

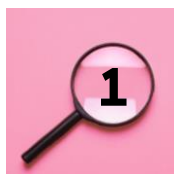
Defaults under the microscope

BlackRock®

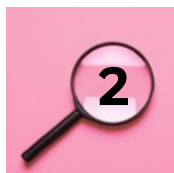
Investment strategy for the new regime

Capital at risk. The value of investments and the income from them can fall as well as rise and are not guaranteed. Investors may not get back the amount originally invested.

Key Points



The time for static defaults is over, research-driven and forward-looking investment design is needed. Volatility is back and it's driving greater focus on what default objectives are and how they are set up to achieve those objectives.



Managing defaults is more than risk and return, it considers time and savings. Lifecycle investment insights therefore should drive any changes to portfolios.



Schemes across the Defined Contribution (DC) eco-system are striving for more sophisticated solutions and greater insights to achieve their goals.

Introduction: “achieving greater precision”

Over recent years, with COVID's market and fiscal policy impacts, rising inflation and uncertainty over the future path of interest rates, DC defaults have been under the microscope to ensure they can meet their objectives and manage member savings throughout the retirement journey.

BlackRock's global target date fund series, LifePath™, celebrated its thirtieth birthday in 2023. Our investment platform has evolved over the last three decades, and we are committed to building retirement solutions that fulfil the evolving needs of our clients. Specifically in the UK, we have undertaken a significant review of our strategy under the theme of “achieving greater precision” which has culminated in three distinct research outcomes:

1. **Gaining precision in fixed income**
2. **Living with inflation**
3. **Evolving our foreign exchange (FX) hedging**

In a series of three thought pieces, we will set out how we evolved our thinking in each of these topics in 2023 and lift the lid on our new approach. This piece will focus on the first topic: **gaining precision in fixed income**.

Lifecycle investing; more than just asset allocation

The LifePath investment approach seeks to improve on traditional multi-asset investing by linking together demographics, time, risk, saving and investing: we describe this as lifecycle investing. It is our lifecycle research platform that drives the investment design and ongoing evolution of the strategy.

LifePath's objective seeks to deliver consistent spending outcomes over a members' lifetime. We aim to achieve this objective by considering labour income, life expectancy and Capital Market Assumptions (estimates of future market behaviour used for investment planning, including expected returns, volatility, correlations, inflation, and risk-free rates) as well as quantitatively measured risk within the investment design.

Fixed income assets have been at the centre of market volatility in the post-COVID period – particularly in the UK. Their prominence in the retirement phase of many default strategies has prompted a debate on the role that fixed income assets should play. The LifePath team have reviewed the fixed income allocations with the aim to achieve better retirement outcomes and improve the resilience of members' portfolios.

Gaining precision in fixed income

Fixed income is a critical component of LifePath portfolios. Fixed income investments provide opportunities for growth and have, over many periods, historically served as important ballast to protect against risks such as market downturns and rising inflation. Their risk diversifying characteristics do not play out in all scenarios as we have observed in recent times. Greater precision is not intended to remove risk by reducing fixed income in portfolios but improve how we access the asset class. We assess the following topics:

- A new framework to identify the appropriate duration in the retirement portfolio,
- An expanded framework to fine-tune which type of fixed income instrument to hold at each point in an individual's lifetime,
- New fixed income exposures to expand our investment toolkit and achieve greater precision in our fixed income holdings.

What's the right level of duration for my default?

The objective of this part of the research was to identify the appropriate duration in the LifePath retirement portfolio.

Multi-asset portfolio managers debate duration endlessly. Should I be overweight relative to my benchmark? Should I own longer duration assets to generate more income? For lifecycle investors the key question is what is the optimal portfolio

duration across a member's lifetime? We can use our lifecycle insights to try to answer these questions.

