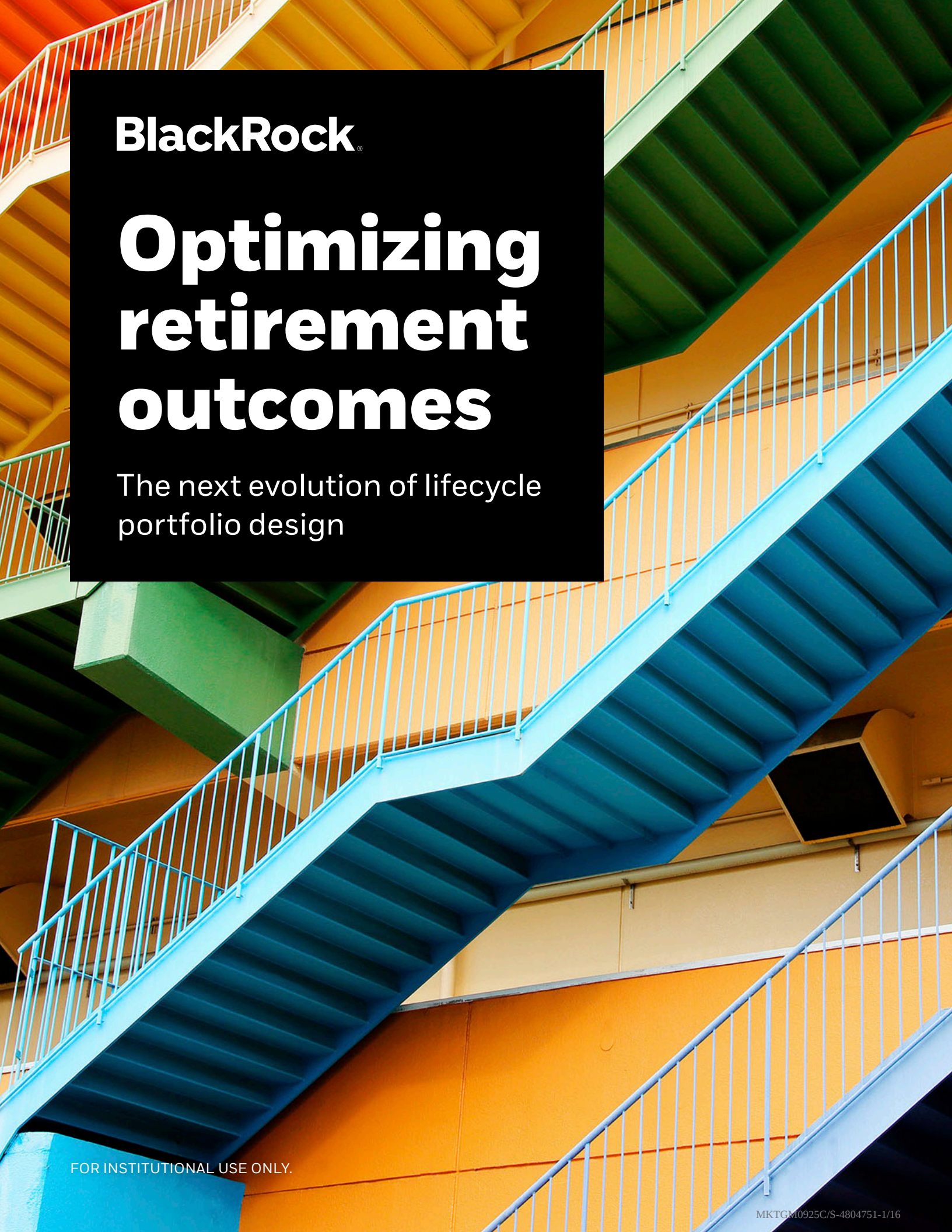

BlackRock®

Optimizing retirement outcomes

The next evolution of lifecycle portfolio design

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MKTGM0925C/S-4804751-1/16

Foreword

Since pioneering the target date fund in 1993, BlackRock has focused on providing access to world-leading expertise on lifecycle investing. Canadian Capital Accumulation Plan (CAP) members have been beneficiaries of these efforts since Canada LifePath® launched in 2007, and we are honoured that millions of Canadians now trust us to support their retirement journeys.

