

POUND-COST ‘RAVAGING’

Understanding Volatility
Drag, Sequencing Risk and
Safe Withdrawal Strategy
In Retirement Portfolios

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Executive Summary



The new pension freedom presents unprecedented challenges to financial planners and their clients. With most restrictions to pension access out

of the window, and the perceived removal of compulsory annuitisation, clients will invariably look to their financial planners for guidance on how best to sustain their income in retirement.

Under pre-pension freedom rules, the Government Actuary's Department (GAD) rates played a pivotal role in determining maximum annual withdrawals for capped drawdown. From April 2015, clients in pension drawdown will bid farewell to GAD rates, and other restrictions on access to their pension funds. Instead, clients will look to their advisers to guide them through the plethora of income options, model the likely impact of taking lump sums from their retirement fund and mitigate the chances of running out of money. For many clients, the question simply will be - how much am I able to draw out of my pension pot without the risk of running out of money during my lifetime? What is the likely impact of taking out lump sums to pay off debts, fund a big holiday or to help the grandkids get onto the property ladder?

Key to the challenge of helping clients generate sustainable cash flow for an unknown but finite duration of life - and through different economic and market conditions - is the question of establishing an optimal and sustainable withdrawal rate from a retirement pot.

Traditionally, many financial planners use cashflow planning tools to model likely retirement outcomes. These tools are deterministic in nature, relying on assumptions of arithmetic average annual returns, inflation and life expectancy. This paper argues that these deterministic planning tools aren't fit for purpose, especially for retirement income planning. The paper explains how the combination of sequencing risk and volatility drag is exacerbated by portfolio withdrawals, resulting in 'pound cost ravaging.' This renders deterministic cashflow models meaningless and potentially misleading for clients. The use of Monte Carlo models and a greater understanding of Safe Withdrawal Rates enables financial planners to model retirement income options more robustly, demonstrate suitability and deliver better client outcomes in retirement planning.

Key Takeaways for Financial Planners

-  'Pound cost ravaging' is a key challenge for clients drawing down their pension pots. It results from the combined impact of volatility drag and sequencing risk, amplified by withdrawals from retirement portfolios. This subtle, yet dangerous risk is often ignored and could wreak major havoc to clients' retirement plans.
-  There is an urgent need to rethink cashflow planning tools used by the vast majority of financial planners in the UK. The danger of sequencing risk and volatility drag makes deterministic cashflow planning models insufficiently robust and they risk misleading clients.
-  Financial planners should adopt Monte Carlo models as the de facto way of modelling retirement outcomes. A Monte Carlo simulation provides a more 'colourful' perspective of the range of potential outcomes given the expected return and volatility of a portfolio. This goes right to the heart of assessing risk capacity and enables advisers to engage in far more meaningful conversations with clients.
-  Managing 'pound cost ravaging' is a planning challenge as much as it is a portfolio management issue. Advisers who use the same investment approach for clients in the accumulation and decumulation stage need to reassess their investment propositions.
-  Financial planners should have a robust framework in place for advising clients on what the Safe Withdrawal Rate (SWR) from their portfolio is. Research on Safe Withdrawal Rates provides a useful foundation for advising clients on how best to ensure their retirement pot doesn't run out before they die. However, it is a rule of thumb and needs to be adapted to account for each client's individual circumstances. This can be achieved through the use of Monte Carlo models, taking account of each client's risk profile, asset allocation, anticipated life expectancy and tolerance to probability of failure.
-  Successful management of finances in retirement can be improved by dynamically adjusting withdrawals to market and portfolio conditions. But there are countless flexible spending approaches, and it's important for advisers to understand the pros and cons of each approach, and have a framework in place for guiding clients.

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Making Sense Of It All

By Tim Orton – Chief Executive, Aviva Platform



The pension freedom announced in 2014 changed the way clients can access their pensions completely and is arguably the biggest change in pension legislation since

compulsory annuities were introduced in 1921. All this change means that your clients have far more choice when it comes to accessing their pension funds. Because greater choice can bring confusion, they're likely to need your help more than ever before. Your clients will want to know the best course of action they can take in order to achieve the kind of retirement that they have worked so hard for.

Pension rules – and the changes being introduced - are complex enough to explain to clients. So where on earth do you start when it comes to volatility drag, sequencing risk and safe withdrawal rates? It's important clients have an understanding of these concepts and your role will be to make them easy to digest. It's vital your clients recognise that they need to consider how much income they'll need to see them through their retirement – not to mention the consequences of running out.

Initially, it's helpful to put things into language clients will understand and to draw out what their objectives may be. For example, if they have chosen to take out income drawdown, one of the reasons for doing so may have been to enable them to leave any existing assets to their children or grandchildren. Having a conversation about how long they think they will live is a difficult subject to broach but it's crucial for your client to understand that their income may have to last them another 30 or 40 years or more. So they will need to consider the impact of this on the desire to leave some of their assets to their family. As outlined in this paper, the early years of a drawdown

investment are key to the overall life of the portfolio. If the portfolio suffers early on, it can take much longer for the client's assets to recover and this can be impacted further by the amount of income they are drawing down. Gaining a solid understanding of what your client's real income needs are is important – that way you can understand if there's scope for it to be adjusted if the market and the portfolio is suffering. The tooling that you use is a major factor when looking at a client's retirement projection and it's vital the outcome for the client is projected as accurately as can be. I don't suggest that you explain to your clients the ins and outs of stochastic modelling but it is important to inform them that the methodology you've used takes into account random and variable events such as market instability. As you're both anticipating what may (or may not) happen over a long period of time it's crucial to have the best tools available to you which will provide you a series of probable outcomes.

A blended approach to retirement might be a good solution for some clients to enable them to enjoy the fixed income an annuity can provide, but yet also the flexibility that drawdown can offer to help them enjoy the later years of their life and to help their family if they wish. Many clients won't want to take a gamble with their pension fund. So in explaining these risks, your intention wouldn't be to make them rush into hiding their money under the floorboards, but simply (with your help) to help them make an informed decision about the best way to invest their pension fund.

To sum up, the unprecedented changes coming into force on 6 April 2015 shine the spotlight on the importance of sound financial planning like never before. This is an outstanding opportunity for you to demonstrate to them the value you can offer in helping them make sense of the changes and achieving the retirement of their dreams.

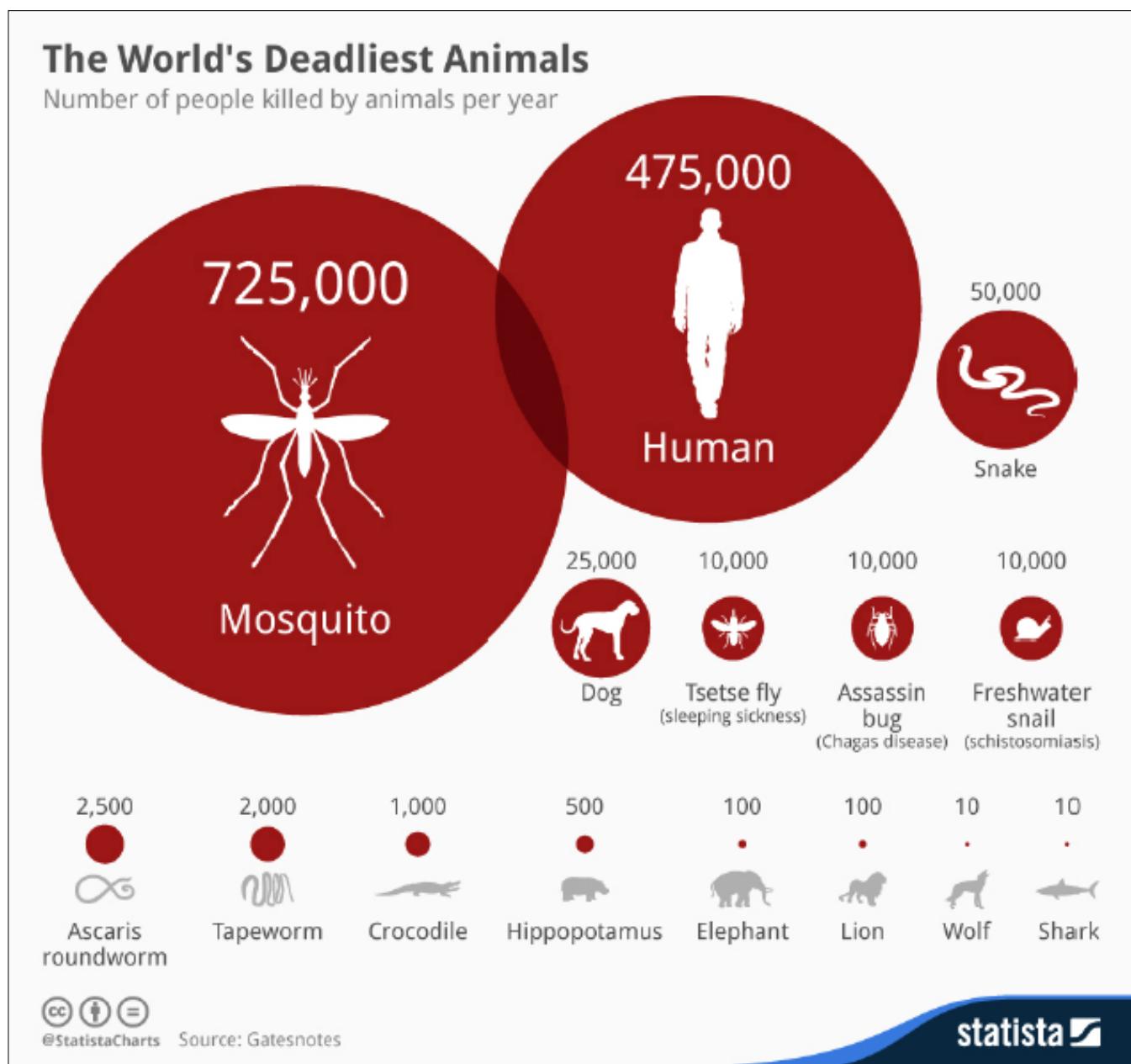
Hidden Dangers

What is the world's deadliest animal when it comes to killing humans? Most people intuitively think of beasts with large teeth and fearsome reputations, such as the lion, rhino, wolf or the oft-cited hippo.

