

# Mastering stochastics

Insights from IMT

For professional use only



# Contents

<b>Introduction</b>	3
– The other stochastics	3
– We are talking about ‘fan charts’	3
<b>Planning Retirement</b>	4
– The deterministic approach	4
– Stochastics: A better way	4
<b>How do Stochastics work?</b>	5
– The graph at a glance	5
– Lifting the bonnet	7
– Plotting the distribution	8
– Joining the dots	9
– Interpreting the output	10
– The finished product	11
<b>Measuring success</b>	12
<b>Stress testing and tuning your advice</b>	13
– The 10th percentile stress test	13
– Fine tuning	14
– Speaking of reviews	15
<b>What about Plan B?</b>	16
– The adviser view	16
– An alternative view	16
<b>Wrapping up</b>	17
<b>About our IMT</b>	18

# Introduction

So, you want to know how stochastic modelling works. Before we start, let's be clear on the kind of stochastic modelling we're talking about.

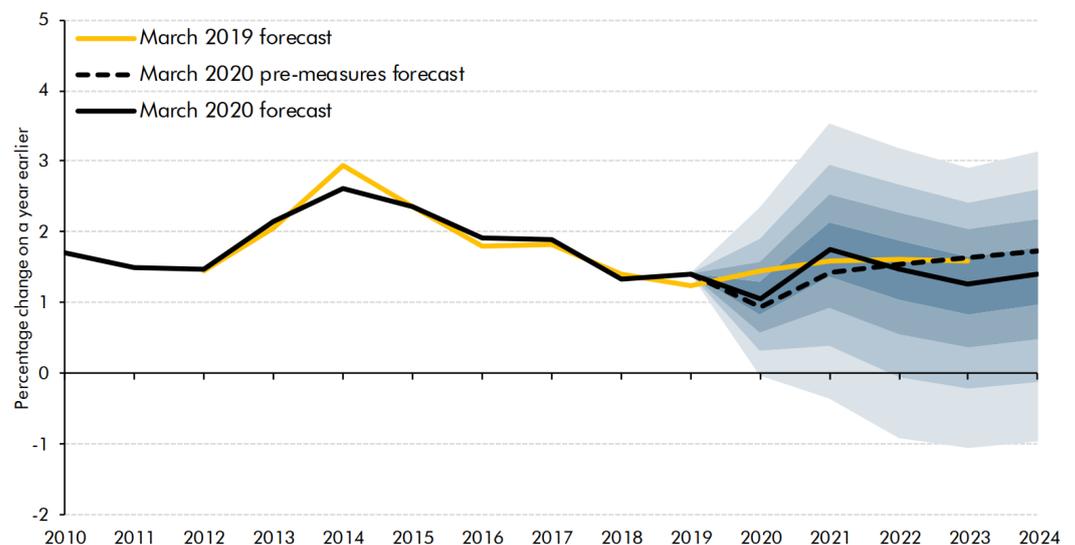
## The other stochastics

We're not talking about the stochastic oscillator charts that are used to show when a stock has moved into an overbought or oversold position. Sorry stock traders.

## We are talking about 'fan charts'

We're talking about 'fan charts'. These are commonly used in data visualisation to express quantified, potential future outcomes, along with the likelihood of those outcomes happening.

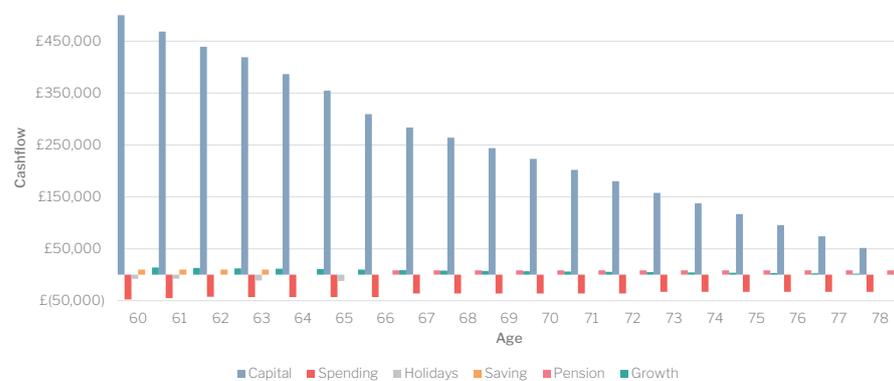
For example, the Office for Budget Responsibility (OBR) use them to predict possible future economic scenarios, like the one below from their Economic and fiscal outlook: March 2020:



# Planning Retirement

## The deterministic approach

Retirement planning has two main dimensions – time and wealth. Traditional cash flow modelling (deterministic) represents these in the form of bar charts showing how much money is saved, spent, invested and retained each year to a point in time, often 95 or 100 years of age.