Our objective is to support consistent spending throughout the individual's lifecycle. Successfully achieving this objective requires us to manage the important risks facing plan members, including market risk, inflation risk, longevity risk, and behavioural risk. These are core risks that an average member, who is likely not an investment expert, may not be equipped to identify and manage. Our investment process also considers how the relative importance of these risks varies across life phases, such as the years leading up to and immediately following retirement.

This **retirement window** is when uncertainty is highest and proactive management of these various risks is critical. For example, suffering a large market selloff at this time would be damaging enough to retirement outcomes. Yet the damage could be compounded by plan member behavior, as individuals are prone to sell out during market downturns but then miss the subsequent recovery.

In this paper, we are excited to share our latest lifecycle insights to better manage risks and deliver improved retirement outcomes for participants. Our recommendations include further increasing the precision of inflation hedging across the lifecycle as well as adding additional diversification to the fixed income allocation. We believe these enhancements will lead to improved retirement outcomes for participants 63% of the time and equip portfolios with a better toolkit for navigating left-tail risks.

Nick Nefouse, CFA
Global Head of Retirement Solutions and Head of LifePath

Authors

Kasey Ng, CFA – Director
James Brown, CFA – Director
Anna Ling, CFA – Vice President
Jill Zhao – Vice President

Executive summary

The objective of all LifePath portfolios is to support consistent spending, and over the last three decades we have researched ways to do so with more certainty. In recent years, we have focused on achieving better retirement outcomes through closer alignment between asset allocation and the different life stages that an individual moves through. Our Grow, Protect, Spend (GPS) framework has informed these efforts and should be used to understand the recommendations detailed in this paper:

Grow	Aim to maximize growth potential for young plan members;
Protect	Aim to minimize uncertainty for members approaching retirement; and
Spend	Aim to maximize spending consistency in retirement.

Improving inflation hedging precision

Our previous inflation research in 2019[1] discussed when, and to what extent, a target date fund should hold inflation hedging assets. We sought a quantitative solution and ultimately constructed the industry's first three-asset glidepath, including inflation as an explicit asset class alongside equity and fixed income. Our key finding then was that **a plan member's aversion to inflation is not consistent across their lifecycle**:

- Far from retirement, unexpected inflationary periods are of little concern to young plan members since wage growth outpaces inflation and portfolios have long time horizons to recover any lost purchasing power; and
- Near retirement, maintaining purchasing power becomes increasingly important because wages no longer keep pace with inflation and portfolios have less time to outperform inflation.

This latest research builds on that original work by answering **how to optimally hedge inflation over a lifecycle**. To do so, we:

1	Refined our approach to modelling inflation in Canada;
2	Enhanced our portfolio optimization methodology; and
3	Updated the inflation hedging asset classes.

1 Source: BlackRock, Inflation and target date funds: Definitive insights into inflation-hedging, April 2019.

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In line with the GPS framework, our latest findings lead us to make three enhancements to the inflation hedging exposures:

Further reduce inflation hedging assets for young plan members in favor of higher equity allocations
Young members are better served by additional exposure to equity risk premia rather than explicit inflation hedging.

Add an allocation to short-term U.S. Treasury Inflation-Protected Securities (TIPS), fully hedged to CAD, as a substitute for Canadian Real Return Bonds (RRBs)
Canadian RRBs are no longer being issued by the Government of Canada, and short-term U.S. TIPS (hedged to CAD) offer an effective alternative inflation protection.

Update our commodity index exposure to improve return potential
This change retains diversification and inflation hedging characteristics while enhancing the portfolio's return profile.

Increasing fixed income diversification

Canada LifePath portfolios have historically accessed nominal bonds through a single broad-based index exposure, most recently the FTSE Canada Universe Bond Index. Our latest findings result in the addition of long duration Canadian bonds to most vintages. This introduces additional diversification to portfolios and will allow us to more precisely manage interest rate risk during different phases of the lifecycle.