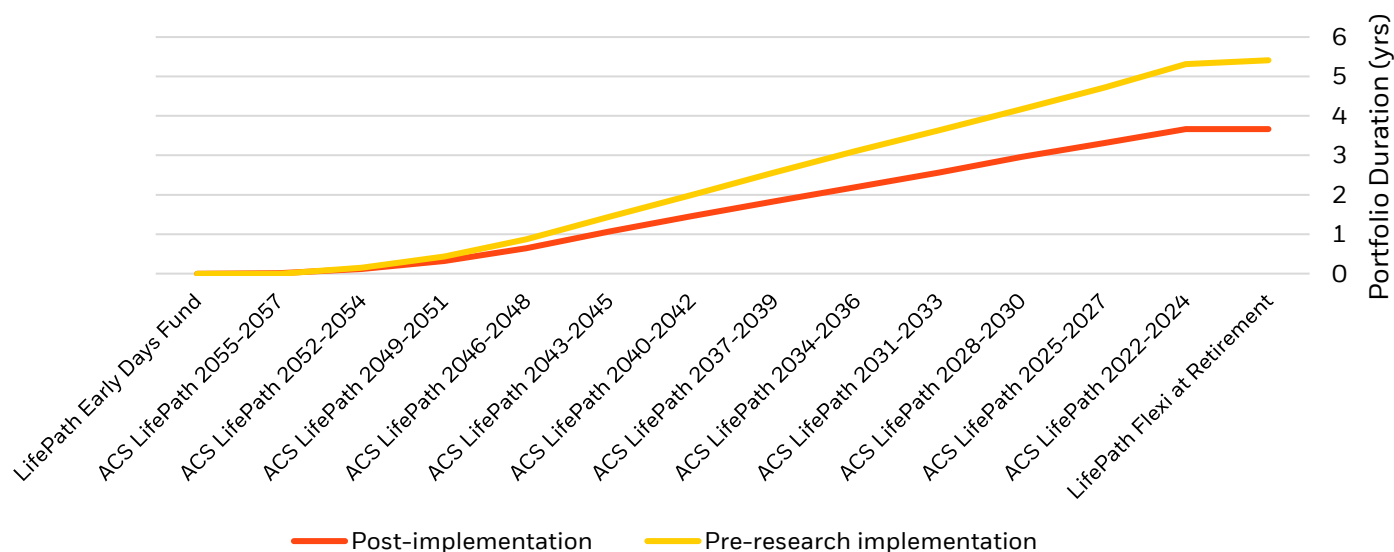
A 65-year-old has a greater life expectancy than a 95-year-old, so their spending is expected to continue for much longer. The future spending can be modelled as a stream of cash flows in the future, each coming at a certain date or, said differently, with a certain maturity. A longer stream of cash flows for the 65-year-old means that the amount of money needed to fund their spending will be more affected by changes in interest rates than that of their nonagenarian counterpart. It follows that the duration (or interest rate sensitivity) of a 65-years-old's portfolio should be longer than the duration of a 95-year-old's.

As all retired LifePath investors invest in our LifePath UK Retirement Vintage, we aim to ensure that it meets the needs of every member. We aim to achieve this by modelling the theoretical level of retirement spending, life expectancy and retirement spending duration of the members.

Historically, the level of duration in the LifePath UK Retirement Vintage was a function of the maturity of bonds issued by borrowers. With our new approach, we have a framework for understanding the appropriate level of duration at retirement. The approach has led us to reduce the overall duration of the LifePath UK Retirement Vintage and affords us the flexibility to modify the target duration in response to future changes in the profile of our retired members.

There is no guarantee that research capabilities will contribute to a positive investment outcome.

Chart 1: Comparing how the level of duration shifts over time before and after the implementation of our fixed income research



The right type of fixed income at the right time.

The objective of the research is to improve outcomes by allowing for more wealth accumulation earlier in the retirement journey and then providing more certainty of outcomes by reducing risk as one approaches retirement. The approach expands on a simple equity and bond glidepath and effectively introduces a glidepath within the fixed income component of the target date fund (by adjusting the fixed income exposures over time). Historically, our fixed income allocations across the glidepath invested across a range of segments (corporate bonds, government bonds and inflation linked bonds) with the weighting representative of a typical institutional portfolio and implemented with a UK home country bias. Going forward, each LifePath portfolio's fixed income exposure will be carefully calibrated to allocate to the primary fixed income factors of rate risk and credit risk, when seeking to meet LifePath target date strategies' investment objective.