In reality though, it is the tiny mosquito that does the most damage. It causes more deaths than virtually any other animal; responsible for about 725,000 human deaths annually. Only human beings themselves come close,

with a tally of about 425,000. And what of man's supposed best friend? Dogs kill about 25,000 people each year, almost exclusively because of rabies.

Now compare these figures to those recorded for the so-called 'most dangerous' animals: wolf(10), lion (100) or hippo(500). Interestingly, the fearsome beasts mentioned earlier don't even appear in the top 10 deadliest animals.



So what's all this got to do with retirement income planning?

This is a classic example of our tendency as humans to misunderstand risk and is particularly relevant when you think about portfolio risk. A case in point is when the new pension freedoms were announced by Chancellor George Osborne in May 2014. Many industry commentators and the media focused on the risk that people could squander their hard-earned savings on Lamborghinis and cruises. Other risks widely publicised in the media include the risk of pensioners being scammed, or

Many advisers have adopted cashflow modelling as a guide in making decisions on what would represent a 'safe' withdrawal rate from clients' portfolios. The very nature of current cashflow modelling tools used by many UK planners means they are far too rudimentary and offer very little beyond time value of money calculations. These tools are deterministic models which treat investment returns as linear (i.e. average annualised returns) and ignore their real-life randomness and volatility. This underplays the dangers of negative sequence of return and risks misleading clients.

"The impact of sequencing risk and volatility drag is subtle, yet dangerous particularly in retirement portfolios because withdrawals amplify market risk in a way that is obscured by the use of time-weighted returns and the averaging of long-term returns, making it difficult for advisers and clients to realise until it's too late."

lured into questionable investments be it car park schemes in China or forestry investments in Brazil.

Increasingly, there's an acceptance that retirees can be trusted with their own money and it's becoming more apparent that the real risks for most retirees are a little more subtle. As more people go into drawdown, the real risk lurking in the corner is that most investors (and dare I say advisers) may not pay enough attention to that most silent of portfolio killers: the negative sequence of return and volatility drag.

Clients risk being blindsided by these silent dangers while they worry about the more obvious risks such as major market crashes. These subtle dangers are particularly relevant to retirement portfolios because withdrawals amplify market risk in a way that is obscured by the use of time-weighted returns and the averaging of long-term returns, so advisers and clients don't notice until it's too late.

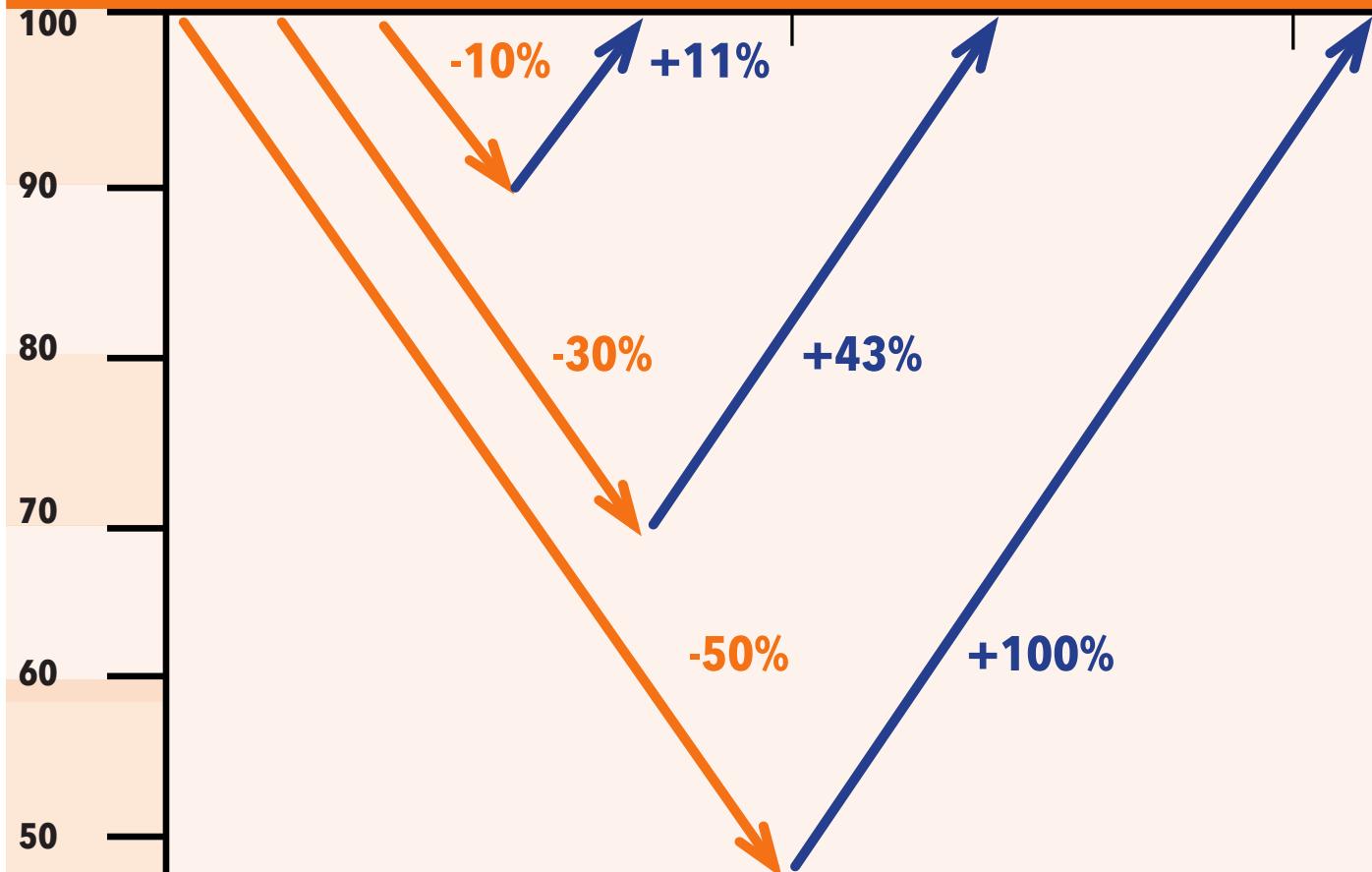
Volatility: What A Drag

'Volatility' is perhaps one of the more commonly used words in the investment dictionary. Put simply, volatility drag is a function of the cruel maths that govern the difference between average returns and compounded returns. The idea is very simple, if a portfolio falls in value, it needs to work harder to go back to its initial value. Take for instance, a £100K portfolio. It falls 10% in year 1 and rises back 10% in the following year. The portfolio should be back to the initial amount of £100K right?

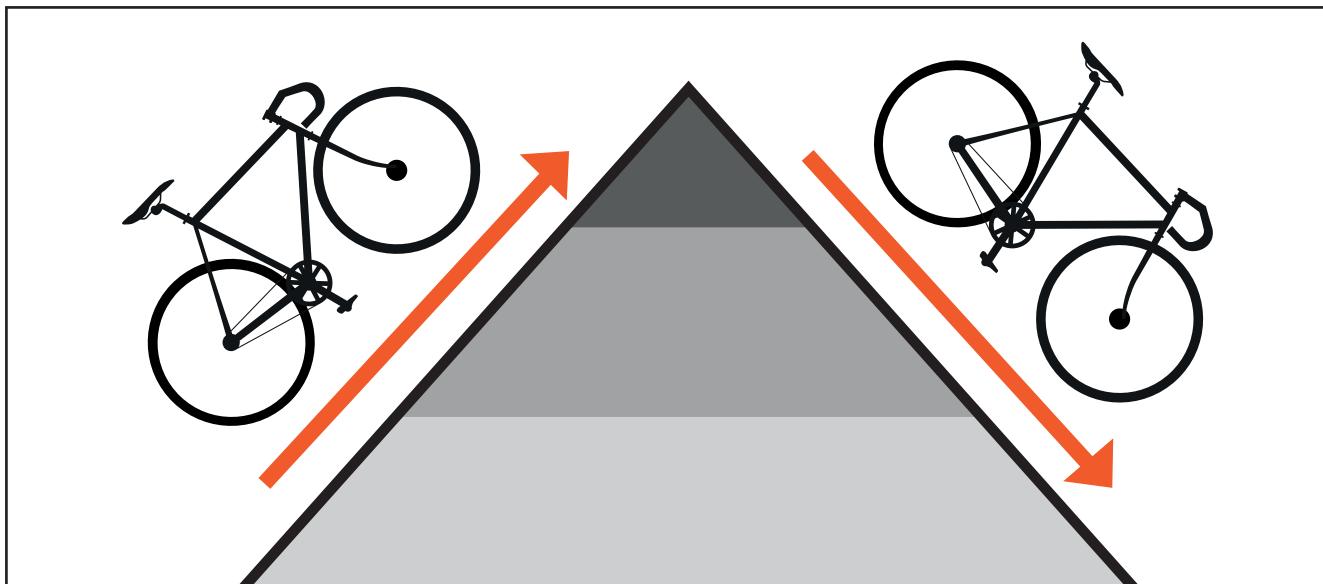
After all, the arithmetic average annualised return is 0% isn't it?