Re-introducing currency hedging

Canada LifePath portfolios have been unhedged since our research in 2012 established that foreign equity risk dominates the related currency risk in a portfolio. Thus, we determined that the cost of currency hedging did not generate a sufficient improvement in expected risk-adjusted returns.

However, the opposite is true for a Canadian investor owning foreign bonds (i.e., the currency risk dominates the foreign fixed income risk). Therefore, the introduction of foreign fixed income necessitated a review of our currency hedging approach, and we concluded that the new U.S. TIPS exposure should be fully hedged back to Canadian Dollars.

Conclusion

Our simulation modelling suggests that including all these enhancements will lead to improved retirement outcomes for participants 63% of the time and equip portfolios with a better toolkit for navigating left-tail risks.

The below table highlights the asset class changes resulting from this research:

Asset class	Exposure	
	Current	Future
Long duration bonds	N/A	FTSE Canada Long-Term Overall Bond Index[2]
Inflation-linked bonds	N/A	ICE US TIPS 0-5 Years 100% CAD Hedged Index[2]
Commodities	S&P GSCI	Bloomberg Enhanced Roll Yield Index[2]

2 Note: Please refer to Appendix for formal definition.

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Improving inflation hedging precision

A refined approach to modeling inflation in Canada

Our latest research seeks to build on our innovative inflation work from 2019 by including two refinements to our modelling to better capture the modern inflation dynamic:

- **Assessing inflation data since 1991**, when the Bank of Canada adopted an inflation-control framework
- **Analysing seasonally adjusted CPI**, to remove seasonal effects and more accurately capture underlying inflation dynamics

Incorporating these refinements using a Markov-switching model[3] captured the modern inflation dynamic well, and Exhibit 1, below, illustrates how our enhanced model more precisely classifies periods of high inflation. Specifically, these include a brief period surrounding the Canadian Fiscal crisis of 1994-5, the intervening years between the dotcom bubble and the Global Financial Crisis, and the post-COVID period.

Enhanced portfolio optimization methodology

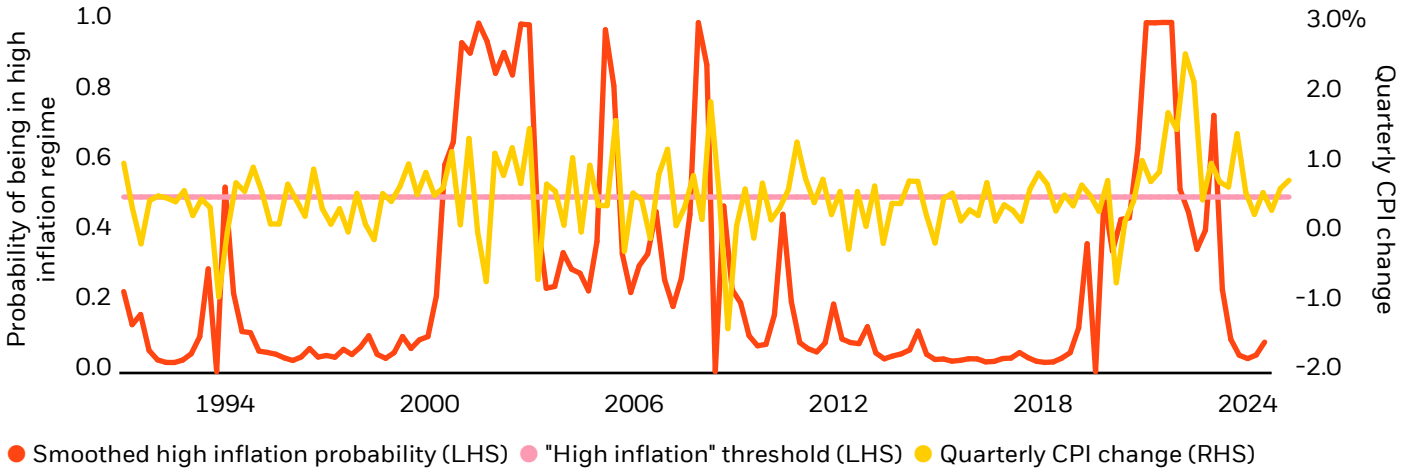
Most research into inflation hedging within a diversified portfolio has leveraged simple mean-variance optimization frameworks. While that approach can offer a helpful starting place, it fails to sufficiently account for the unique needs of a portfolio designed to support consistent spending across an entire lifecycle. It also fails to consider that assets which tend to hedge unexpected inflation generally produce lower long-term returns than a broader portfolio of stocks and bonds.