Fixed income investments carry two primary risk factors: interest rate risk and credit risk. Interest rate risk refers to the risk that changes

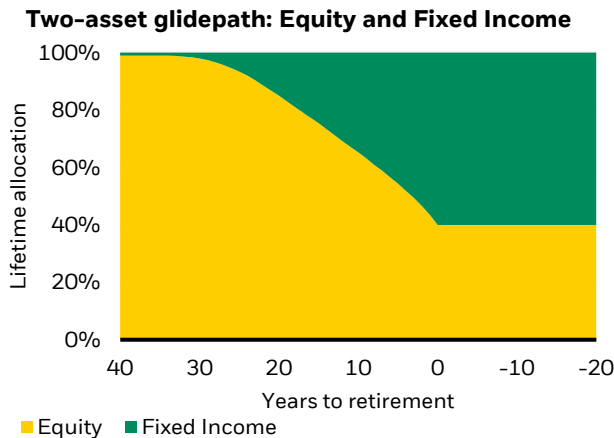
in interest rates may reduce (or increase) the market value of a bond. Credit risk refers to the potential that the borrower will default on their loans and bondholders won't be paid back. Rate risk can help offset equity risk, since developed government bonds over the long-term have low correlations to stocks¹. Credit risk, by contrast, can offer investors more potential for long-term growth because corporate borrowers generally pay a higher yield to offset that risk.

In considering this dual benefit of fixed income in target date strategies, we expanded our lifecycle model to include equities and both the rate and credit components of fixed income.

- Younger members will now have more exposure to credit risk – meaning growth-oriented fixed income assets, such as corporate bonds.
- Exposures for members near retirement will emphasise rate risk – meaning bonds, such as short-term government bonds, that have historically provided downside protection in market selloffs.

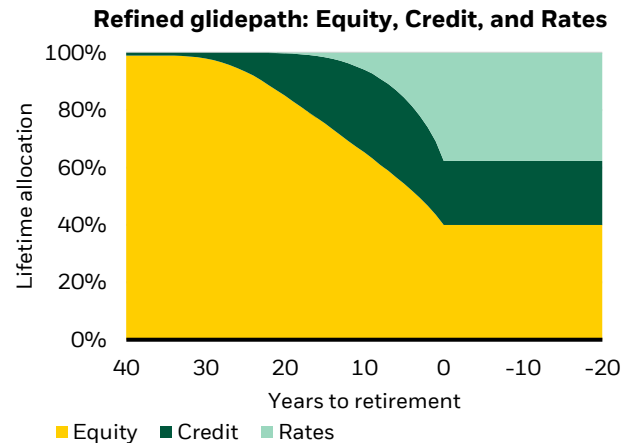
Source: BlackRock, 31 January 2023. ¹Source: BlackRock as of 31 December 2023 using data from Morningstar Direct. Observation based on monthly returns of the MSCI ACWI NR USD Index and the FTSE G7 USD Index over a 20 year period from 01/01/2004 to 12/31/2023.

Chart 2: Comparing the previous equity / fixed income glidepath to the new disaggregated fixed income approach



Using our original lifecycle model, we set our allocations to overall equity and fixed income over a lifetime

Source: BlackRock, as of 31 January 2024. For illustrative purposes only.



Moving to a refined lifecycle model, we can determine the optimal allocation to rate and credit risk over a lifetime

We've found that having an evolved, more granular, fixed income allocation could help participants achieve a higher consumption than a static fixed income exposure, helping to meet the LifePath objective.

Delivering Confidence: Expanding the toolkit:

LifePath portfolios have held a wide range of fixed income investments through index strategies (which seek to replicate the performance of a market index) to achieve geographical diversification and invest across government, inflation-linked, credit and emerging markets.

To achieve greater precision in both duration and risk factor targeting, we wanted to ensure we had the most appropriate investment toolkit. As such, we decided to introduce two new exposures that invest in shorter duration UK gilts and inflation linked UK gilts. The expansion of our building blocks allows us to reduce duration, follow insights from our new framework and allows access to a broader range of investments as we evolve our research and monitor portfolios.

Conclusion

The fixed income research aims to provide a simple outcome:

- A framework to manage interest rate sensitivity
- more growth potential when members are young with,
- more safety when members are nearing or in retirement.