Well, wrong! The portfolio fell by 10% in year 1, so your initial investment of £100K is down to £90K. To get back to the initial value of £100K, you need the portfolio to grow at around 11%, not 10%. So the portfolio needs to work harder to get back up. If the portfolio only grew by 10% in the second year, it will be back to £99K, not £100K. The £1,000 leakage from the portfolio is down to volatility drag.

THIS FIGURE HELPS VISUALISE THE CONCEPT OF VOLATILITY DRAG



Another good way to visualise volatility drag is to imagine riding a bike up and down a hill. Going down the hill is a whole lot easier than climbing up.



Of course, volatility drag is a familiar concept for investors, or it should be. It comes with the territory. However, the stakes are much higher for clients drawing down their portfolios. Volatility drag is exacerbated by withdrawals from portfolios, making it even harder for a portfolio to recover after a fall.

When investing, advisers often 'coach' clients to ignore the yearly market movement and focus on the longer term average returns. In essence, the message is that the destination is more important

that the journey. However, for clients in retirement, the journey is as important as the destination.

Because clients are making regular withdrawals from their portfolio, short term volatility is an ever present danger. High volatility increases the chances that you'll be taking money out when the portfolio is suffering, thereby locking in losses. It reduces both the expected value of those funds and the chances that there will be enough money to meet future needs.

Milly, Molly & Their Financial Planner, Arthur

To get a better understanding of how withdrawal amplifies volatility drag, let's take an example of two ladies - Milly and Molly, both aged 65. They have been friends for years and are both recently retired. Such is the strength of their relationship that they even share the same financial planner, Arthur, who recommended that they each invest their £300,000 in his 'Global Balanced Portfolio.' The only difference is that Molly needs to make a portfolio withdrawal of £15,000 a year, to be adjusted with inflation each year. Milly didn't need the income as her late husband left her a decent final salary pension, so she doesn't need to make any withdrawals from her portfolio.

Arthur has used a 'cashflow plan' to model the potential outcome that Milly and Molly may expect, using reasonable assumptions of average annualised returns and inflation. Table A below shows the experience of Milly and Molly's portfolios over the following 25 years. Contrast that though with Table B, which shows what Arthur the financial planner has modelled in his cashflow plan. Arthur's cashflow plan indicates that

Molly's portfolio should continue to support withdrawals well beyond her 90th birthday. Arthur was right about one thing; the average annual return for both clients is 3.8%pa and the average inflation in both cases is 3.4%. However, Milly and Molly's experiences couldn't be more different from their financial planner's original intent.

Molly's portfolio in particular suffered more and she ran out of money after her 88th birthday. The portfolio leakage i.e. returns lost as a direct result of making withdrawals from her portfolio amounted to in excess of £117,290. This is calculated as the difference between Milly's portfolio at age 88 (£474,242) and Molly's portfolio (£11,952) at age 88, plus total withdrawals over time (£345,000). This exemplifies how the negative impact of volatility is amplified to work against clients in drawdown.

TABLE A: MILLY & MOLLY'S EXPERIENCE

Age	RPI	Real return	Milly's Portfolio		Molly's Portfolio	
			Annual Withdrawal	Portfolio Balance	Annual Withdrawal	Portfolio Balance
66	4.4%	0.3%	£0	£300,848	£15,000	£285,848
67	9.3%	(17.8%)	£0	£247,267	£15,000	£219,938
68	2.6%	12.2%	£0	£277,398	£15,000	£231,739
69	3.5%	2.1%	£0	£283,311	£15,000	£221,679
70	2.9%	(-5.5%)	£0	£267,820	£15,000	£194,558
71	4.0%	1.6%	£0	£272,198	£15,000	£182,738
72	2.5%	3.7%	£0	£282,310	£15,000	£174,527
73	3.6%	10.4%	£0	£311,745	£15,000	£177,724
74	2.8%	13.2%	£0	£352,900	£15,000	£186,186
75	2.5%	3.6%	£0	£365,703	£15,000	£177,941
76	2.9%	(3.7%)	£0	£352,285	£15,000	£156,412
77	0.7%	(-5.4%)	£0	£333,088	£15,000	£132,889
78	2.8%	13.1%	£0	£376,878	£15,000	£135,359
79	2.8%	8.8%	£0	£410,182	£15,000	£132,321
80	3.5%	2.1%	£0	£418,946	£15,000	£120,148
81	2.2%	9.3%	£0	£457,825	£15,000	£116,298
82	4.4%	(-0.7%)	£0	£454,745	£15,000	£100,516
83	4.0%	1.6%	£0	£461,990	£15,000	£87,117
84	1.0%	(-7.5%)	£0	£427,503	£15,000	£65,614
85	2.4%	7.4%	£0	£459,134	£15,000	£55,468
86	4.8%	5.1%	£0	£482,534	£15,000	£43,295
87	4.8%	(5.5%)	£0	£456,016	£15,000	£25,916
88	3.1%	4.0%	£0	£474,242	£15,000	£11,952
89	3.7%	24.9%	£0	£592,273		
90	1.6%	4.8%	£0	£620,948		
91	4.4%	15.4%	£0	£716,678		
Aver.	3.4%	3.8%				

TABLE B: ARTHUR'S CASHFLOW PLAN

Age	Real return	Milly's Portfolio		Molly's Portfolio	
		Annual Withdrawal	Balance	Annual Withdrawal	Balance
66	3.8%	£0	£311,400	£15,000	£296,400
67	3.8%	£0	£323,233	£15,000	£292,663
68	3.8%	£0	£335,516	£15,000	£288,784
69	3.8%	£0	£348,266	£15,000	£284,758
70	3.8%	£0	£361,500	£15,000	£280,579
71	3.8%	£0	£375,237	£15,000	£276,241
72	3.8%	£0	£389,496	£15,000	£271,738
73	3.8%	£0	£404,297	£15,000	£267,064
74	3.8%	£0	£419,660	£15,000	£262,213
75	3.8%	£0	£435,607	£15,000	£257,177
76	3.8%	£0	£452,160	£15,000	£251,949
77	3.8%	£0	£469,342	£15,000	£246,524
78	3.8%	£0	£487,177	£15,000	£240,891
79	3.8%	£0	£505,690	£15,000	£235,045
80	3.8%	£0	£524,906	£15,000	£228,977
81	3.8%	£0	£544,852	£15,000	£222,678
82	3.8%	£0	£565,557	£15,000	£216,140
83	3.8%	£0	£587,048	£15,000	£209,353
84	3.8%	£0	£609,356	£15,000	£202,309
85	3.8%	£0	£632,511	£15,000	£194,996
86	3.8%	£0	£656,547	£15,000	£187,406
87	3.8%	£0	£681,496	£15,000	£179,528
88	3.8%	£0	£707,392	£15,000	£171,350
89	3.8%	£0	£734,273	£15,000	£162,861
90	3.8%	£0	£762,176	£15,000	£154,050
91	3.8%	£0	£791,138	£15,000	£144,904
Aver.	3.8%				

Return is adjusted for inflation and net of all fees.

~~ACB CBA CAB~~ ABC Of Sequencing Risk

'...all the right notes, but not necessarily in the right order'