Therefore, we sought to quantitatively account for this "cost of inflation hedging" in the LifePath model. Said another way, how much should a participant be willing to "pay" in the form of lower expected nominal returns in exchange for increased inflation sensitivity?

Our research drew on Zvi Bodie's landmark paper[4] on inflation hedging to inform our understanding of three key aspects of an efficient inflation hedging portfolio:

1	It reduces the probability that portfolio returns will be outpaced by inflation;
2	It reduces the volatility of the inflation-adjusted (real) returns; and
3	Nominal returns of the portfolio have positive correlations with inflation.

Exhibit 1: Modelling periods of high and low inflation



Source: BlackRock, from June 1991 to March 2025.

3 Note: Markov-switching model is a statistical framework that allows for changes in the behavior of a time series. **4** Source: Bodie, Z. (May 1976), Common stocks as a hedge against inflation, The Journal of Finance, vol. 31, issue 2, pp. 459-470.

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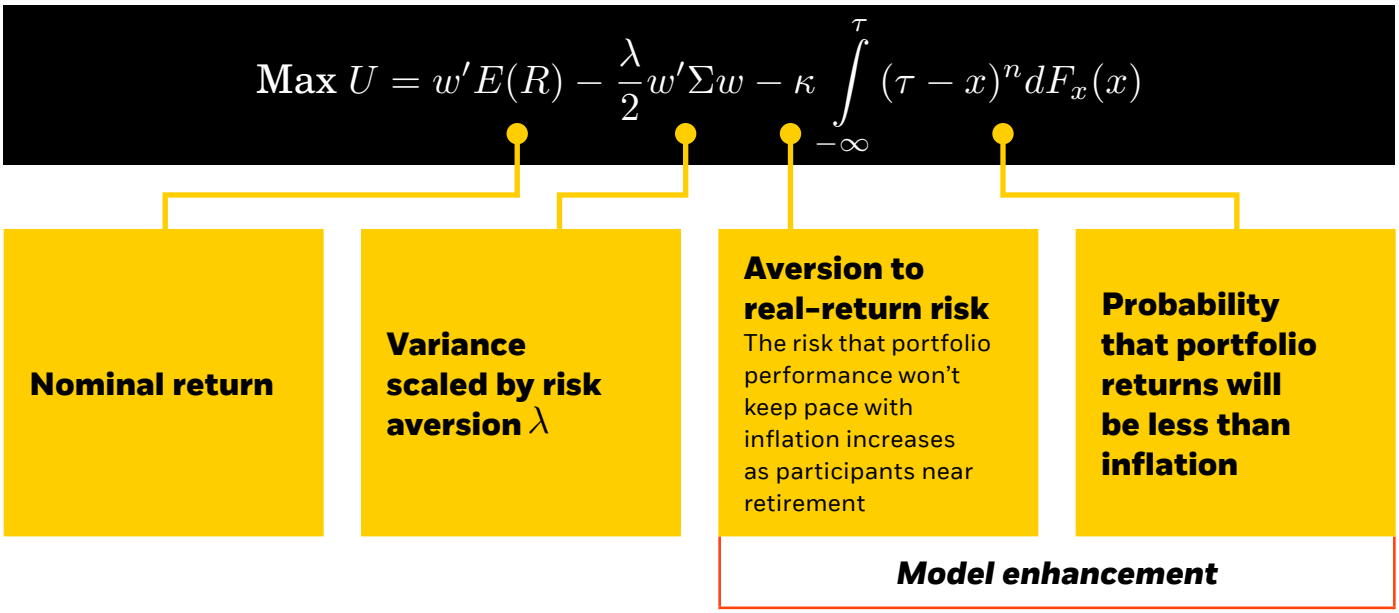
To incorporate this framework into our portfolio construction model, we adjusted the LifePath utility function to quantitatively account for an individual's aversion to unexpected inflation as outlined below in Exhibit 2.

