



Withdrawal order: making the most of retirement assets

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- Retirees in the UK face more challenges today than ever before when it comes to retirement planning. The decline of defined benefit pensions in favour of less expensive (for the employer) defined contribution plans, pension freedoms, increased longevity and other factors have made retirement planning considerably more complex.
- Arguably foremost among these challenges is how to convert the retiree's accumulated retirement savings into a sustainable income that may need to last 30 years or more. While reducing spending and working longer are the most effective ways of extending the life of a retirement portfolio, increasing the portfolio's net after-tax return can also have a positive impact. One way to accomplish this is to select the proper withdrawal order when deciding which accounts to spend from.
- This paper looks at three withdrawal orders across three crystallisation strategies. Using our Vanguard Capital Markets Model (VCMM), we simulate the impact of withdrawal order and crystallisation strategy on a number of success metrics over a 30-year time horizon. Our analysis shows that, for most investors, withdrawing from taxable accounts first provides the best results.

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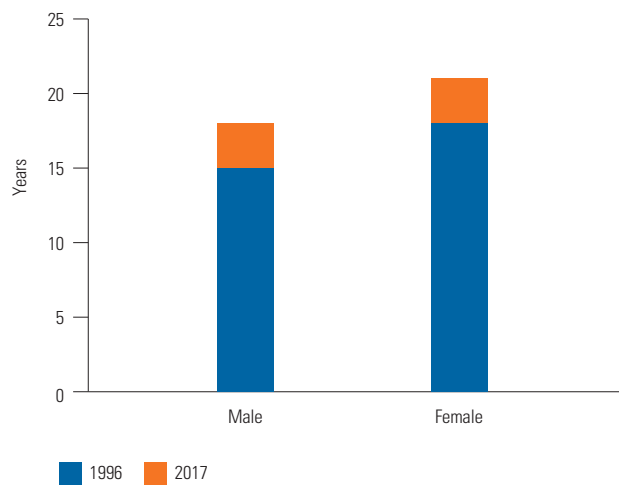
I. Introduction

The retirement income landscape has undergone significant changes over the last several years. Defined benefit (DB) plans, which covered almost half of UK workers as recently as 1996, now cover less than 30% of UK workers, most of whom are in the public sector (Office of National Statistics, 2019). In the private sector, only about 12% of workers are covered by defined benefit plans (Office of National Statistics, 2019).

However, this is not to say that most UK workers do not have access to a retirement plan. The decline in defined benefit pensions has been more than offset by a rise in defined contribution (DC) pensions. In fact, more workers are covered by an occupational pension scheme today than ever before. Since 1996, the proportion of workers covered by a workplace pension scheme (DB or DC) has increased from 55% to 76% (Office of National Statistics, 2019), with a particular boost over the past few years due to the introduction of mandatory auto enrolment (as required by the Pensions Act of 2008¹). While the broader coverage of occupational pension plans is largely a good-news story, the shift from DB to DC means most of the responsibility for generating retirement income has shifted from employers to workers.

Part of the reason for this shift from DB to DC pension schemes is that life expectancies have increased, making these plans more expensive for employers². According to the ONS, life expectancy for a 65 year old in the UK increased by three years from 1996 to 2017 (Office of National Statistics, 2018). While a three-year increase in life expectancy may not seem large, it is significant in the context of retirement. In 1996, the average life expectancy for a 65 year old UK resident was 80 for males and 83 for females. Assuming a retirement age of 65, this means that in 1996 the average UK male could have expected a retirement lasting about 15 years and the average UK female about 18 years. A three-year increase in life expectancy, assuming no change in the retirement age, equates to a 20% longer retirement for men, and a 17% longer retirement for women – a significant increase in the length of the average worker’s retirement, as shown in **Figure 1**. Part of the reason behind recent legislation that has increased State Pension age for many retirees is to offset longer retirement and the strain it puts on public finances.

Figure 1. Increase in length of retirement for a UK worker: 1996 – 2017.



Source: Vanguard calculations using data from the Office of National Statistics.

Adding to these new retirement challenges, pension freedoms added another layer of complexity. Passed in 2015, this legislation repealed the annual limits on drawing from pension pots which had made annuities the only viable option for many retirees with a DC pension³. Under pension freedoms, UK retirees may now spend down their DC pensions in whatever manner they see fit. This means that not only are UK workers responsible for accruing sufficient assets to adequately fund their retirement, but for determining the best way to access those assets, as well – a question made even more complex when there are multiple ‘pots’ to draw from. Taken together, these trends mean that retirees bear more of the responsibility for providing for more of their retirement income for longer than ever before.

These challenges have led many investors and advisers to try to extend the life of retirement portfolios by constructing them to maximise yield and, in theory, reduce the need to draw down on capital. However, given the current low-return environment, meeting an investor’s income needs through the natural yield of the portfolio may not be feasible in many cases. Further, these portfolio construction approaches often come at the expense of exposing the portfolio to greater investment risk (Schlanger, Jaconetti, Westaway, & Daga, 2016).

¹ The Pensions Act of 2008 required all employers in the UK to establish a qualifying occupational pension scheme, enrol all eligible employees into the scheme, and make contributions to the scheme subject to legislative minimums. Employers were required to comply with these provisions according to a schedule set by employer size, starting with the largest employers. Staging of compliance began in October 2012 and ran to February 2018. While auto enrolment is mandatory under this legislation, employees have the option to opt out, although most do not (Vanguard Asset Management & Nest Insights, 2018).

² The long-term decline in interest rates has also contributed to the increased costs of these plans.

³ Other decumulation options were available, however, prior to pension freedoms the rules around these options made them impractical or impossible for many investors to implement.

We believe that total return investing (funding spending through a combination of the natural yield, unrealised gains and, where necessary, the capital of the portfolio) is a better approach because it does not involve the portfolio construction trade-offs that yield-seeking strategies do (Schlanger, Jaconetti, Westaway, & Daga, 2016). Instead, we recommend advisers and their clients seek to increase net portfolio returns through risk-neutral methods that lie outside of the traditional portfolio construction process (Vanguard Asset Management, 2019). One such method is adopting an efficient withdrawal order.

Previous research on withdrawal order has predominantly focused on the US, see e.g., Horan (2006), Spitzer & Singh (2006), Jaconetti & Bruno (2008), Meyer & Reichenstein (2013) and Cook, Meyer, & Reichenstein (2015). As a general rule, these studies argue for withdrawing from the least tax efficient account first. However, this type of quantitative, academic research on withdrawal order is scarce to non-existent for the UK. We try to shed light on this topic in the subsequent sections.

The purpose of this paper is to analyse the impact withdrawal order has on investor outcomes across multiple success metrics for a retirement lasting decades. In particular, we consider:

- The different crystallisation strategies with which investors can access their pension.
- The order in which an investor can draw down their different investment wrappers (taxed, tax-deferred, and tax free)⁴.

We consider these matters both using quantitative analysis and from an intuitive standpoint. Our results should help shed some light on preferred strategies for crystallisation and withdrawal order, and the impact these strategies may have on retirement outcomes⁵.

II. UK account types

Many investors will retire with multiple account types. While DC pensions will often account for the bulk of an investor's retirement assets⁶, many investors will hold other accounts, as well. While investors may hold many different account types, we will focus on the three most common: defined contribution pensions (DCPs), individual savings accounts (ISAs), and general investment accounts (GIAs)⁷.

Before we begin our discussion, a brief introduction to these account types and their different tax treatments is in order:

DCPs

During the accumulation phase, contributions to DCPs attract tax relief, meaning they are effectively exempt from income tax. In drawdown, 25% of the assets in the account may normally be withdrawn tax free, with the remainder taxed as income when withdrawn. For most schemes, it is possible to withdraw the tax-free portion and leave the taxable portion in the wrapper to be withdrawn (and taxed) in the future.

ISAs

Although no tax relief is received on contributions, withdrawals are tax free. The ISA balance and all growth in the account is exempt from dividends and capital gains taxes, as well as income tax.

GIAs

Like ISAs, there is no tax relief on contributions to GIAs. Dividends and interest earned in the GIA are taxed in the year received, and capital gains are taxed in the year they are realised, subject to available allowances and losses⁸. While GIAs are the least tax efficient of the three account types, proper utilisation of allowances and losses can significantly improve the GIAs' tax efficiency, at least until it reaches a certain size.