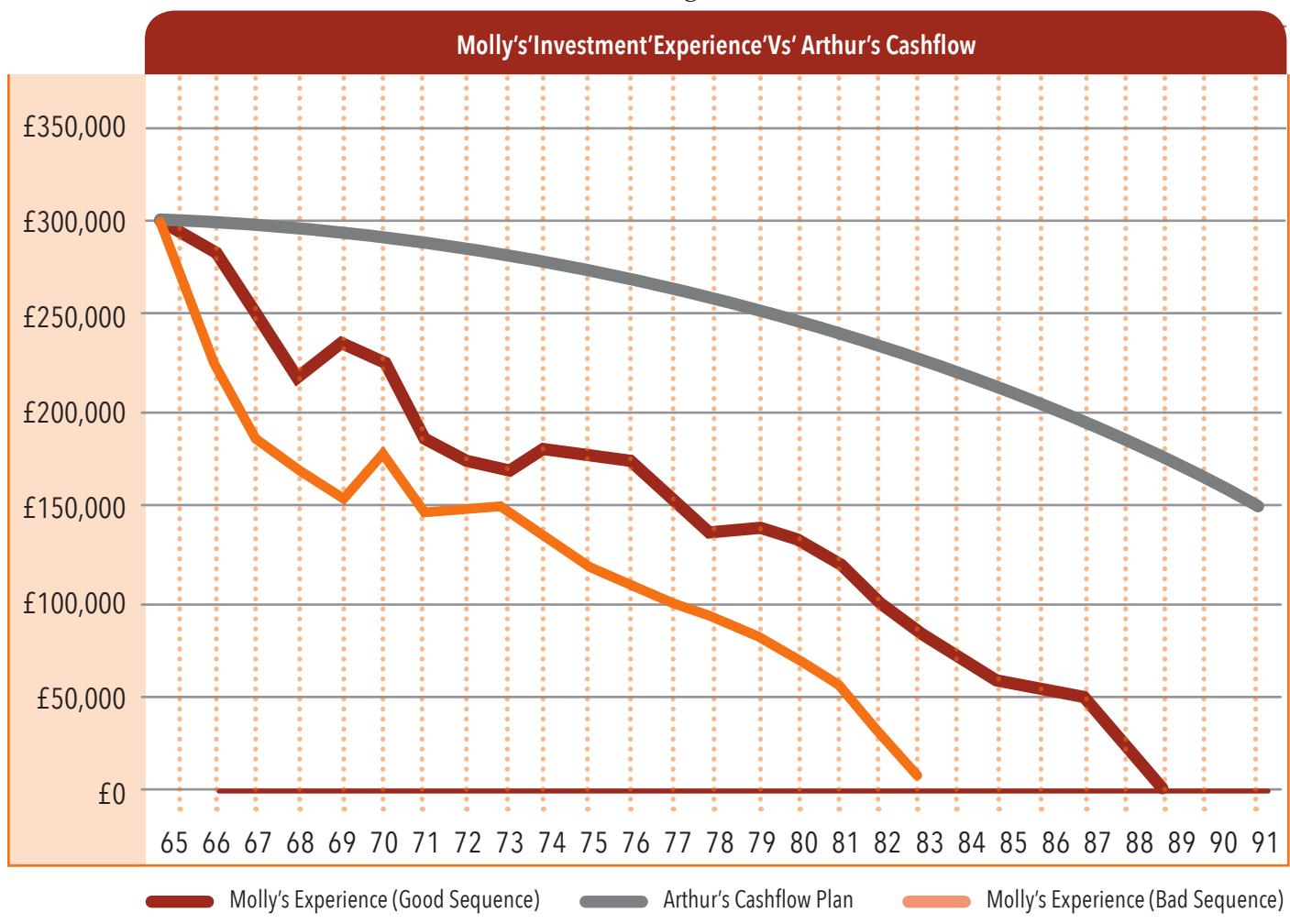
~ Eric Morecambe

Sequencing risk is a twin to volatility drag, in an evil kind of way. It is how the order of returns impacts portfolio longevity, especially when withdrawals are being made from the portfolio. The point is that, poor returns in the first decade of retirement can cause untold damage to the portfolio, even if these poor returns are then followed by good returns. This means that, average long term positive returns notwithstanding, if the order of returns is unfavourable, there is a negative impact because returns in the early years of retirement have a disproportionate effect on the outcome. Once cash outflows are happening, it's not enough for returns to average out in the long run. The portfolio could be severely decimated before the good returns finally have a positive impact.

To get a better understanding of sequencing

risk, let's take Molly in our previous case study for example. We saw that with an annual withdrawal £15,000, she ran out of money just after her 88th birthday. Now, suppose the order of returns in Molly's portfolio is less favourable than shown in Table A; in other words, the yearly returns are still the same but there were a few more bad returns in the first decade of her retirement. How does that change the outcome?

Table C shows Molly runs out of money just after her 83rd birthday, four years earlier than when the order of returns was more favourable. So while her financial plan designed by Arthur in Table B shows the portfolio continues to support the level of income withdrawal, with a bad sequence of returns, Molly actually runs out of money at age 83.



This highlights how a negative sequence of market returns early in retirement can cause funds to erode to the point where what seemed like a reasonable income level can become unsustainable, even if portfolio

effect of volatility drag and sequencing risk is exacerbated by withdrawals from retirement portfolios.

The point here is that, while the average

"Poor returns in the first decade of retirement can cause untold damage to a portfolio, even if these poor returns are then followed by good returns"

performance recovers in later years. This is because taking income from a portfolio in a falling market leads to pound cost ravaging, where a client is essentially forced to sell units in their portfolio when prices are falling to pay the required income. Pound cost ravaging (a term coined from pound-cost averaging) is used to describe how the

annualised returns on all the portfolios are the same, in reality the outcomes for the client couldn't be more different. This drives home the point that, when in drawdown, the order in which returns occur is perhaps more important than the average return over a period of time.

Key Takeaways

Portfolio withdrawal amplifies the impact of volatility drag and sequencing risks in retirement portfolios. The subtle, yet commutative nature of these risks can make it hard for financial planners and clients to spot until it is too late. Accordingly, planners and their clients need to be conscious of these risks and put a framework in place to manage them.

Some important challenges for financial planners are:

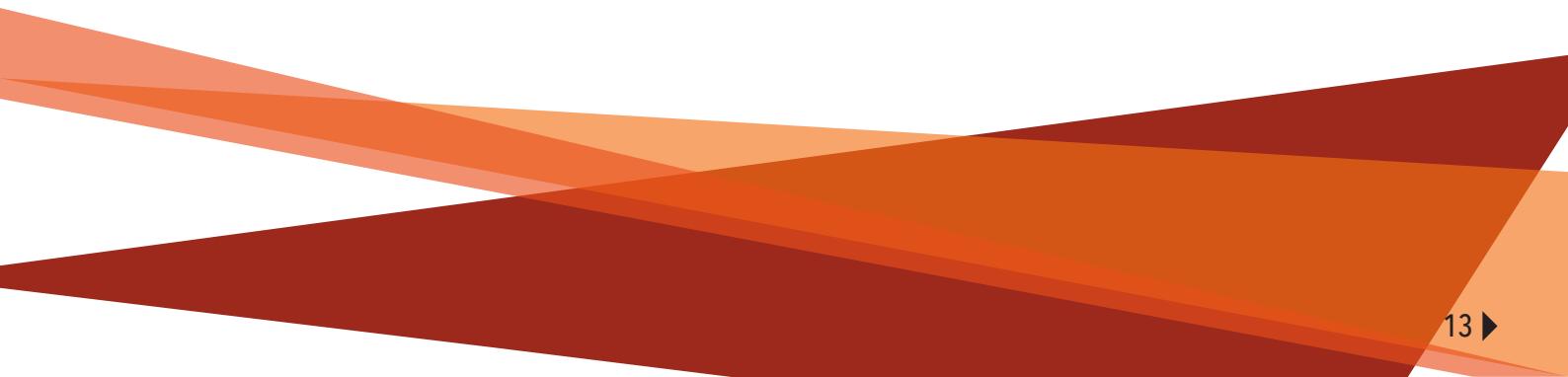
- ▶ How do we help clients understand the greater risks associated with drawing down retirement portfolios, compared with the accumulation stage?
 - ▶ How should the investment process for clients in decumulation be different from those in accumulation? Many advisers use the same portfolios for clients in both accumulation and decumulation. Will this approach stand intense scrutiny and more importantly, is it suitable bearing in mind the way withdrawals amplify risk?
 - ▶ What framework do we adopt in modelling to manage the risks that are associated with pound cost ravaging in retirement portfolios?
- 

TABLE C: MOLLY'S EXPERIENCE (BAD SEQUENCE)

Molly's Portfolio			
Age	Real return	Annual Withdrawal	Balance
66	(17.8%)	£15,000	£231,570
67	(7.5%)	£15,000	£199,284
68	(5.4%)	£15,000	£158,914
69	0.3%	£15,000	£173,424
70	15.4%	£15,000	£168,413
71	(3.7%)	£15,000	£147,234
72	13.1%	£15,000	£151,590
73	8.8%	£15,000	£149,986
74	2.1%	£15,000	£138,191
75	(5.5%)	£15,000	£115,597
76	1.6%	£15,000	£102,438
77	7.4%	£15,000	£95,018
78	5.1%	£15,000	£84,860
79	(0.7%)	£15,000	£69,289
80	4.0%	£15,000	£57,059
81	(5.5%)	£15,000	£38,939
82	4.8%	£15,000	£25,824
83	2.1%	£15,000	£11,374
84	1.6%	£15,000	
85	3.7%	£15,000	
86	10.4%	£15,000	
87	13.2%	£15,000	
88	3.6%	£15,000	
89	12.2%	£15,000	
90	24.9%	£15,000	
91	9.3%	£15,000	
	3.8%		

Trouble With Averages, And (Deterministic) Cashflow Planning

'Never try to walk across a river just because it has an average depth of four feet.' ~ Milton Friedman

If you were to put one foot in a bucket of ice and the other foot in a bucket of boiling water, on average, your body temperature should be normal, or so goes the saying. The danger of sequencing risk and volatility drag examined above demonstrates why using deterministic cashflow planning models, with assumptions based on averages in financial planning is insufficiently robust. Especially in retirement planning. Sadly, this approach is prevalent amongst the vast majority of UK financial planners. Most of the cashflow planning tools used by planners (such as Voyant, Prestwood / Truth) are primarily deterministic models, and even the highly regarded Certified Financial Planner accreditation is primarily assessed based on this model.

The lack of robustness and rigour aside, perhaps more worryingly, deterministic cashflow planning models risk misleading clients. Because they are often used as tools to help clients visualise likely retirement outcomes, they give clients an impression

that their investments grow in a smooth, linear format over time, when in reality nothing can be further from the truth. Add to this the fact that product illustrations are also deterministic, you end up with meaningless data being served to clients, with no real grounding in reality.

Deterministic planning tools convey the illusion of certainty, where there is none. The reality is, investment outcomes are unknown, so why pretend to clients that they are? As we have shown, assumptions of long term averages are unhelpful. They can be easily thwarted by the powerful combination of volatility drag, sequencing risk and 'pound cost ravaging.'