Exhibit 2: LifePath utility function



Specifically, we enhanced our model by applying Lower Partial Moment[5] analysis to incorporate a real-return risk penalty term. In simpler terms, utility is maximized by nominal return minus a penalty for portfolio volatility and a penalty for the risk that portfolio returns do not keep pace with inflation, scaled by a participant's aversion to that real-return risk.

While a seemingly incremental adjustment, this enhanced framework marks a considerable evolution of our 2019 research. Under this new approach, the LifePath model[6] can systematically account for the appropriate level of inflation protection required across the lifecycle and seamlessly shift our portfolio construction process from a **nominal efficient frontier** for young participants (when inflation is not a concern) to an **inflation-aware real efficient frontier** for participants approaching retirement.

In other words, a portfolio construction model using this approach is acutely aware of the trade-off between exposure to equity risk-premia, and exposure to assets that could exhibit more resilience in periods of unexpected inflation (and thus help increase spending consistency in retirement) but may have lower expected returns. This evolution increases the precision of our allocation to inflation-hedging assets across a lifetime.

In practice, this means the LifePath model would seek to maximize exposure to equity risk premia where real-return risk is of little concern (up until approximately 20 years before retirement) and increase allocations to the most effective inflation-hedging assets thereafter.

In addition to the above enhancements to our modelling and optimization approaches, our research also considered whether any asset class changes could be beneficial for the portfolios. The following pages detail our findings regarding inflation-linked debt and commodities.

5 Note: Though details are beyond the scope of this paper, Lower Partial Moment (LPM) analysis is a mathematical approach to assessing the downside risk of a portfolio. In this context, we use LPM to assess the risk that a portfolio's returns will not keep pace with inflation. **6** Source: BlackRock, To Versus Through: Reexamining Glidepath Design in Target Date Funds, July 2024.

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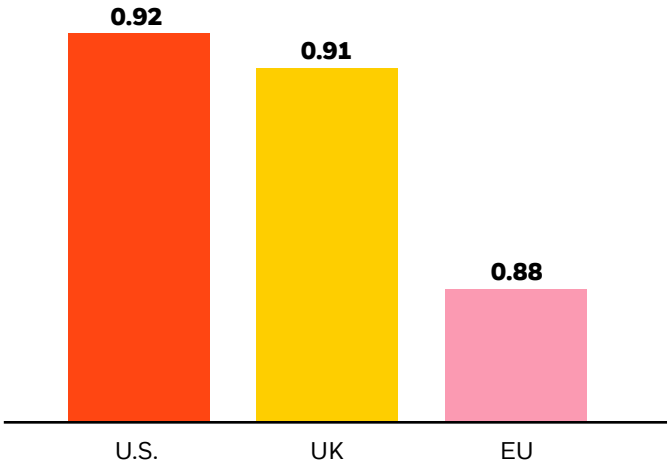
Inflation-linked debt

Canada LifePath portfolios have historically used Canadian Real Return Bonds (RRBs) as the inflation-linked debt asset class. However, since the Government of Canada ceased issuance, we turned to the international bond market to identify an alternative.

Our comprehensive analysis of global economic linkages and more than three decades of empirical data identified **hedged short-term U.S. Treasury Inflation-Protected Securities (TIPS)** as the optimal solution for Canadian lifecycle portfolios. This conclusion is based on two factors.