⁴ While this paper focuses on drawdown scenarios, it should be noted that investors do still retain the option to purchase an annuity using part or all of their defined contribution pension (DCP), which may still be appropriate for some investors. The presence of an annuity or other guaranteed source(s) of income does not impact the findings of this paper in respect to the proper withdrawal order.

⁵ This paper and its findings are based on the 2019/2020 UK tax laws. These laws are subject to change, and such changes could impact the strategies discussed. Investors are advised to speak with a qualified adviser prior to engaging in any transactions that may have tax consequences.

⁶ DC pensions, otherwise known as 'money purchase pensions', can be occupational schemes or private schemes such as a self-invested personal pension (SIPP) or personal pension (PP).

⁷ A fourth account type, the occupational defined benefit pension, could be added to this list, as well. While assets could also be withdrawn from a DB plan (instead of taking it as a guaranteed income), we do not discuss this as an option due to the complexity of the decision and the fact that most investors will be best served by taking the guaranteed income.

⁸ Please refer to Appendix 1 for further details of the applicable tax rates and allowances.

A note about contributions

Since this paper is about the proper withdrawal order, we focus primarily on the tax treatment of these accounts during the drawdown phase, as shown in **Figure A**. We take account balances (and prior contributions) as given, and do not discuss the relative merits of contributing to a pension as opposed to an ISA. In this light, investors may get the impression that an ISA is a better account for retirement savings than a DCP, however, this is not the case for most investors. DCPs receive tax relief on contributions and 25% of the fund value can be taken tax-free in retirement⁹. Additionally, many investors will find themselves in a lower tax band in retirement than when they are making contributions, meaning they receive tax relief at their current (higher) marginal rate, but will pay taxes on the money at their future (lower) rate. This means over the life of the account, most investors will pay less in total taxes by contributing to a DCP than by contributing to an ISA¹⁰. DCPs also have other advantages over ISAs, such as protection from creditors and preferential inheritance tax (IHT) treatment. For this reason, we would recommend most investors prioritise DCP contributions over ISA.

Figure A. Tax treatment of DCPs vs ISAs vs GIAs.

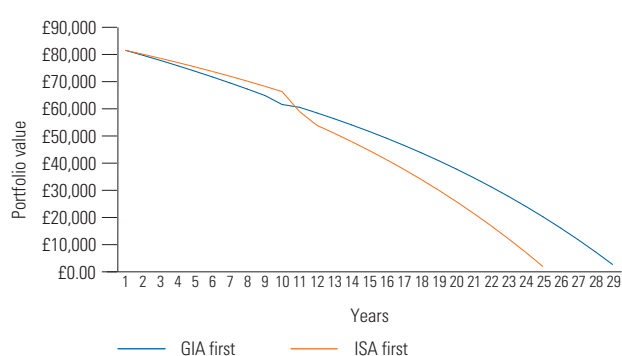
	DCP	ISA	GIA
Pre-tax amount contributed	£10,000	£10,000	£10,000
Tax on contribution	£0	£4,000	£4,000
Net contribution	£10,000	£6,000	£6,000
Capital growth	£500	£300	£300
Tax on growth	£0	£0	£60
Net growth	£500	£300	£240
Gross ending value	£10,500	£6,300	£6,240
Tax on value	£3,150	£0	£0
Net value	£7,350	£6,300	£6,240

Notes: Assumes a single £10,000 pre-tax contribution by a higher rate tax payer after one year at 5% rate of return. All taxes are calculated at the higher band marginal rate (40% on income, 20% on capital gains). Assumes all returns in the GIA are capital gains and fully taxable. Tax on value of the DCP is calculated net of the 25% tax-free portion.

III. What is withdrawal order?

One question many investors with multiple account types will inevitably ask is, "which account should I take my money from?" Many investors use simple rules of thumb to make this decision, such as withdrawing from the smallest (or largest) account first or withdrawing from all accounts pro rata. However, because each type of account is taxed differently, withdrawing from the accounts in the correct order can have a significant impact on the investor's ability to meet their retirement goals.

Figure 2. Portfolio longevity and withdrawal order.



Vanguard calculations. Assumes portfolio consisting of a GIA and an ISA, each with a beginning value of £40,000 and a 50/50 stock/bond allocation returning 5% per year (7% equities broken down as 4.5% capital return and 2.5% dividend rate and 3% bond return all of which is income) and after-tax withdrawals of £5,000 per year. Taxes are assessed on the GIA at the rate of 40% against interest income, 32.5% against dividends, and 20% against capital gains. Taxes on interest and dividends are incurred in the year earned, capital gains tax is incurred when realised. Ignores all applicable tax allowances. All dividends and income are assumed to be reinvested net of taxes, except when spending from the GIA, in which case dividends and income from the GIA are assumed to go to satisfy spending before assets are sold.

⁹ So long as the investor has not breached the lifetime allowance.

¹⁰ The main exception to this rule is investors who expect to be in a higher tax band in retirement than they are when making the contribution.

In **Figure 2** we illustrate the impact of withdrawal order with a simple illustration using a portfolio consisting of a GIA and an ISA. Each portfolio has the same starting value and the after-tax withdrawal amount is constant, however, withdrawing from the GIA first significantly enhances the portfolio longevity from 25 to 29 years¹¹.

When withdrawing from an ISA or a GIA, while an investor must decide which assets to sell, the withdrawal decision itself is fairly binary – the investor withdraws or not. For a DCP, however, there is a further layer of decision – the method by which an investor ‘crystallises’ capital. Since an investor must crystallise funds when withdrawing from a DCP, it is impossible to discuss withdrawal order without discussing crystallisation strategies at the same time – we have considered this in our analysis.

IV. Crystallisation methods

While withdrawal order is an important planning consideration, for UK investors entering drawdown it is only part of the story. UK investors, and their advisers, have another opportunity to increase after-tax returns by selecting the appropriate DCP crystallisation strategy. There are, essentially, three options when choosing a crystallisation method.

- First is what we refer to as ‘lump sum’ crystallisation. This is where the investor withdraws the full balance of their DCP as one lump sum. 25% of the account balance will normally be free from tax, and the remainder is taxed as income. This is commonly known as fully cashing out the DCP.
- Secondly, in what we describe as ‘drawdown’, the entire balance is crystallised, but only the 25% tax free portion is withdrawn from the DCP (sometimes referred to as a pension commencement lump sum, or PCLS). This creates no immediate tax liability for the investor because it leaves the taxable portion of the pension balance in the DCP wrapper, where it continues to grow on a tax-deferred basis (and to be taxed as income when drawn in the future).
- Third, and finally, in what we describe as ‘annual’ crystallisation, a series of partial lump sums is taken each year in order to meet spending needs (sometimes referred to as uncrystallised funds pension lump sum, or UFPLS). 25% of each year’s withdrawal is tax-free and the remainder is taxed as income. The tax-free portion reduces the effective marginal income tax rate the investor pays on each withdrawal.

As we will see in the discussion to follow, the choice of crystallisation method can be every bit as important to the investor’s outcome as the withdrawal order itself.

V. Results

In this paper we examine six different withdrawal orders across three crystallisation strategies using the three most common types of accounts (DCP, ISA and GIA, as defined above). We find that the annual crystallisation strategy produces the best results across all withdrawal orders and withdrawing from the GIA first provides the best outcomes across all success metrics.

Methodology and assumptions

To test whether the investor’s tax band in retirement affects withdrawal order, we modelled each withdrawal order/crystallisation combination against three base cases:

	Portfolio size (DCP/ISA/GIA)	Net annual spend (increasing with inflation)	Assumed other income
Base case 1	£100,000 / £100,000 / £100,000	£20,000	£8,791*
Base case 2	£400,000 / £400,000 / £400,000	£58,000	£8,791*
Base case 3	£1,000,000 / £1,000,000 / £1,000,000	£123,000	£8,791*

*The full new State Pension of £168.60 per week (as at April 2019).