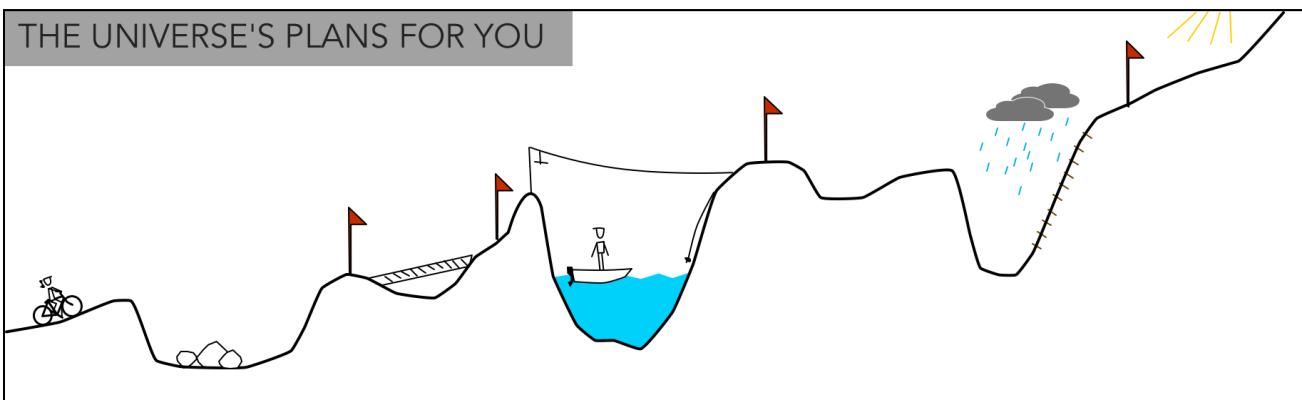
These are ever present dangers in retirement portfolios. Using tools that attempt to simplify potential outcomes, but in the process miss some of the most important factors that could impact the plan's outcome is clearly an inadequate approach.

Your (Deterministic) Financial Plan Vs The Market's Plan

YOUR "PLANS"



THE UNIVERSE'S PLANS FOR YOU



Some financial planners argue that 'whatever the plan is, it would always be wrong' or that 'all plans are wrong, regardless of the tool you use'. This argument misses the point, as it is not about being right or wrong. The key is to ensure that the plan is rigorously tested under a range of possible but ultimately unknown outcomes. And

inflation. The concept of sequencing also applies to inflation. Higher inflation in the first decade of retirement means that clients need to increase withdrawals earlier on in retirement to maintain their lifestyle. This could wreak havoc with their retirement plan, even if inflation becomes restrained in later life.

"Sequencing applies to inflation as well, because higher inflation in the first decade of retirement means that clients need to increase withdrawals earlier on in retirement to maintain their lifestyle."

why wouldn't someone use the best tools available for the job? In the absence of certainty, why run oversimplified straight-line projections, when in actual fact you could run thousands of potential outcomes to estimate the probability of success or failure?

Besides investment returns, deterministic modelling tools also assume a linear path for other unknown inputs into the planning process, namely life expectancy and

Higher inflation in the early stages of retirement results in higher levels of base portfolio withdrawals, upon which later inflation compounds. Using average inflation, without accounting for the risk of unfavourable sequencing makes deterministic models far from robust.

Some financial planners have also argued that reviewing clients' financial plans on a regular basis enables them to overcome the serious shortcomings of deterministic

models. However, the subtle yet compounding nature of sequencing risk and volatility drag means that it may be too late before it is picked up. Clients may have to rein in their portfolio withdrawals significantly to avoid running out of money. This would be unsatisfactory for clients, and uncomfortable for the planner who gave the initial recommendations.

Another scenario could be that using insufficiently robust deterministic cashflow plans may also lead planners and their clients to take a knee-jerk reaction to lower portfolio withdrawals at the first sight of negative portfolio returns.

The point here is, while regular planning meetings are a key part of helping clients stay on track, it is no proper mitigation for using tools that are inadequate for the job. Of course, some of the short comings of deterministic models can be addressed by using a geometric mean of returns, but this doesn't entirely overcome the fundamental flaw of implanting a visual image of a linear path in retirement. Even with very conservative assumptions, it is difficult to take account of how extreme scenarios may affect potential outcomes.

Right Tool For The Job

'The future of financial planning is in Monte Carlo. No, not the city. The technique'
~ Investment Advisor (June 1, 2002)¹.

It is interesting that we are having this debate in the UK in 2015, because across the pond in the US, this debate is all but over. Most leading financial planners have adopted the stochastic models - Monte Carlo models to be specific - as the de facto tool for modelling retirement outcome. The model has been widely adopted by most financial planners. Many retirement experts such as Moshe Milevsky, David Blanchett, Wade Pfau, and Michael Kitces use Monte Carlo in their work, and have written extensively about its power (and

weaknesses) in retirement planning.

Monte Carlo simulation is a mathematical method used to estimate the most likely outcome and the odds that certain events will occur. Like the roulette wheels associated with the casinos of Monte Carlo, these simulations reproduce outcomes by generating random numbers within set parameters. Unlike a roulette wheel, the Monte Carlo method uses random numbers to quantify uncertainty and chance events.

"The reason Monte Carlo simulations are being used more frequently (by financial planners), is because they do a better job explaining the potential outcomes versus time-value-of-money calculations, such as future value. The problem with a future value calculation is that it treats the outcome as certain, while in reality, and especially with the markets, nothing is certain. A Monte Carlo simulation provides a more 'colourful' perspective of the range of potential outcomes given the expected return and volatility of a portfolio"

~ David Blanchett, Morningstar's head of retirement research²

¹ The Nuts and Bolts of Monte Carlo, June 2002 Issue of Investment Advisor. Available at www.thinkadvisor.com/2002/06/01/the-nuts-and-bolts-of-monte-carlo

² Adam Zoll (April 2013) Monte Carlo's Role in Retirement Planning. Available at <http://www.morningstar.co.uk/news/107766/monte-carlos-role-in-retirementplanning.aspx#sthash.bs0XvcMZ.dpuf>

Monte Carlo is a significant improvement on deterministic models, because it takes into account the unpredictability of returns and factors such as life expectancy and inflation. They are based on an assumed mean, standard deviation and correlation, and express potential outcomes in terms of the probability of successfully meeting clients' objectives. This is valuable information for planners to consider and communicate to their clients. It gets clients and their advisers talking about financial planning and retirement outcomes in terms of probability rather than certainty. And this goes right to the heart of communicating and demonstrating clients' capacity for loss. By running thousands of scenarios using specific parameters, planners can determine the likelihood of specific outcomes. Some Monte Carlo simulations even allow users to adopt a more "fat-tailed" distribution method. This means that the odds of extreme events are counted as being greater than they are in a traditional bell-shaped distribution curve. This enables planners to define outcomes in terms of probability of success or failure - that is, the percentage of

outcomes and drives home the importance of ongoing financial planning. A good Monte Carlo tool should also enable planners to investigate the magnitude of failure. In other words, if there is a 30% chance of failure, what is the magnitude of the potential shortfall?

Monte Carlo isn't the Holy Grail but it is a significant improvement on deterministic models. It has its shortcomings, not least of which is the fact it is too often utilised as if it is an absolute answer. Like all models, you need quality inputs to get quality outputs. It should never be treated as an absolute forecast, but rather as an educated guess of likely outcomes.

Advisers have also complained about the 'black box' nature of many Monte Carlo tools. And there are tendencies to focus excessively on the probability of success / failure, and ignore the magnitude of failure and sensitivity of inputs. But these aren't shortcomings of the model as such, just how it's implemented by financial planning software providers.

"Monte Carlo analysis has become an increasingly popular arrow in the financial planner's quiver, as an improvement over the oversimplified traditional straight-line projection." ~ Michael Kitces³

trials that resulted in a successful outcome (or failure). So for instance, the planner may decide, together with their client, that a success rate of below 70% probability is unacceptable to them and the plan needs to be adjusted by reducing withdrawals or changing asset allocation, to bring back the probability of success to an acceptable level. They may also decide that a success rate of more than 90% is too cautious and have a conversation about increasing withdrawals (if required by client).

This communicates clearly to the client, the probabilistic nature of the potential

In the UK, Monte Carlo software available to financial planners include eValue's Retirement Modeller, Capita's Synaptic Modeller, Iress' XPLAN and Voyant. A cursory look at these tools shows that they still have a long way to go. The 'blackbox' approach of some of these tools means that many financial planners don't understand them and are wary of using them. Many also place significant constraints on the planner's ability to influence the underlying assumptions. It's hard to find a tool that actually gives advisers a great degree of flexibility in this regard.

³ Michael Kices (July, 2012) 'It's Time For The Next Generation Of Monte Carlo Analysis Software'. Available at <https://www.kitces.com/blog/its-time-for-the-next-generation-of-monte-carlo-analysissoftware/>

Many of these tools also have an excessive degree of focus on products and funds, rather than just being purely financial planning tools. One exception is Voyant, although it is primarily a deterministic model, with Monte Carlo simulations added in. The Iress Xplan tool is particularly unique in the sense that it sits within the back office system and portfolio values and asset allocation are pulled through automatically, saving the adviser considerable time in keying data. Capita's Synaptic Modeller is powered by Moody's Analytics stochastic engine, a major advantage given Moody's global risk modelling capability, but navigating the system could be a little easier.

Key Takeaways

- Deterministic tools aren't sufficiently robust in modelling financial planning outcomes in retirement as they ignore the danger of pound cost ravaging and risk misleading clients into expecting a linear path.
- Monte Carlo models are more suited to modelling retirement outcomes, but the tools available to UK advisers require significant improvement.

Better ‘Safe’ Than Sorry ... And Skint

For clients in retirement, developing a sensible and sustainable withdrawal strategy is at least as important as developing a sensible investment strategy. Unless a client annuitises all or most of their retirement pot, they need to have a robust framework in place to guide their withdrawal decisions or risk running out of money.

Experience From Across The Pond: The ‘4% Rule’

Across the pond in the US, where retirees have had virtually unrestricted access to their retirement fund for several years, there is an extensive body of research aimed at helping financial planners and clients implement a sustainable withdrawal strategy in retirement. The foundation for this work lies in understanding ‘Safe Withdrawal Rates’ (SWR), which has its origins in the work of a now retired financial planner, William Bengen.