If this is the answer, what's the question? The chart certainly shows that the sums add up. But does it answer the question of variability and uncertainty? Investment markets aren't fixed at 5% growth. Market movements have meaningful impacts on investment portfolios, especially in drawdown where fluctuations (both positive and negative) are crystallised as soon as your client accesses their money.

## Stochastics: a better way

Using stochastic analysis adds a third dimension – uncertainty – both of investment return and longevity. Inevitably, this makes the model more complex to interpret, but it also makes it richer in meaning. Clients are prompted to consider the possible impact of sequence risk, and the risk that one or both members of a couple could live to a great age.

While cash flow modelling is a great way of helping clients understand how much money they will need and when, it can't demonstrate the range of possible outcomes, nor can it show you the likelihood of your plan succeeding. Stochastic modelling can help bridge this gap.

# How do Stochastics work?

With the help of our easy to use Income Manager Tool (IMT) we're going to lift the bonnet on stochastics.

## The graph at a glance

At first sight, IMT presents a clear and simple drawdown chart, showing the 50th percentile line of possible outcomes (the default view for our tool).



- (A)** Accumulation - the growth phase of a client's investment journey
- (B)** Decumulation - the phase where a client draws down their money
- (C)** Percentile toggle - to switch between percentile breakdowns

It also shows some useful information to help frame the discussion with your client.



**(A) Longevity distribution**

A visual representation of the percentage likelihood that a client has of reaching a certain age

**(B) Annuity nudge**

How much annuity income the fund could buy at each specified percentile level of investment return, at age 75

**(C) Longevity estimate**

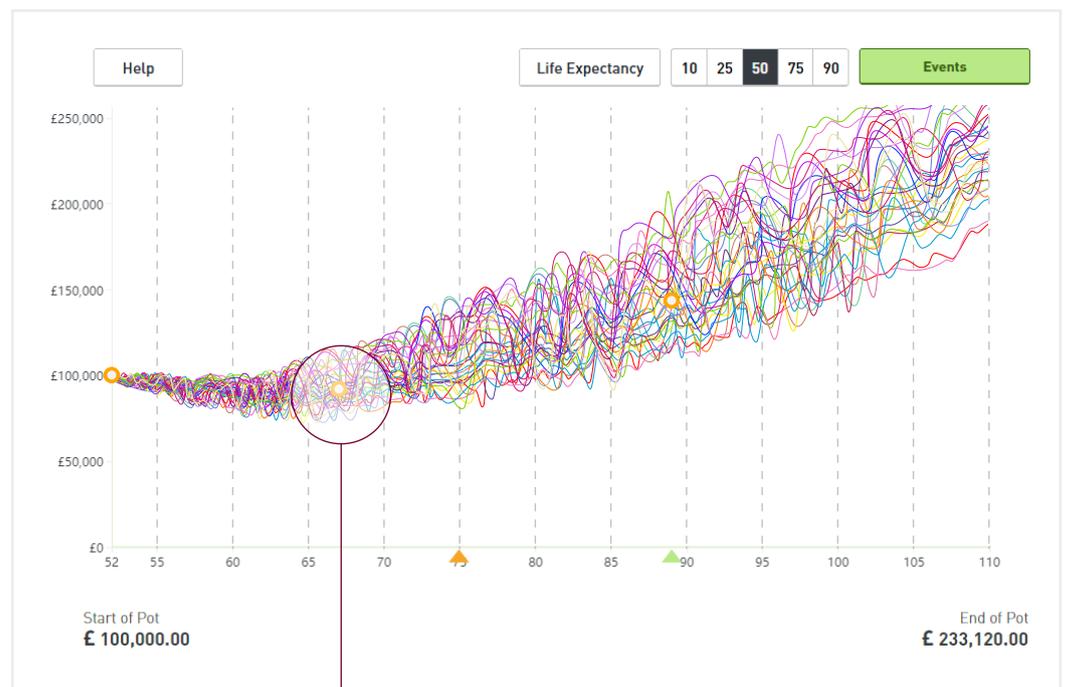
The client's median life expectancy i.e. the date at which c.50% of individuals with the same characteristics would live to.

**(D) Viability score**

A percentage score detailing your client's overall plan viability.