Spending rates were chosen to ensure the robustness of our approach across investors in different tax bands: basic, higher, and additional. We then determined total portfolio size based on annual spending to achieve a success rate in each base case of ~87% under the most efficient combination of crystallisation method and withdrawal order¹². Finally, portfolio assets were divided equally across the three tax wrappers. These assumptions were made to isolate the impact of the withdrawal order strategies discussed, and to make the impact of those strategies comparable across income levels and portfolio sizes, rather than to reflect actual investor portfolios¹³.

¹¹ The inflection point or ‘kink’ in the two lines represents the point at which withdrawals switch from the GIA to the ISA or vice versa. When spending from the GIA first, withdrawals in the early years are higher than when spending from the ISA first primarily because capital gains taxes require higher pre-tax withdrawals to net the same amount after tax.

¹² See the Reasons for withdrawal order section below for a definition of success rate.

¹³ We tested the strategies discussed on portfolios of different sizes, with varied amounts in the different tax wrappers, and with different spending levels. Our results (not shown) were consistent with respect to the recommended crystallisation strategy and withdrawal order, although the magnitude of the values changed depending on the scenario.

For our analysis, we assume the modelled portfolios hold a 50/50 stock/bond allocation in each of the tax wrappers, rebalanced annually. Modelled portfolios have an overweighting of approximately 15% to domestic (UK) holdings, with equal beginning balances in each of the three tax wrappers (DCP, ISA, GIA), and a base cost in the GIA (for capital gains purposes) equal to 50% of its value at retirement. We assume bonds pay a constant 3% interest rate and equities pay dividends of 2.3%, with the remainder of the returns consisting of capital gains/losses. Income and dividends earned in the GIA are spent prior to any portfolio liquidations. Finally, when liquidating equities, gains are realised as a pro-rata portion of the equity balance held in the GIA. All results are presented gross of fees.

All tax rates, thresholds and allowances are based on the 2019/20 UK tax legislation, summarised in Appendix 1. Tax allowances are indexed with inflation as are the included State Pension and spending amount. When simulating the various crystallisation methods, we assume that any money withdrawn from the DCP wrapper and not used for current year spending is reinvested in the GIA. Under these assumptions, we then use our Vanguard Capital Markets Model (VCMM)¹⁴ to run 10,000 simulations for all possible withdrawal orders (and crystallisation methods) and obtain a distribution of results across several success metrics.

Results for crystallisation methods

The results for the three crystallisation methods were fairly definitive and we therefore present these first in order that we can simplify our discussion of withdrawal order by assuming the 'best' crystallisation method takes place. As shown in Figure 3, our analysis finds the 'annual' option provides the highest probability of success. Regardless of withdrawal order, highest success rates are achieved by annual crystallisation, followed by drawdown and, finally, lump sum. While we have chosen to illustrate this point using probability of success, these results hold regardless of the success metric chosen. As such, for the remainder of this paper, we will assume an annual crystallisation strategy and display results accordingly¹⁵.

Results for withdrawal order

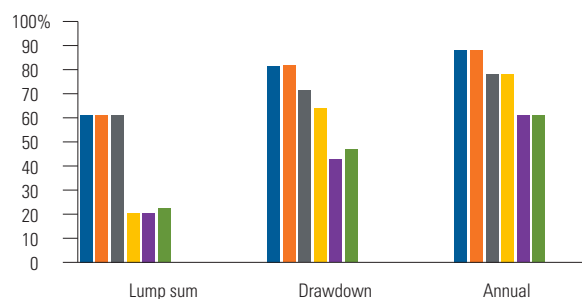
The idea of 'success' will mean different things to different investors. For this reason, we present our results using several success metrics, each of which represents a different view of what 'success' means (though the implication on withdrawal order is generally the same).

Internal rate of return (IRR)

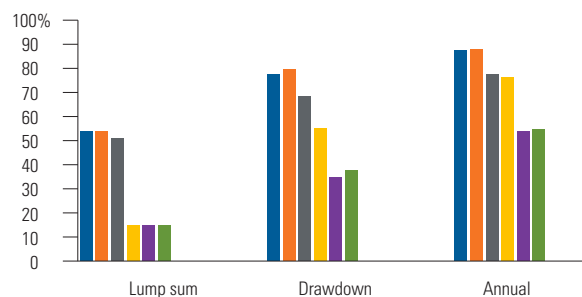
The internal rate of return quantifies the profitability of an investment (i.e. the net annual return over the life of the portfolio). It can be particularly useful when comparing two investment strategies with different cash flows, as IRR takes the amount and timing of these cash flows into account where more straightforward return calculations typically do not. Quite simply, all else equal, a higher IRR indicates a better after-tax return.

Figure 3. Success rates for different crystallisation methods.

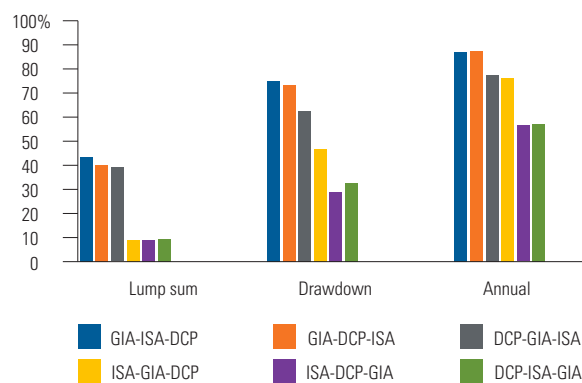
Base case 1



Base case 2



Base case 3



Note: The graphs show results in terms of success rates for simulations including the three base cases, all three crystallisation methods and for each withdrawal order. Assumptions, where not stated above, are as outlined in Appendix 1.

Source: Vanguard.

¹⁴ VCMM is Vanguard's proprietary capital markets forecasting engine. It uses a dynamic module to simulate a wide array of asset class return distributions based on a vector autoregressive forecast. See Davis, Aliaga-Diaz, Harshdeep, Polanco, & Tasopoulos (2014) for an overview of the model.

¹⁵ Retirees may find that they need a lump sum for a specific purpose (such as repaying a mortgage at retirement). In the absence of other available assets, this may dictate a drawdown approach to pension crystallisation rather than an annual strategy. This does not change our findings in relation to the efficient withdrawal order, discussed in the next section.

In Tables 1-3 we set out the IRRs for the three base cases described above and six withdrawal orders, each across the 30-year retirement horizon. Columns 2-6

show IRR percentiles and column 7 lists the mean of all the simulations.

Table 1 Base case 1: Retirement funds of £300,000 (£100,000 in each account) and £20,000 spending with State Pension included. Annual crystallisation.

Order	IRR percentiles					Mean
	5	25	50	75	95	
GIA-ISA-DCP	1.80%	3.19%	4.06%	4.91%	6.11%	4.04%
GIA-DCP-ISA	1.80%	3.17%	4.02%	4.85%	6.04%	4.00%
DCP-GIA-ISA	1.10%	2.56%	3.46%	4.30%	5.49%	3.41%
ISA-GIA-DCP	1.11%	2.57%	3.49%	4.35%	5.54%	3.44%
ISA-DCP-GIA	0.37%	1.79%	2.75%	3.63%	4.92%	2.71%
DCP-ISA-GIA	0.37%	1.78%	2.75%	3.64%	4.92%	2.70%

Note: Calculations based on funds of £300,000 (£100,000 in each account) and £20,000 after-tax spending with State Pension included. Assumptions see Appendix 1. Annual crystallisation. 10,000 path simulations from VCMM for equity and fixed income instruments across 30 years.
Source: Vanguard.

Table 2 Base case 2: £1,200,000 (£400,000 in each account) £58,000 spending with State Pension included. Annual crystallisation.

Order	IRR percentiles					Mean
	5	25	50	75	95	
GIA-ISA-DCP	2.40%	3.72%	4.57%	5.40%	6.59%	4.56%
GIA-DCP-ISA	2.41%	3.70%	4.51%	5.32%	6.49%	4.51%
DCP-GIA-ISA	1.74%	3.10%	3.96%	4.77%	5.92%	3.93%
ISA-GIA-DCP	1.68%	3.06%	3.95%	4.79%	5.96%	3.92%
ISA-DCP-GIA	0.89%	2.21%	3.04%	3.80%	4.86%	3.00%
DCP-ISA-GIA	0.91%	2.22%	3.07%	3.82%	4.90%	3.02%

Note: Calculations based on funds of £1,200,000 (£400,000 in each account) and £58,000 after-tax spending with State Pension included. Assumptions see Appendix 1. Annual crystallisation. 10,000 path simulations from VCMM for equity and fixed income instruments across 30 years.
Source: Vanguard.