These are important changes today because the market regime has changed, we are moving into a world of higher volatility driven by greater inflation and interest rate uncertainty. In addition, the UK DC market will be the primary source of retirement income for many going forward. Thus, how we allocate to fixed income will have a meaningful impact on the retirement outcomes of many individuals. Most importantly, the changes align with the objective of the LifePath target date strategies, which is to provide individuals with the ability to smoothly transition from working years to retirement without sacrificing our ability to spend.

Our revised approach affords us more long-term flexibility to adapt LifePath's asset allocation over a participant's lifecycle. For instance, as inflation rises or falls, interest rates shift, and equity markets move up and down, this approach to fixed income offers more tools to build efficient portfolios that can be optimized across asset classes.

Appendix

Lifecycle extension

A brief recap on lifecycle model

Our lifecycle model is based on the idea of maximizing the utility of lifetime consumption. Below is the utility function:

$$V_{i,t}(X_{i,t}) = \left\{ (1 - \delta) C_{i,t}^{1-1/\psi} + \delta E_t \left[p_t \left(V_{i,t+1}(X_{i,t+1}) \right)^{1-\gamma} + b(1 - p_t) X_{i,t+1}^{1-\gamma} \right]^{\frac{1-1/\psi}{1-\gamma}} \right\}^{\frac{1}{1-1/\psi}}$$

where γ is the coefficient of relative risk aversion, ψ is the elasticity of intertemporal substitution, δ is the subjective discount factor, b is the strength of the bequest motive, and p_t is the conditional survival probability from t to $t+1$.

We want to maximize $V_{i,t}$, which is a function of consumption today and future expected V . Furthermore, the wealth variable given above is related to consumption through the following budget constraint:

$$X_{i,t+1} = Y_{i,t+1} + (X_{i,t} - C_{i,t})(\alpha_{i,t}r_{eq,t+1} + (1 - \alpha_{i,t})r_{b,t+1})$$

We denote wealth X_t , as the liquid (financial) wealth available for funding consumption and savings. At each point in time the investor must decide how much to consume and how to allocate wealth among stocks and bonds. At the beginning of each period investor i starts with wealth $X_{i,t}$. Then labor income $Y_{i,t}$ is realized. In the equation above, $\alpha_{i,t}$ is the fraction of wealth invested in stocks. Below is a summary of the variables:

Table 1. Variable Description

Variable	Description
$X_{i,t}$	Wealth/Cash-on-hand in period t
$C_{i,t}$	Consumption in period t
$\alpha_{i,t}$	Equity allocation in period t
$Y_{i,t+1}$	Income in period $t+1$
$r_{eq,t+1}$	Equity return between period t and $t+1$
$r_{b,t+1}$	Bond return between period t and $t+1$
p_t	Probability of surviving from period t to $t+1$
b	Bequest motive
γ	Risk aversion
ψ	Elasticity of intertemporal substitution
δ	Discount factor

Three-Asset lifecycle model

What was described above is the procedure to model a two-asset problem. In this research, we expand the above framework and introduce an additional fixed income asset. Specifically, we modify the budget constraint to add a third asset:

$$X_{(i,t+1)} = Y_{(i,t+1)} + (X_{(i,t)} - C(i,t)) (w_{(eq,t)}r_{(eq,t+1)} + w_{(b1,t)}r_{(b1,t+1)} + w_{(b2,t)}r_{(b2,t+1)})$$

where b_1 and b_2 simply mean the two fixed income assets of our choice.

Term premia estimation

Term premia is defined as the reward of taking duration risk, i.e., additional return one can earn by buying long duration Treasuries instead of short duration Treasuries.

We estimate term premia using affine term structural model (ATS). ATS is a type of statistical model one could use to fit historical yield curves. Specifically, the type of ATS model we employ assumes no-arbitrage, and the model fits yield curves based on cross-sectional and time series assumptions.

Yield curve driving dynamics:

The dynamics of our chosen state variable $X(t)$ evolve according to a vector auto-regression of order one, VAR(1)

$$X(t) = \mu + \Phi X(t-1) + \epsilon(t), \text{ where } \epsilon(t) | X \sim N(0, \Sigma)$$

The state variables include the first five principal components of yields.