## Lifting the bonnet

If you were to lift the bonnet and peek inside, you would see something significantly more complex. The IMT stochastic model is powered by Hymans Robertson's Economic Scenario Generator and the underlying Monte Carlo tracks would look something like this:



### A Generating returns

Looking 70 years out from the starting age of the clients plan, to a maximum age of 110, 5,000 potential sequences of portfolio investment returns are generated. These returns, based on the investment pot's chosen investment solution, use the underlying asset allocation of that solution and Hymans Robertson's capital market assumptions as the basis for the expected investment return and volatility characteristics for that solution.

## Plotting the distribution

Plotting the distribution of each of the 5,000 projected portfolio values at any future point in time, as a histogram, produces a bell curve. Over time, the range of possible portfolio investment returns will expand.



- A** Distribution of possible returns at age 60
- B** Distribution of possible returns at age 75
- C** Distribution of possible returns at age 95.

“Once you have mastered stochastics, you can offer a clearer view of the range of possible outcomes clients may expect.”

Patrick Ingram, Retirement Specialist

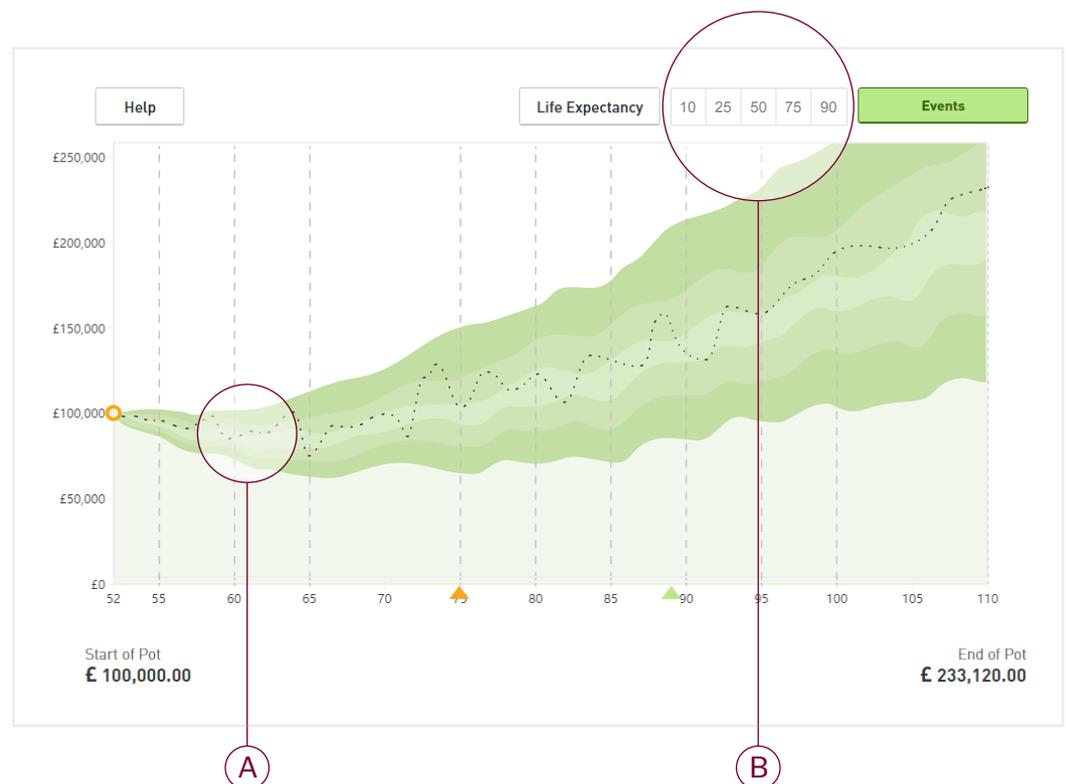
## Joining the dots

The IMT picks up the 10th, 25th, 50th, 75th and 90th percentile points on these histograms for each plan year and ‘joins the dots’ to create a stochastic fan chart to illustrate the range of potential investment outcomes over time.



## Interpreting the output

It's important to remember that actual portfolio returns will straddle multiple percentiles over the duration of a plan as the dotted example scenario does below.



### A Following a single track

To illustrate this, we can follow the 5th projection track of the 5,000 potential investment outcomes generated by the IMT. Notice that it crosses all percentile levels in its early years and that age 75 is lying on the 50th percentile line.

### B Testing the robustness of 'Plan B'

What the 10th and 25th percentile options allow is the opportunity to consider 'what if' the portfolio was badly affected at a chosen point in time to test the robustness of 'Plan B', remembering that respectively the 75th and 90th percentile outcomes are as equally likely.

## The finished product

By “joining the dots” of the histograms, the IMT graph is generated. The 50th percentile line is shown first. However, in some modellers, they may all be shown at once, giving the “fan” effect.