In 1994, Bengen famously postulated the 4 percent withdrawal rule using historical simulations. He would later coin the term “SAFEMAX” to describe the highest withdrawal rate, as a percentage of the initial account balance at retirement, that could be adjusted for inflation in each subsequent year and would allow for at least 30 years’ withdrawals during all the rolling historical periods in his dataset. He found that a first year withdrawal rate of 4%, followed by inflation adjusted withdrawals in subsequent years, should be safe. Cooley, Hubbard, and Walz (1998) used a Monte Carlo simulation based on the same data to determine that a 4 percent withdrawal rate with an underlying portfolio of 50% stocks and 50% bonds provides a 95% chance of success.

Some experts and practitioners feel the 4% rule is rather naïve, as it ignores the dynamic nature of market and portfolio returns. More recent research has sought to determine the optimal withdrawal strategy by dynamically adjusting to market and portfolio conditions.

Is The 4% Rule ‘Safe’ For UK Retirees?

Most of the work on safe withdrawal rates has been generated using US financial market data. How would Bengen’s research have applied in a UK context? Luckily, in 2010, Wade Pfau, a Professor of Retirement Income at The American College of Financial Services replicated Bengen’s research in 17 developed countries including the UK.

Pfau’s initial research used 109 years of financial market data (between 1900 and 2008) for the 17 developed market economies, using domestic asset classes and currencies. With this data, he used an historical simulations approach, considering the prospect of individuals retiring in each year of the historical period. Because of the assumed retirement duration of 30 years and the data ends in 2008, retirements take place between 1900 and 1979 - i.e. 80 retirement dates for each of 17 countries. Pfau’s results provide guidance to prospective retirees in 17 different countries as to what a sustainable withdrawal rate in their portfolios is likely to be.

⁴ Pfau (2010) Pfau, Wade D (2010) ‘An International Perspective on Safe Withdrawal Rates from Retirement Savings: The Demise of the 4 Percent Rule’. Journal of Financial Planning, 23, 52–61

So what does the data tell us about safe withdrawal rates for UK retirees? Sadly it's not good news.

Pfau determined that even with perfect foresight of the best combination of UK equities and bonds (a concept that is unrealistic in real life), SAFEMAX for UK is 3.77%. If a client is prepared to accept a 10% probability of failure however, the SWR improves to 4.17%. At a 5% withdrawal rate however, the probability of failure is 27.5%.

Since the concept of perfect foresight is wishful thinking, Pfau's results for a 50/50 portfolio puts SAFEMAX at 3.43%. But if a 10% probability of failure is acceptable, then the SWR is 4.01%. Interestingly, a withdrawal rate of 5% has a failure rate of a whopping 55.6%! Pfau later revisited the research to see if global diversification improves the SWR. He found that with a 50/50 portfolio the SAFEMAX is 3.26% and where a 10% failure rate is acceptable, the SWR rate is 3.55%. This indicates that the SWR actually worsened for UK retirees.

The table below summarises the findings:

Safe Withdrawal Rates For UK Retirees

	SAFEMAX	10th Percentile	% Failures for 4% Withdrawal Rate	% Failures for 5% Withdrawal Rate
Perfect Foresight Assumption	3.77	4.17	3.8%	27.5%
UK 50/50 Portfolio	3.43	4.01	9.30%	55.60%
Global 50/50 Portfolio	3.26	3.55	17.90%	31.00%

Source: Wade Pfau (2010, 2014) Assumptions include perfect foresight/fixed 50/50 domestic equities/bond allocation/fixed 50/50 global equities/bond allocation, a 30-year retirement duration, no administrative fees, annual inflation adjustments for withdrawals, and annual rebalancing.

Perhaps worryingly, Pfau's research assumed fund charges and the adviser fee to be 0%. This is of course unrealistic, and if we were to deduct a conservative 1.2% from the percentage withdrawal to account for the adviser fee, fund and platform charges, SWR for UK would be closer to 2% than 4%! (And around 3% for a 30% failure rate).

Personalising SWR To Clients

An understanding of the SWR provides a useful foundation for advising clients on how best to ensure their retirement pot doesn't run out before they die. However, it is a rule of thumb and needs to be adapted to account for each client's individual circumstances. This can be achieved through the use of Monte Carlo models, taking account of each client's risk profile, asset allocation, expected life expectancy and tolerance of the probability of failure. It is especially important to bear in mind the following factors when working with clients to establish a personalised SWR:

-  **Probability of Failure & Magnitude of Failure:** Sustainable withdrawal rates will vary for each client because it is sensitive to what probability of failure (PoF) is acceptable to the client. Generally, a PoF of 10-30% would be acceptable, but each client differs in terms of what they feel comfortable with.

⁵ Pfau (2014) Does International Diversification Improve Safe Withdrawal Rates? Adviser Perspectives, Available at http://www.advisorperspectives.com/newsletters14/pdfs/Does_International_Diversification_Improve_Safe_Withdrawal_Rates.pdf

 **Life Expectancy:** Most research into SWR assumes a period of 30 years in retirement. Financial planners and their clients have to engage in an informed conversation about whether they consider this conservative enough. This is particularly relevant when planning for couples, as data from the National Office of Statistics shows that a couple who are both aged 65 has a 25% chance of one of them reaching age 97 and a 17% chance of one of them reaching age 100! So maybe 30 years is not robust enough for some clients after all?

 **Asset Allocation:** a SWR is sensitive to asset allocation, and accordingly it needs to be adapted to reflect each client's risk profile and the recommended asset allocation.

 **Flexibility of Withdrawal/Spending:** a SWR as defined by Bengen and Pfau in their research assumes that clients withdraw a percentage of the initial portfolio and adjust it for inflation every year. It doesn't account for clients' preparedness to adjust withdrawals in bad or very good years. A greater degree of flexibility in spending improves the probability of success.

"Retirement outcomes can be improved substantially by flexibly adjusting withdrawals to market and portfolio conditions. But there are countless flexible spending approaches, and it's important for advisers to understand the pros and cons of each approach."

Research has shown that the success in retirement can be improved by dynamically adjusting withdrawals to market and portfolio conditions. These dynamic approaches can offer a more realistic path that retirees are more likely to follow, as they continually "adapt" to the ongoing returns of the portfolio. But, how exactly should retirees adjust their spending patterns in response to changes in the value of their portfolios?

There are countless flexible spending approaches, and it's important for advisers to understand the pros and cons of each approach, and have a framework in place for guiding clients. This can ensure that wealth will not run out, though it provides no protection against painfully low levels of spending. The most commonly used strategies that advisers can apply to managing client portfolios include (but are not limited to) the following:

-  Forgoing annual inflation adjustments in years following a poor market return
-  Constant Percentage Approach, where withdrawals are based on a fixed percentage of portfolio value, as opposed to an inflation adjusted amount based on a percentage of the initial portfolio size
-  Portfolio Management Rule, which focuses on attempting to make withdrawals from asset classes which have experienced the most growth.

This is an area where ongoing financial planning comes into its own; when clients become aware of the invaluable work that their advisers do to ensure that they don't run out of money before they run out of time. It is equally important to ensure that clients aren't underspending and facing the risk of dying with too much money - having not enjoyed the best possible lifestyle that they could have.

Taming The Evil Twin

We started this paper talking about the evil twins of sequencing risk and volatility drag in retirement portfolios. So it feels appropriate to consider ways in which we might tame them. Not just from a financial planning point of view - which we considered in the last chapter - but also from a portfolio management point of view.

The truth though is, there is no silver bullet for removing this risk. But all is not lost.

As mentioned in the last chapter, the starting point for financial planners is to adopt Monte Carlo modelling to help clients make decisions about the SWR from their portfolios. This is a valuable exercise that helps planners work out the extent to which a client's portfolio is vulnerable to sequencing risk in the first place. Using probability-of-failure in a Monte Carlo model, a planner can carry out a forward-looking evaluation of clients' exposure to sequencing risk and assess how likely it is they will need to adjust their withdrawal levels to avoid running out of money.

For instance, if the model suggests there is a 10% probability a plan will fail if the level of withdrawal is maintained, that plan would be considered less vulnerable than one for which a 30% probability of failure is produced. This equips a planner with the information to have a meaningful dialogue with a client about the probability of having to reduce withdrawal significantly in the future. If a plan is highly vulnerable to sequencing risk (generally, this means the probability of failure is above 30%), there are a number of approaches planners may consider for managing this in a retirement portfolio.

Of course, a starting point would be to consider if the client is prepared to live off a lower level of income from their portfolio. If this is acceptable to the client, then the probability of failure may be reduced to an acceptable level. But, from a portfolio management point of view, there are a number of approaches that advisers may want to consider when looking to manage sequencing risk in drawdown portfolios.

1

Cash Flow Reserve Ladder

The traditional method of managing sequencing risk is to keep about two years' worth of cashflow in cash or near-cash assets like high quality short-dated bonds. This approach means clients benefit from time-diversification and avoid selling equities at the worst possible time.

This is because, in the event of a prolonged market downturn, a client can draw from the cash component of their portfolio for two years or so, and then from the bond allocation, which may last another five to ten years in a 60/40 portfolio. By the time the client gets around to making withdrawals from the equity allocation, the market will (hopefully) have recovered.

The downside to this approach, of course, is that it screws up the asset allocation within the portfolio and only works if the portfolio isn't rebalanced periodically back to the original allocation. This means that, as bonds within the portfolio are liquidated to pay for income, the overall allocation to equities increases. This may be something that advisers and indeed clients aren't prepared to live with.

It also goes against the message that advisers may have given clients during the accumulation stage — the importance of consistent asset allocation and rebalancing.

2

Rising Equity Glide Path Approach

Research by US-based financial planner Michael Kitces and Professor Wade Pfau suggests a more systematic way to managing sequencing risk, by starting with a lower equity allocation and increasing it gradually over the first decade or so in retirement.

The idea is, where a 60/40 portfolio would have normally been recommended for the client, the planner would instead start with a 40% equity allocation and increase the allocation gradually each year until it gets to 60%.