Table 3 Base case 3: £3,000,000 (£1,000,000 in each account) £123,000 spending with State Pension included. Annual crystallisation.

Order	IRR percentiles					Mean
	5	25	50	75	95	
GIA-ISA-DCP	1.84%	3.27%	4.17%	5.03%	6.25%	4.15%
GIA-DCP-ISA	1.85%	3.23%	4.08%	4.90%	6.10%	4.06%
DCP-GIA-ISA	1.17%	2.62%	3.53%	4.37%	5.55%	3.48%
ISA-GIA-DCP	1.11%	2.59%	3.54%	4.43%	5.66%	3.50%
ISA-DCP-GIA	0.37%	1.77%	2.70%	3.54%	4.75%	2.66%
DCP-ISA-GIA	0.38%	1.78%	2.72%	3.56%	4.77%	2.68%

Note: Calculations based on funds of £3,000,000 (£1,000,000 in each account) and £123,000 after-tax spending with State Pension included. Assumptions see Appendix 1. Annual crystallisation. 10,000 path simulations from VCMM for equity and fixed income instruments across 30 years.
Source: Vanguard.

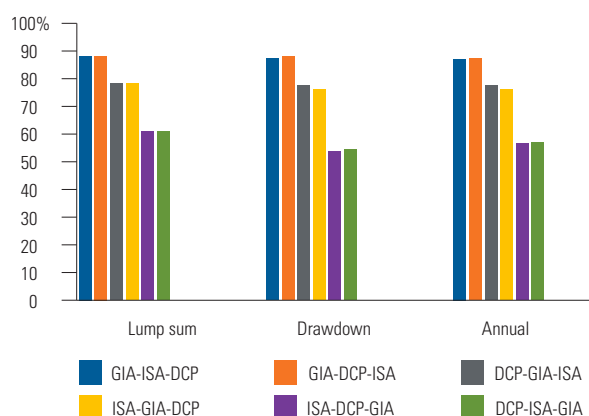
Highest IRRs are found when the GIA is drawn down first, with little difference whether the DCP or ISA is drawn next. Lowest IRRs are found when drawing on the GIA last. Somewhat surprising is how much difference withdrawal order makes. In base case 1, we see a difference in IRR of 1.31% annually between a high preference and low preference withdrawal order at the 50th percentile, **holding spending constant**. In base case 2 the difference is 1.5%, while in base case 3 the difference is 1.47%. Looked at on a relative basis, the differences are even more meaningful. For base case 1, moving from a high preference to a low preference withdrawal order reduces IRR by 32%, while in base case 2 and 3 IRR is reduced by 33% and 36%, respectively. Not only does the preferred withdrawal order remain consistent across base cases, but we see that it has a greater (relative) impact as we increase spending and portfolio size.

Success rate

Success rate quantifies the probability that the strategy will be successful, where 'success' is defined as having a positive portfolio balance at the end of the 30-year retirement horizon. We define the portfolio success rate as the number of successful simulations divided by the total number of simulations. Thus, a strategy where 8,500 of the 10,000 simulations end with a positive portfolio balance has a success rate of 85%.

Figure 4 shows a comparison of success rates for the various withdrawal orders across our three base cases. Similar to our findings for IRR, we see that the best results are found by drawing from the GIA first, with success rates decreasing as we delay drawing down the GIA. Also as with IRR, we find that while the preferred withdrawal order does not change as we move to higher rate tax bands, the difference in success rate between withdrawal orders become more pronounced.

Figure 4. Success rates for base case 1 to 3. Annual crystallisation.



Source: Vanguard.

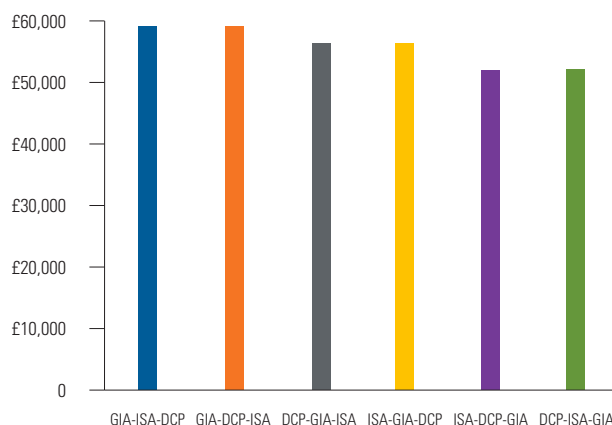
It is worth drawing attention to the magnitude of the impact withdrawal order can have on success rates. Under all three of our base cases, drawing from the GIA first increases success rates by approximately 10 percentage points over drawing from it second, and by approximately 30 percentage points over drawing from the GIA last, **holding all other factors constant**. This is a significant improvement in outcomes, especially as it is achieved without taking additional risk in the portfolio.

Portfolio spending

Another way of looking at performance of withdrawal strategies is to quantify the impact they have on sustainable spending rates. In other words, how much money can one spend in retirement, holding the success rate constant. All else equal, the more the investor can spend each year, the more efficient the withdrawal strategy.

Figure 5 considers base case 2 and shows sustainable annual portfolio withdrawal rates at an 85% probability of success. In order to keep the success rate constant for each withdrawal order, we alter the spending for each scenario. In line with the previous evidence, highest spending is achieved with withdrawal orders where GIA is first, with spending decreasing as withdrawals from the GIA are delayed. Results for base case 1 and 3 are similar (these can be found in Appendix 2).

Figure 5. Spending rates for 85% success rates, base case 2. Annual crystallisation.



Source: Vanguard.

As with success rate, we see that the withdrawal order can have a significant impact on investor outcomes. Spending from the GIA first can support a portfolio income approximately 14% higher than spending from the GIA last, holding all other factors constant.

Portfolio longevity

Another measure of success is to look at how long one can spend from a retirement portfolio until it runs out of money, given a specified withdrawal amount.

Figure 6 shows a distribution of scenarios for base case 2 where portfolios run out of money. We have extended our time horizon for this success metric to make the impact of withdrawal order on longevity more apparent. When looking at longevity on a 30-year time horizon, results appear largely the same across withdrawal orders, since they all have a portfolio longevity of at least 30 years, at the median. This is due to our selection of portfolio withdrawal rates that result in a high probability of success. By lengthening the time horizon, we are better able to better illustrate the impact of withdrawal order on portfolio longevity.

Extending our withdrawal period to 80 years, we see withdrawing from the GIA first gives rise to the longest portfolio lifespan. Note that even with a 80-year time horizon, portfolio longevity exceeds this in some scenarios, and therefore some points lie beyond the scale of the graph. As before, in order to simplify the discussion, we display the results only for base case 2. However, results for the other cases are similar (see Appendix 2).

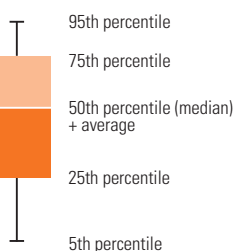
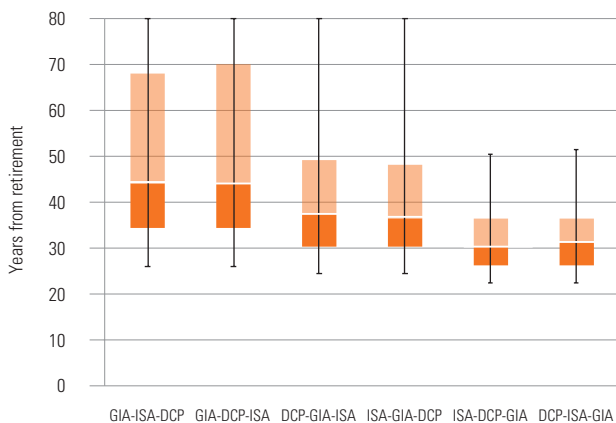
Portfolio values

Some clients, especially those who desire to leave a bequest, may wish to maximise the value of their portfolio at the end of the planning horizon. Figure 7 highlights portfolio values over a 30-year planning horizon for a higher efficiency withdrawal order (GIA-ISA-DCP) versus the path of a less efficient withdrawal order (DCP-ISA-GIA). The solid line marks the median value and the shaded area emphasises a 25/75 percentile error band. Consistent with previous results, withdrawing from the GIA first significantly increases portfolio values during the later years of the planning horizon. Distributions for preferred withdrawal order portfolios have longer horizons and are also wider – in fact at the 75th percentile for an efficient withdrawal order, the portfolio can be seen to continue to grow in retirement (as shown by the upwards sloping top edge of the grey shaded section).