### A Reviewing the possible range of outcomes

You can easily switch to the 10th, 25th, 75th and 90th percentiles to see the degree of dispersion in potential outcomes for your clients plan by clicking on the percentile buttons at the top of the graph.

# Measuring success

Unique to the IMT is the Viability Score, which combines the range of forecasted portfolio outcomes. 'A' With the range of longevity outcomes 'B'. To calculate the likelihood of plan success as a single percentage figure. 'C' And by extension, a credible, independent assessment of how great the need for a plan B.



# Stress testing

Being able to see the possible range of outcomes (both good and bad), you can stress test your plans for the worst-case scenarios and tune them accordingly. Here's an example.

## The 10th percentile stress test

Let's look at a typical scenario of a 65-year-old man with a £100,000 pension pot in Risk Grade 5.

Looking at the 10th percentile line on this plan shows that the portfolio is exhausted before the client's median life expectancy.



**A** Portfolio exhausted before median life expectancy

# “With an actuary’s forecast of the downside, assessing a client’s capacity for loss is well supported.”

Patrick Ingram, Retirement Specialist

Drawing 4% a year from his portfolio generates an overall Viability Score of 72% - a 28% chance of failure. Looking at the 10th percentile outcome you can see there is 10% confidence of the portfolio being exhausted before his median life expectancy. Assuming that’s not a risk this hypothetical adviser wants to take with his client, they can make some subtle tweaks to the plan.

## Fine tuning

Let’s see what effect working an extra year (and therefore having an extra year of contributions), increasing the Risk Grade to 6 and reducing withdrawals to 3.6% pa in real terms would have...



The Viability Score jumps to 85%, a much more comfortable figure. The portfolio could last for over 35 years.



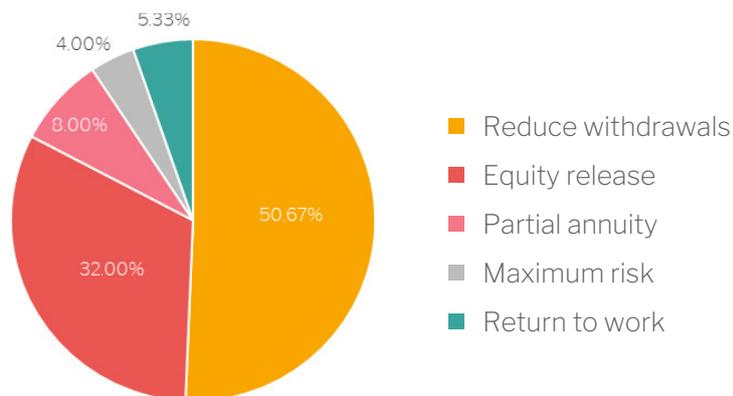
# What about plan B?

This is all well and good, but what about the 15% chance of plan failure? This is where the plan B comes in.

## The adviser view

When we asked 75 financial advisers what their personal plan B was in our 2019 Mastering Stochastics webinar, we got the following results.

### What is your personal 'plan B'? (n=75)



Source: Parmenion - Mastering Stochastics webinar, October 2019

Around half would opt to reduce withdrawals, followed by equity release at about a third. Reducing withdrawals can make a big difference on the success rate of a plan when combined with other fine tweaking.

## An alternative view

Of course, a client's plan is never static. In an advised relationship it will always be tweaked, updated and modified to adapt to changing client circumstances. While a prudent adviser will always coach their client on the possibility of needing a fallback option, the very best plan B is to continuously evolve plan A.

# Wrapping up

Stochastics can be a very powerful part of any adviser's planning toolkit.

It can demonstrate the range of possible outcomes of your plans (both good and bad) and help you understand the likelihood of your plans succeeding. It also enables you to create that balance of risk and uncertainty, stress testing and subsequently tweaking your plans.

Of course, the data in a stochastic model is only as good as its assumptions, including client longevity data. The IMT offers:

- Independent, institutional-level projected 'real return' data on all major markets
- Postcode personalisation of individual longevity from one of the UK's largest databases of retiree data
- Integration with Parmenion platform and no additional charge
- Independent scoring of strategies, even highly complex ones
- Forward pricing of potential annuity purchase to help balance confidence and certainty
- Client friendly reporting

To find out more, read on.

## Want to know more about our Income Manager Tool?

If you'd like to read a bit more detail about what's under the bonnet of the IMT, you'll find a more in-depth breakdown in our [Introduction to the Income Manager Tool](#).

Or, for a quick glance of what the IMT can do for you, take a look at our [At a glance: Income Manager Tool](#).

And finally, if you'd like to chat to us about the IMT, or our wider proposition, please get in touch with us.

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