Though this approach seems counterintuitive – as the conventional view is that equity allocations should decrease as clients age – it actually works in a similar way to the cashflow reserve ladder discussed earlier. When you think about it though, the rising equity glide-path approach actually makes a lot of sense. Beginning with a lower equity allocation in the early years reduces the volatility within a portfolio at the very time when it is most vulnerable to sequencing risk.

Increasing the equity allocation over the first ten years in retirement also gives the portfolio a chance to negate the effect of reverse pound cost averaging; in other words, if equities do fall during the first decade in retirement, the rising glide path means clients benefit from buying low. Of course one may argue that, if equities do well in those early years, lower allocation to equities will mean the client potentially loses out. But that shouldn't be too much of a worry because the goal is to provide income in a sustainable way, not necessarily to maximise growth.

Low-Beta-High-Tilt Portfolios

Another approach that planners can consider in managing sequencing risk is to consider using lower equity allocations, and to tilt them heavily towards value and small cap equities.

In their book *Reducing the Risk of Black Swans: Using the Science of Investing to Capture Returns With Less Volatility*, authors Larry Swedroe and Kevin Grogan suggest holding a lower equity allocation within a portfolio, but tilting it heavily towards value and small cap. So, for instance, where a 60/40 portfolio would normally have been recommended, planners can consider recommending a 50% portfolio allocation, half of which will be in UK and global small cap and the other half in value equities.

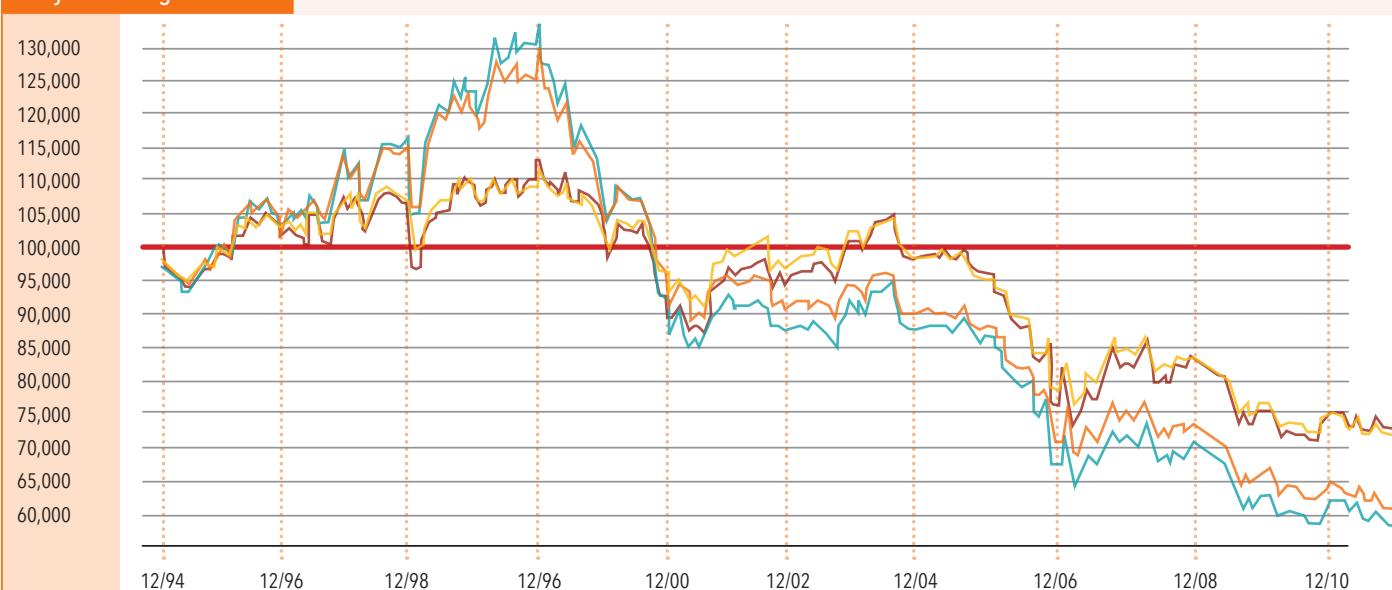
This idea relies on the ample evidence suggesting value and small cap equities have higher risk-adjusted returns than growth and large cap equities respectively. But, rather than tilting your portfolio toward value and small caps to boost returns, it flips the idea on its head by doing so instead to reduce risk within the portfolio. By keeping the equity allocation low and tilting heavily toward value and small cap, the overall risk within the portfolio would be lower than the original client recommendation.

To put Swedroe's research to the test, we constructed two portfolios with 60% and 50% global equity allocations respectively. 'BetaBasic 60' has 60% invested in the MSCI World Index and 40% in the Dimensional Global Short Dated Bond Index. 'BetaBasic 50' has 50% in MSCI World and 50% in the Dimensional index. Then we constructed two 'high tilt' portfolios: 'BetaTilt 50' invests 25% in global value and 25% in global small cap, while 'BetaTilt 40' invests 20% in global value equities and 20% in global small cap.

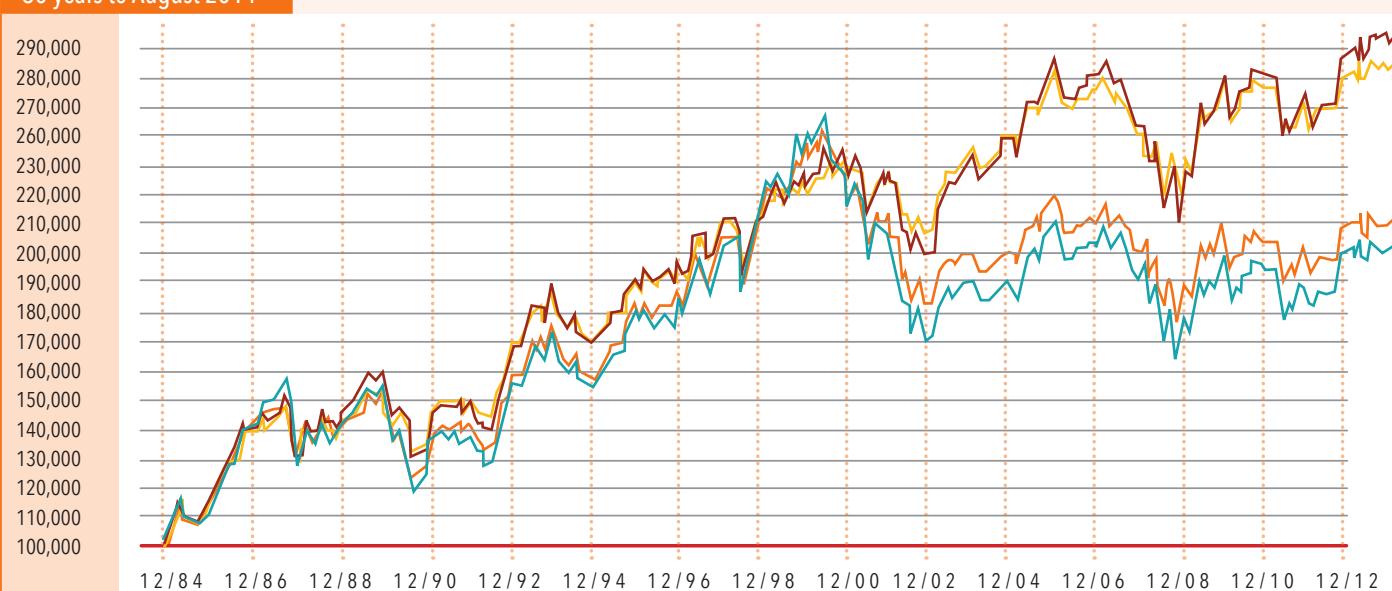
With an initial investment of £100,000, we applied a cashflow of £500 per month withdrawal from each portfolio (£6,000 a year) and ran the portfolios over a period of 20 and 30 years to the end of August 2014. We also ran a few scenarios assuming the client started making withdrawals from their portfolio just before the major bear markets of September 1992 (Black Wednesday), October 2002 and September 2008 (Credit Crunch). Again, we ran the withdrawal up until the end of August 2014. If the theory is right, then the 'BetaTilt 50' portfolio should do better than 'BetaBasic 60' and 'BetaTilt 40' should do better than 'BetaBasic 50'.

The graphs on pages 27 - 28 show the results. As it turns out, the low-beta-high-tilt portfolios did outperform in every single case, and the longer the period, the bigger the difference. Of course, the research is backward-looking, and the usual caveats must apply. Nonetheless it relies on fundamental evidence that value and size 'premia' do exist in global stock markets. As long as that theory continues to hold, one can expect a low-beta-high-tilt portfolio to be an effective strategy in managing sequencing risk. In addition, plenty more research has found that value equities tend to do better in bear markets and that indeed, the value premium is generated during the periods of, loosely speaking, 'bad times.'