The assumption of no arbitrage implies that there exists a pricing kernel $M(t)$ that satisfies the following:

$$P_t^n = E_t \left[M_{t+1} P_{t+1}^{(n-1)} \right]$$

Where $P^n(t)$ denote the price of a zero-coupon bond with maturity n at time t .

Consistent with this line of literature, the pricing kernel is assumed to be exponentially affine and prices the risks of underlying state variable $X(t)$:

$$M_{t+1} = \exp(-r_t - 0.5 \lambda_t' \lambda_t - \lambda_t' \Sigma^{-0.5} \epsilon_{t+1})$$

Where:

$r_t = \ln(P_t^1)$ is the risk-free rate, defined such that $E_t[M_{t+1} r_{t+1}] = 1$.

The market prices of risk λ_t are also affine in the state variables:

$$\lambda(t) = \lambda_0 + \lambda_1 X(t)$$

Credit premia estimation

Credit premia is defined as the reward of taking credit risk, i.e., additional return one can earn by holding a corporate bond rather than a duration-equivalent Treasury bond.

Our estimation of credit premia involves estimating both OAS and loss from downgrading:

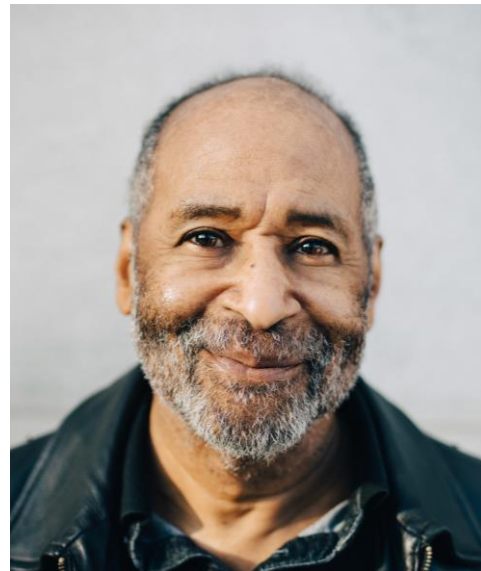
$$E(\text{spread}) = (1 + E(\text{OAS})) * (1 + E(\text{Downgrading Loss})) - 1$$

OAS is estimated based on the following, where n is a set of macro and market variables.

$$E(\text{OAS}) = \beta_n E(x_{t+1}^n)$$

Downgrading loss is estimated based on historical observed credit movement by various rating agencies.

$$E(\text{loss due to rating move}) = (1 + E(\Delta \text{OAS due to rating move}))^{-\text{duration}} - 1$$



Delivering Confidence

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To make this a reality, we are aiming to build better solutions, and making them more accessible.

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¹ Source: BlackRock as of 31 December 2023.

BlackRock DC LifePath UK Specific Risks

Credit Risk: The issuer of a financial asset held within the Fund may not pay income or repay capital to the Fund when due.

Equity Risk: The values of equities fluctuate daily and a Fund investing in equities could incur significant losses. The price of equities can be influenced by many factors at the individual company level, as well as by broader economic and political developments, including daily stock market movements, political factors, economic news changes in investment sentiment, trends in economic growth, inflation and interest rates, issuer-specific factors, corporate earnings reports, demographic trends and catastrophic events.

Derivative Risk: The Fund uses derivatives as part of its investment strategy. Compared to a fund which only invests in traditional instruments such as stocks and bonds, derivatives are potentially subject to a higher level of risk.

Liquidity Risk: The Fund's investments may have low liquidity which often causes the value of these investments to be less predictable. In extreme cases, the Fund may not be able to realise the investment at the latest market price or at a price considered fair.

Counterparty Risk: The insolvency of any institutions providing services such as safekeeping of assets or acting as counterparty to derivatives or other instruments, may expose the Fund to financial loss.

Tax treatment depends on the individual circumstances of each client and may be subject to change in the future.

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Past performance is not a reliable indicator of current or future results and should not be the sole factor of consideration when selecting a product or strategy.

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