Again, we note the magnitude of the difference between withdrawal orders. Under the preferred withdrawal order (GIA-ISA-DCP), at the end of the 30-year time horizon the portfolio has a median balance of approximately £60,000, while the less preferential withdrawal order (DCP-ISA-GIA) has a median balance of less than £10,000, a difference of approximately £50,000. While this difference is significant in isolation, it is even more so when one realises that the same amount has been spent from both portfolios during the simulation. This attests to the power tax-efficient withdrawal strategies can have over investor outcomes.

Interestingly, we note that when withdrawing from the GIA first, portfolio values tend to be lower in the early years compared to withdrawing from the GIA last. This is because when selling down assets in the GIA, capital gains tax must be paid, meaning the gross withdrawal must be higher (compared to withdrawing from the ISA first) to offset the taxes. In the case of

Figure 6. Distribution of scenarios for portfolio longevity, base case 2.



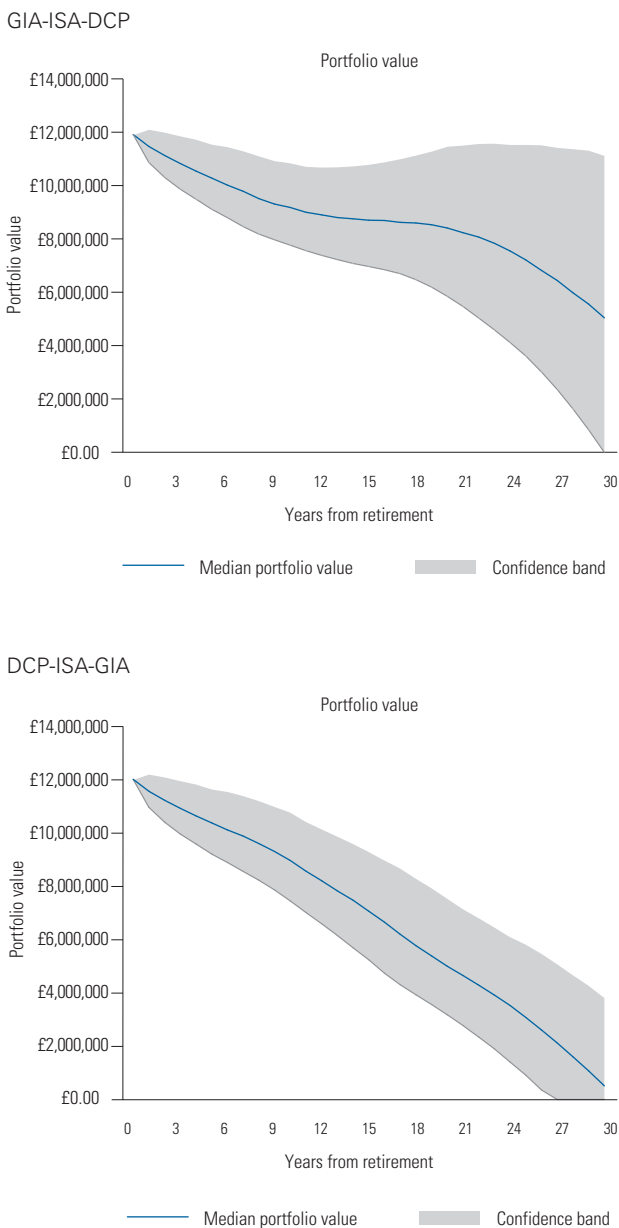
How to read a box and whisker chart:

This box and whisker chart shows the range of outcomes. The box represents the 25th to 75th percentile results, with the median represented by a horizontal line within the box. The ends of the 'whiskers' extending from the top and bottom of the box represent the 5th and 95th percentile results.

For the GIA-ISA-DCP withdrawal order, for example, the chart shows that the median portfolio longevity was 44 years, with a range from 80 years at the 95th percentile to 26 at the 5th percentile.

selling from the ISA first, however, this simply delays payment of the taxes and future withdrawals must then be higher to offset the greater tax liability created by the growth of the assets in the GIA. Where the short-term value of the portfolio is the investor's primary concern, advisers and investors should keep in mind that selling down the GIA first may erode the portfolio value faster than selling down from the ISA first.

Figure 7. Median portfolio value over time including 25/75 error bands, base case 2. Annual crystallisation.



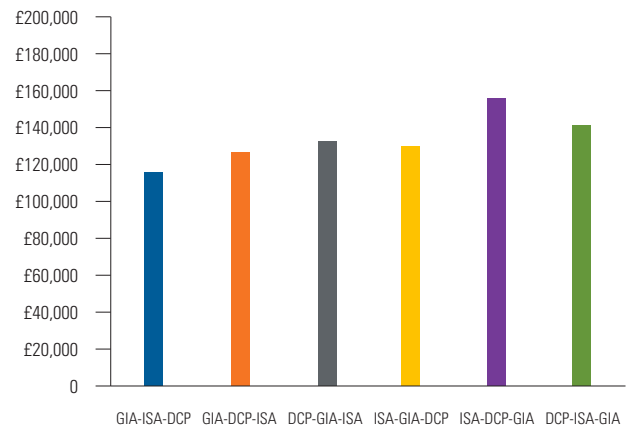
Note: This graph compares portfolio values for two distinct withdrawal orders, GIA-ISA-DCP versus DCP-ISA-GIA and annual crystallisation. The solid line marks the median portfolio value across time. The grey area highlights the 25/75 percentile error bands. Source: Vanguard.

Taxes

Our final success measure is taxes. Success can also be defined as minimising the amount of taxes paid across retirement – a lower level of tax increases the proportion of the portfolio that the investor retains. We contrast the strategies by quantifying the net present value of taxes paid across retirement. For each year, taxes are discounted by the respective simulated return of the portfolio.

Figure 8 shows the present value of the average amount of taxes paid across the 10,000 simulations, discounted by the average return for each year of the simulation (to account for the fact that taxes paid today are worth more to the investor than the same nominal amount of tax paid in the future). Consistent with previous performance metrics, we see that a preferential withdrawal order pays approximately 25% less in tax as compared to a less preferential withdrawal order.

Figure 8. Present values of taxes, base case 2. Annual crystallisation.

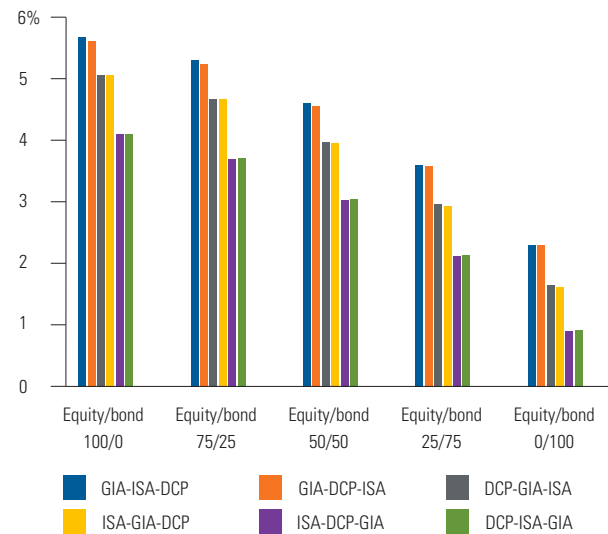


Note: This graph shows averages for the present value of taxes for each withdrawal order across all 10,000 simulations. Based on base case 2 and annual crystallisation. Each year's taxes are discounted with the respective yearly portfolio return. Source: Vanguard.