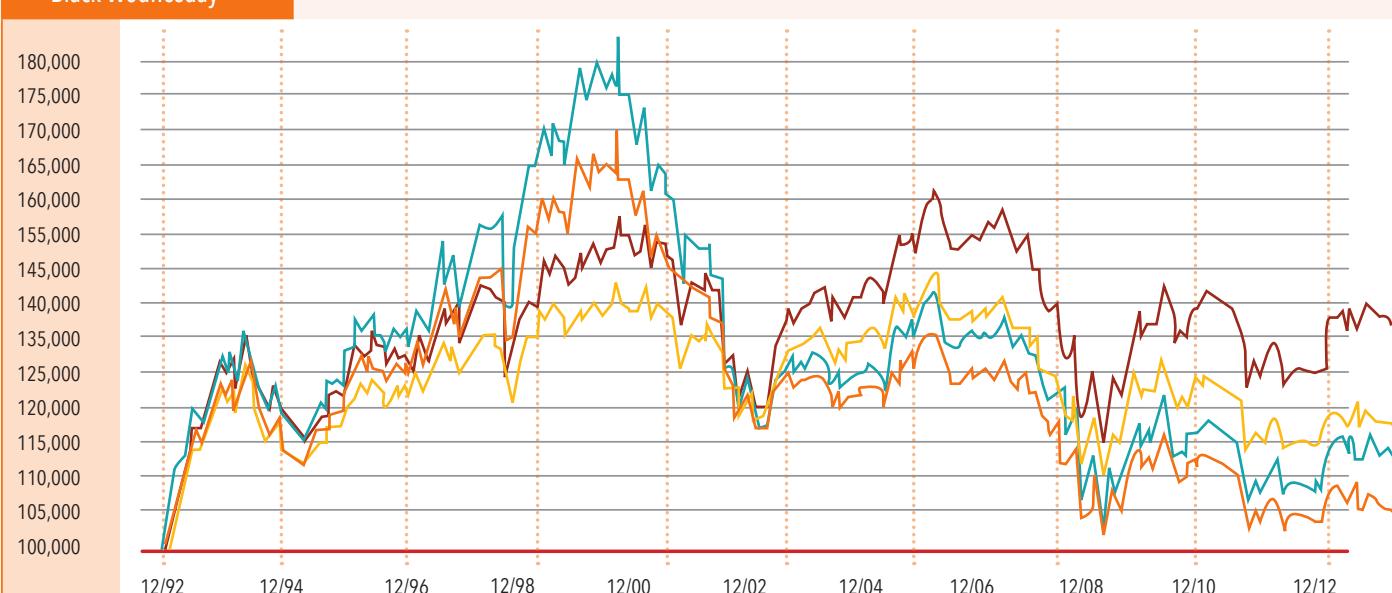
20 years to August 2014

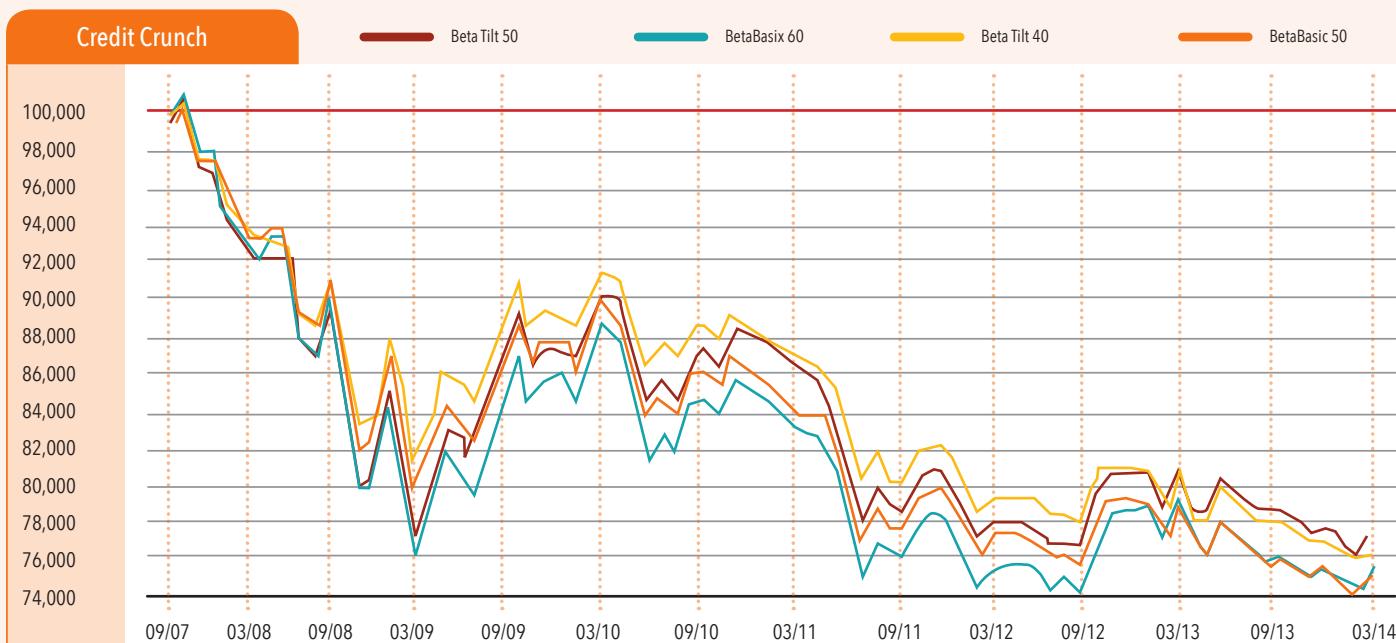
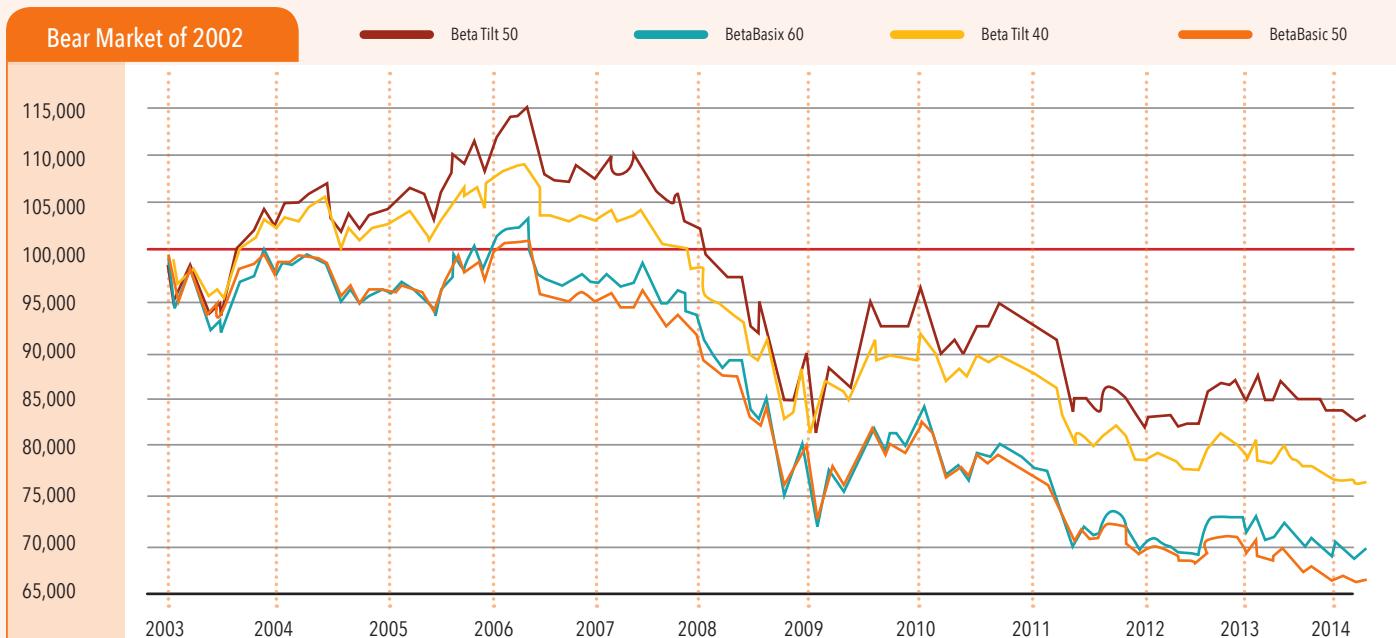


30 years to August 2014



Black Wednesday





And It's A Wrap

We hope you have enjoyed reading this paper as much as we've enjoyed writing it.

It's clear that the impact of sequencing risk and volatility drag are subtle, yet dangerous particularly in retirement portfolios because withdrawals amplify market risk and they do it in a way that is obscured by the use of time-weighted returns and the averaging of long-term returns, making it difficult for advisers and clients to notice until it's too late. This presents a unique challenge to financial planners and requires them to have a robust framework in place for advising clients on what safe withdrawal rate from their portfolio is.

It's important to stress that this is more of a planning challenge than a portfolio management issue. But we are aware that there are a number of product 'solutions' to managing sequencing risk and volatility out there and, in the run up to pension freedom day (6th April, 2015), we can expect a plethora of new offerings to flood the market. These products tend to have three main features in common – high cost, the use of derivatives to provide so-called 'downside protection', and mind-boggling complexity. Advisers should be wary and question why these would work given the documented failure of products with high costs and complexity.

About

► The Author

Abraham is the principal at FinalytiQ, a research consultancy specialising in centralised investment propositions, platforms and technical support for financial planning firms.



A Chartered Financial Planner and CFP Professional with nearly a decade's experience, Abraham holds a Master's degree from Coventry University and more financial services qualifications than anyone else cares to remember. He sits on the investment committees of several financial planning firms, and his services are frequently sought by platform providers looking to build deeper and more meaningful relationships with advisers. He chairs the London branch of the Institute of Financial Planning. A prolific writer, his articles regularly feature in industry press including Professional Adviser, FT Adviser and New Model Adviser.

► The Firm

FinalytiQ is a research consultancy that specialises in centralised investment propositions, wrap platforms and technical support for financial planning firms. We support advisory firms with robust centralised investment propositions, high-quality research and reports that help advisers to deliver superior outcomes to clients in a compelling and compliant way. We also work with platforms on their adviser propositions, providing unique insight into the advisory market which enables platforms to strengthen their relationships with advisers through thought-leadership and research-based content.

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