suitable and compliant, through an end to end financial planning and research solution. These tools help the market evidence their expertise, compliance and help achieve better outcomes for clients.

For more information:

0800 783 4477
sales@synaptic.co.uk
www.synaptic.co.uk

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