Additional analysis – asset allocation

To see how asset allocation impacts withdrawal order, we looked at IRRs for various equity/bond allocations. The results are shown in **Figure B**, based on annual crystallisation. Similar to the previous examples, withdrawing from the GIA first provides the highest IRR. Interestingly though, while the withdrawal order does not change with asset allocation, the magnitude of the differences between withdrawal orders changes substantially. A higher bond allocation exhibits larger relative differences between the withdrawal order scenarios. The reason for this is the greater tax drag¹⁶ stemming from the higher fixed income allocation within the GIA (i.e. for assets held in the GIA, the proportion of return lost in taxation is greater for fixed income compared to equities). While this does not have any direct impact on our recommended withdrawal order, it does indicate that withdrawal order should be of greater concern for investors with more conservative portfolios, or who hold a greater proportion of their bond holdings in their GIA.

Figure B. IRRs for different asset allocations, base case 2. Annual crystallisation.



Note: This graph shows IRRs for each withdrawal order and five equity/bond allocations. Based on base case 2 and annual crystallisation. Source: Vanguard.

Reflection on results

Our quantitative analysis suggests that, when using a simple ordering strategy, drawing the GIA first will generally deliver the best result for most investors. Our analysis also shows that there is little difference, in terms of meeting retirement spending goals, of the order of drawing the remaining wrappers once the GIA is depleted. In this section, we seek to explain these results qualitatively and discuss some considerations, including some scenarios where the suggested withdrawal order may not be optimal.

Crystallisation

Our analysis found that the annual crystallisation method provides improved outcomes for most investors. This is because, in most cases, the annual crystallisation method results in less tax drag and/or less paid in taxes. When using the drawdown or lump sum methods, the funds withdrawn from the DCP must be put somewhere. For the purposes of our analysis, we assume these funds are re-invested in the GIA to keep account balances consistent across crystallisation methods¹⁷. This means, (a) to the extent the amount withdrawn exceeds the tax-free portion,

¹⁶ Tax drag is the amount by which taxes reduce the net return of the portfolio. For example, if a £100,000 portfolio returned 5%, the portfolio value would increase by £5,000. However, if taxes were levied on the gain at 20%, the net return would be only £4,000, or 4%. The 1% reduction in net return is known as tax drag, and compounds over time, which can make a significant difference in investor outcomes.

¹⁷ If we did not make this assumption, the impact of crystallisation strategy on success metrics such as probability of success would likely be overwhelmed by the impact of the significantly smaller portfolio size.

income tax is paid at a higher rate than the investor would normally pay (because the withdrawn funds are taxed as income in the year received) and (b) the net amount is placed into a less tax-efficient account with greater tax drag. This combination of higher taxes and higher tax drag significantly lowers the investor's probability of success¹⁸.

Withdrawal order

Logically, if we are taking a long-term view and have three wrappers with different levels of tax efficiency, it would make sense to sell down the least tax efficient wrapper first, thus reducing the overall tax drag. At face value, certainly for a higher rate taxpayer, this may seem to be the DCP (which as discussed below, is taxed at an effective marginal rate of 30% for higher rate tax payers). However, this requires some re-thinking.

It is true that an investor will likely owe more in taxes upon withdrawing money from their DCP as compared to an ISA or even a GIA. However, if the investor's tax bracket remains constant, the proportion of the DCP they receive after tax should also remain constant. For example, consider a higher rate taxpayer with a DCP worth £400,000. Assuming the investor's tax status does not change, we can view 70% of the DCP as belonging to the investor (25% tax free with the remaining 75% subject to 40% income tax) with 30% belonging to HMRC. This ratio applies not only to the capital, but growth as well – for every pound of growth in the account, the investor keeps 70p. This means, when measured against the 70% net portion of the account the investor 'owns,' the investor keeps the entire return. If the underlying investments grow by 5% then the investor receives a 5% net return on their portion of the DCP. Thus, although more taxes are owed, there is no tax drag. An example may help clarify our point on this topic:

Table 4			
Gross versus net returns across tax wrappers			
	ISA	DCP (total value)	DCP (after-tax value)
Beginning value	£400,000	£400,000	£280,000
Return at 5%	£20,000	£20,000	£20,000
Taxes due on returns (30% rate)	£0	£6,000	£6,000
Net return	£20,000	£14,000	£14,000
Net % return	5.0%	3.5%	5.0%

Note that in the example above, when considering only the portion of the DCP 'owned' by the investor (i.e. the after-tax value), the net returns on the DCP and the ISA are equal. Thus, although money withdrawn from a DCP will generate higher tax liabilities than money withdrawn from an ISA, there is no tax drag in the sense of a difference in net returns that compounds over time.

Working on this basis, the GIA has the greatest tax drag. By depleting this account sooner rather than later, an investor is able to eliminate the tax drag from the portfolio, increasing its average net return. At the same time, selling down the GIA reduces taxable capital gains over time (because the account becomes smaller), further reducing the tax drag on the portfolio. This explains why drawing down on the GIA first will often be the most tax-efficient strategy.

In our results, we noted that while drawing down the GIA first made a substantial difference in outcomes, we found little difference as to whether the ISA or DCP was drawn down next. While this might make little intuitive sense at first, our discussion of tax drag in a DCP, above, explains this result. Since the net portion of the DCP is essentially tax free, it makes little difference whether the ISA or DCP is drawn next from the standpoint of the investor outcomes we have examined in this paper.

DCPs, however, carry a number of advantages which argue for delaying withdrawals. Most DCPs are not part of the investor's estate for IHT purposes, and as such have value as an asset transfer vehicle, especially if the investor is unfortunate enough to die before age 75. DCPs also receive protection from creditors that ISAs do not. Finally, flexibly accessing a DCP triggers the money purchase annual allowance, potentially reducing the investor's ability to contribute to the DCP in the future. While outside the scope of the outcomes we have reviewed in this paper, these factors argue for spending from the DCP last. Therefore, our recommended withdrawal order for most investors is GIA, ISA, DCP. There are, however, some exceptions and considerations to this general rule, discussed below.

Considerations

The objective of our analysis was to provide a general rule for crystallisation and withdrawal order that improves most UK investors' ability to successfully fund their retirement. As with any general rule, there are exceptions and other factors that may indicate the investor is better off deviating from the general rule. We explore some of these exceptions and factors in this section.

¹⁸ Although not by as much as spending the withdrawn funds.

Effective use of tax bands

This is probably the most common, and potentially the most significant, exception to our general withdrawal order rule. Our analysis and the examples above assume that all income is taken from a single account until it is exhausted, and then income is taken from the next account in the withdrawal order.

For retirees whose portfolio withdrawals straddle tax bands, it may make more sense to use the DCP to ensure the maximum income is drawn at the investor's basic rate tax band each year. Further withdrawals, falling into the higher rate band would revert to the recommended order. This is especially true for those retirees with large DCP balances.

For example, consider an investor who desires an income of £60,000 per year in retirement and has £40,000 of non-portfolio income. Depending on the amounts invested in different tax wrappers, by withdrawing £10,000 from the DCP within the investor's basic-rate tax band and then withdrawing the other £10,000 from the GIA or ISA, the investor may be able to avoid ever paying higher rate income tax during retirement. This same strategy can be used by lower income investors who have unused personal allowance – the investor can draw from their DCP to the limit of their personal allowance¹⁹.

Note that this strategy is more an enhancement to our withdrawal order than an exception, as once the nil or basic-rate income band is full, our recommended withdrawal order still applies.

Other considerations and/or instances in which our general rule for crystallisation strategy and withdrawal order may be affected include:

Changing tax bands: In our analysis, we assume that the investor's tax rate is constant throughout retirement. For investors who expect to move into a higher tax band at some point — because they have delayed claiming State Pension or expect to receive additional taxable income at some point in the future, for example — there may be a benefit in withdrawing from their DCP ahead of their ISA during the period they are in a lower tax band. This allows them to take more of the DCP at their current lower rate, lowering the overall taxes paid during retirement. This, however, must be balanced against the other considerations, such as protection from creditors and IHT treatment, that argue for

delaying withdrawals from the DCP. Drawing from the DCP in the earlier years may also increase both the value and longevity of the GIA, increasing the tax drag on the portfolio. Clients who expect to be in a lower-tax band in the future are likely best served by following our baseline withdrawal order (GIA-ISA-DCP).

Spouses or civil partners: Our analysis assumes an individual who does not share finances with another. Effective utilisation of a spouse or civil partner's allowances adds another dimension which could affect the appropriate strategy for an investor²⁰.

Movement between wrappers: Continuing to leverage accumulation strategies may allow investors to improve the overall tax efficiency of their retirement portfolios by accelerating the 'spending down' of their GIA (and removing its associated tax drag). One of the more tax-efficient ways to do this is to use a so-called 'Bed and ISA' strategy, withdrawing funds from the GIA up to any unused capital-gains allowance and reinvesting those funds in the ISA (in some instances this may be worth doing, even if some capital gains tax is payable). This can both maximise use of the client's capital-gains allowance and reduce tax drag on the portfolio more quickly than might otherwise be the case.

Lifetime allowance: The lifetime allowance (LTA) and its associated tax charge can begin to apply once an investor's pension balance reaches a certain level. Due to the punitive nature of the tax charge on amounts in excess of the LTA, investors who are likely to breach it may be better off spending down their DCP sooner than our base withdrawal order would suggest (the preferred DCP crystallisation method could also be impacted).

Capital gains tax considerations: Investors with large unrealised gains in their GIA may benefit from drawing down on their GIA more slowly, supplementing early years' GIA withdrawals with withdrawals from the ISA or DCP. This may allow them to better use their capital gains tax allowances, lowering the total tax cost of winding down the GIA.

¹⁹ The same logic also holds for those investors crossing from the higher rate to the additional rate band, as well, although the smaller difference in marginal rates means the impact of the strategy will be less.

²⁰ Although we did not perform our quantitative analysis for a couple, intuitively, the basic withdrawal order would likely remain the same, except there would be two of each wrapper. Thus, the withdrawal order might be: GIA1, GIA2, ISA1, ISA2, DCP1, DCP2. More complex withdrawal strategies, such as topping up tax bands, become significantly more so when planning for couples, however.

Many of the considerations and exceptions mentioned above require sophisticated cash-flow analysis to fully take advantage of the planning opportunities. Investors who feel they could benefit from such a strategy should consult a trusted financial adviser. We will also undertake further research in consideration of some of these.

VI. Conclusion

Managing taxes on retirement portfolios can have a significant impact on an investor's ability to meet their retirement goals. One way investors with multiple pots can reduce the taxes paid on their retirement assets is selecting the correct withdrawal order among their accounts. Our analysis shows that, generally speaking, the most effective withdrawal order strategy is to deplete the GIA first. This withdrawal order, combined with an annual crystallisation strategy, where possible, can significantly improve retirement outcomes across a number of success metrics. Once the GIA is depleted, we found very little difference in outcomes between spending the ISA or DCP first, however, other factors such as IHT treatment and protection from creditors will likely mean most investors are better off drawing down their ISAs first.

Appendix 1 – Personal tax rates and allowances

The applicable tax rates on investment income are as follows:

Taxpayer status	Interest income	Dividend income
Non-taxpayer	0%	7.5%
Basic rate taxpayer	20%*	7.5%
Higher rate taxpayer	40%	32.5%
Additional rate taxpayer	45%	38.1%

*Rate can be zero if starting rate savings allowance applies (see below).

Capital gains on investments are taxable at up to 20% on the gain realised, though for non-taxpayers or basic rate taxpayers, the applicable rate is 9%.

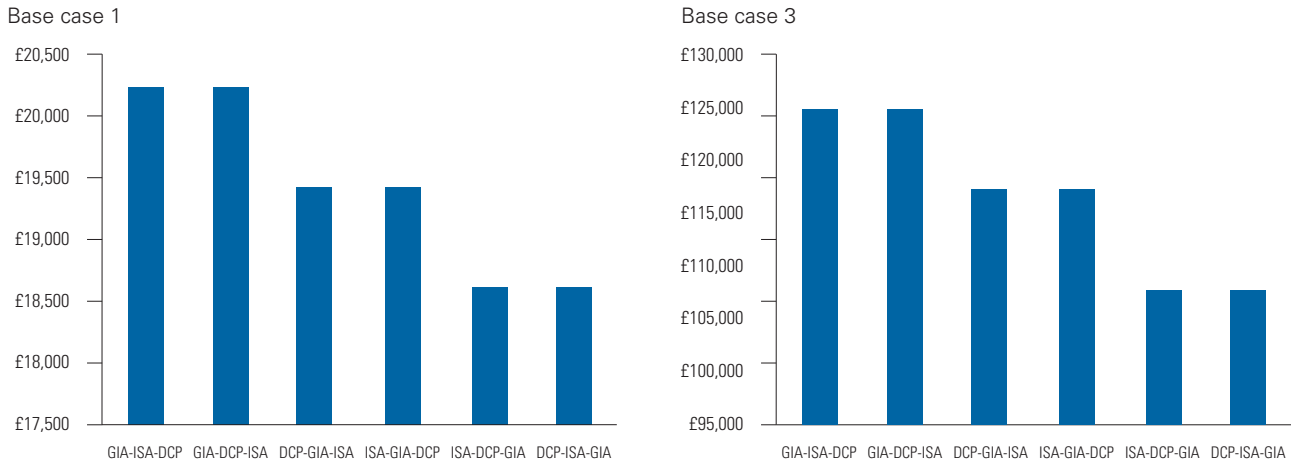
While there is no tax relief on the GIA itself, investors have a range of personal tax allowances which can be used to offset the tax which might arise from the GIA. These include the personal savings allowance (up to £1,000 each year to offset interest).

Allowance	Annual amount (for 2019/20)	Description
Dividend allowance	£2,000	Can be used to offset dividend income
Personal savings allowance	Up to £1,000	Can be used to offset interest (reduced/removed for higher/additional rate taxpayers)
Starting savings rate allowance	Up to £5,000	Can be used to offset interest where total income is less than £17,500
Capital gains tax allowance	£12,000	Can be used to offset capital gains crystallised

Appendix 2 – Further results for base cases

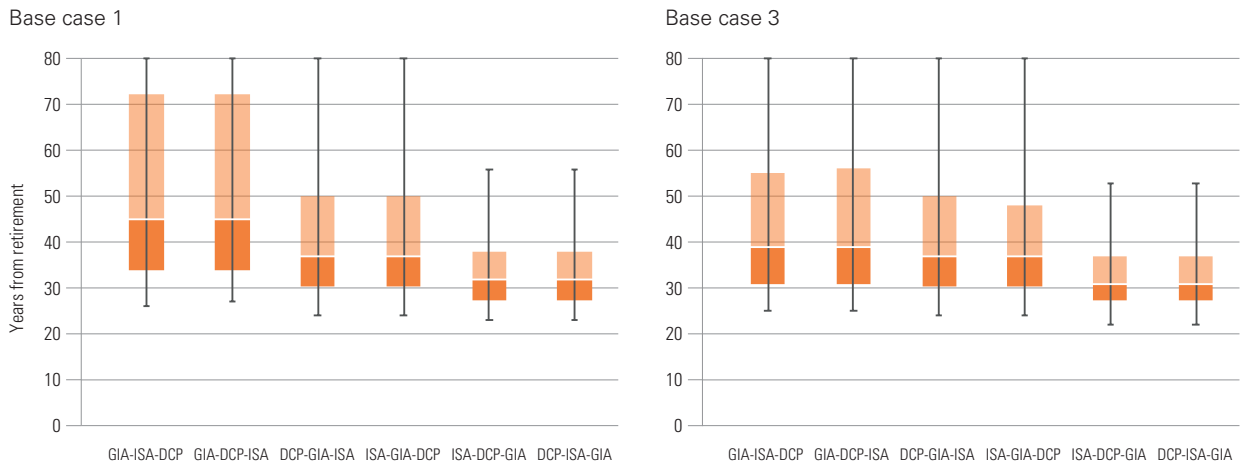
The following figures show additional results for bases cases 1 and 3 following the analysis in section V.

Figure 9. Portfolio spending at 85% success rates. Annual crystallisation.



Note: This graph shows portfolio spending for a constant success rate of 85% across the withdrawal strategies.
Source: Vanguard.

Figure 10. Distribution of scenarios for portfolio longevity.

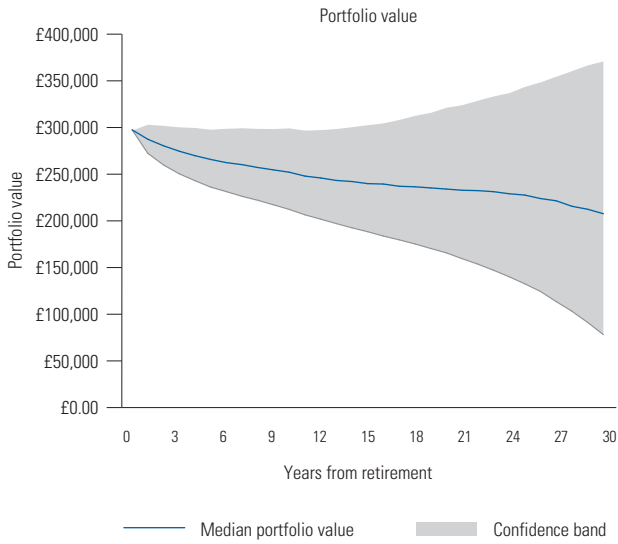


Note: This graph shows boxplots for portfolio longevity across various withdrawal strategies over a 80-year planning horizon. Calculations based on base case 1 and 3 and the respective assumptions above. Annual crystallisation. The box emphasizes the 25/75 percentile and the whiskers the 5/95 percentile. The horizontal line in the box marks the median portfolio longevity.
Source: Vanguard.

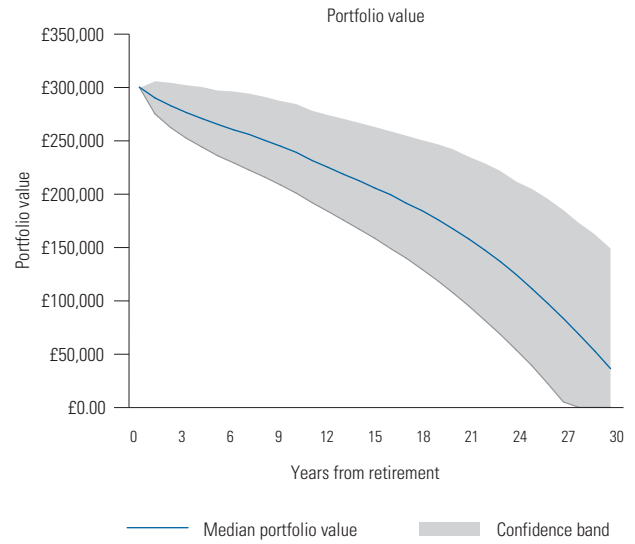
Figure 11. Median portfolio value over time incl. 25/75 error bands, base case 1 and 3. Annual crystallisation.

Base case 1

GIA-ISA-DCP

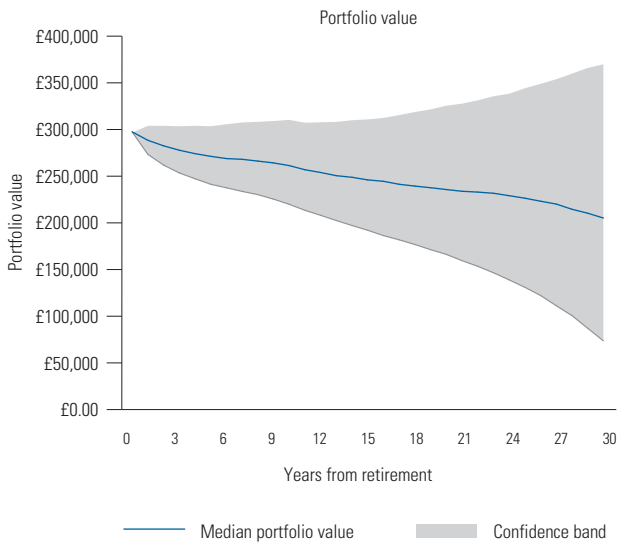


DCP-ISA-GIA

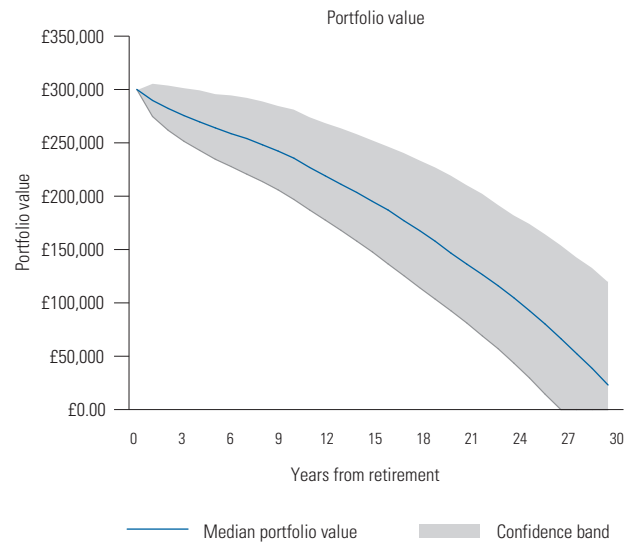


Base case 3

GIA-ISA-DCP

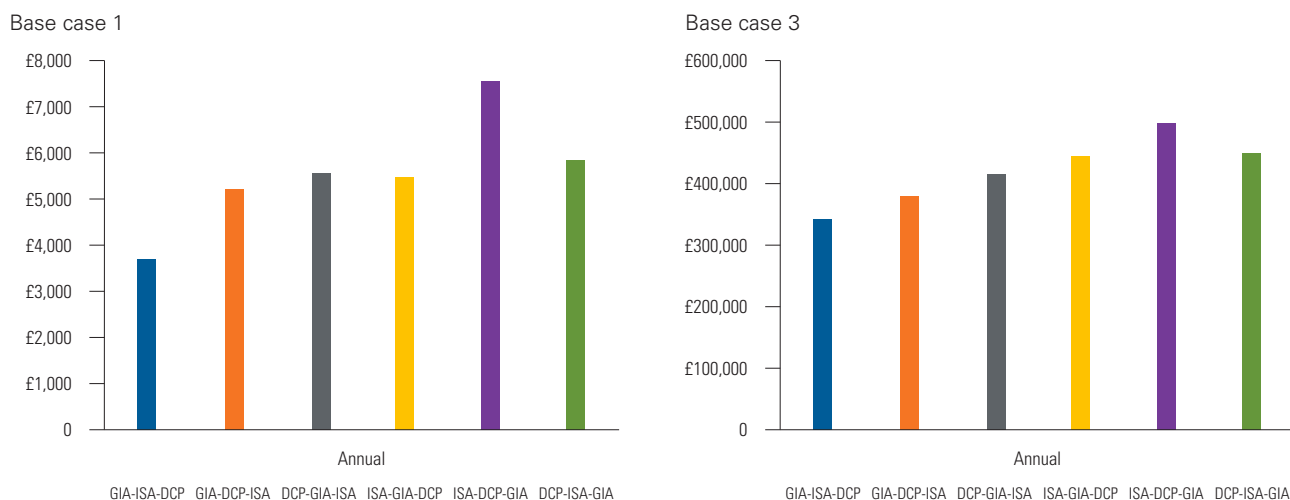


DCP-ISA-GIA



Note: This graph compares portfolio values for two distinct withdrawal orders, GIA-ISA-DCP versus DCP-ISA-GIA and annual crystallisation. The solid line marks the median portfolio value across time. The grey area highlights the 25/75 percentile error bands.
Source: Vanguard.

Figure 12. Present value of taxes for base cases 1 and 3. Annual crystallisation.



Note: This graph shows averages for the present value of taxes for each withdrawal order across all 10,000 simulations. Based on base case 1 and 3 and annual crystallisation. Each year's taxes are discounted with the respective yearly portfolio return.

Source: Vanguard.

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