Firstly, we sought to verify the synchronisation of monetary policy using Overnight Interest Swaps (OIS) across a variety of financial markets, which serve as an indicator of expected short-term interest rates, reflecting market perceptions of future monetary policy decisions. Exhibit 3 below shows that the U.S. has the strongest correlation across different regions.

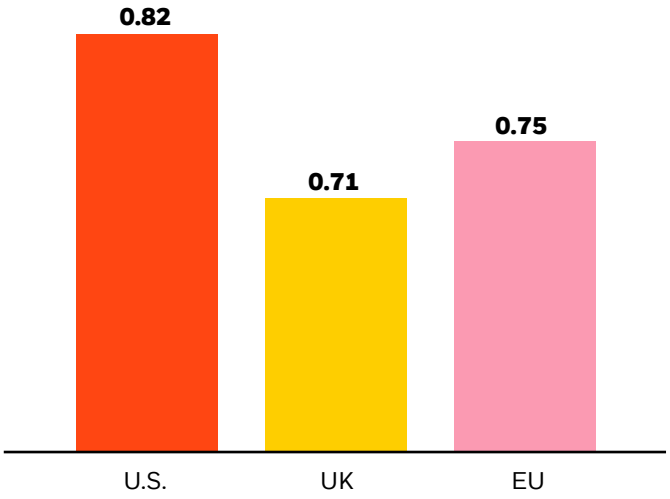
Exhibit 3: Correlation to Canada Overnight Interest Swap (OIS)



Source: BlackRock, from May 2002 to March 2025.

Second, we performed a more direct assessment of inflation dynamics using regional Consumer Price Indices (CPI). Exhibit 4 to the right highlights that U.S. CPI has historically had the highest correlation with Canadian CPI, compared to different regions. Despite current trade tensions, we expect this relationship to persist given geographic proximity, trade connectivity, and demographic similarity.

Exhibit 4: Correlation to Canadian Consumer Price Index (CPI)



Source: BlackRock, from January 1991 to March 2025.

With the relationship between the U.S. and Canada quantitatively established, we could begin investigating how different inflation-linked assets perform in high-inflation environments through regression analysis.

$$Y_i = \alpha + \beta_0 * E(I) + \beta_1 * (I - E(I)) + \epsilon$$

Where:

Y_i : *Time series of asset i return*

I : *Time series of realized inflation*

$E(I)$: *Time series of expected inflation*

B_0 : *Beta to expected inflation*

B_1 : *Beta to unexpected inflation*

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We used consensus estimates for E(I), with I-E(I) representing unexpected inflation (or shock inflation). We were most interested in the beta (or sensitivity) to this term. Exhibit 5 provides the results of this analysis, which found that hedged U.S. Short-Term TIPS have the highest beta to inflation shock.

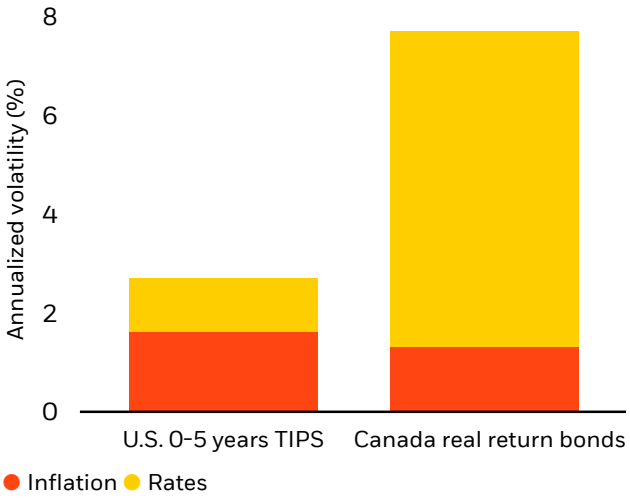
Exhibit 5: Beta to inflation shock

Asset class	Beta
U.S. Short-Term TIPS (Hedged)	**0.19**
World Inflation-Linked (Hedged)	-0.07
Canada 3-month Bills	-0.18
U.S. Short-Term TIPS (Unhedged)	-0.55
Real Return Bonds	-1.20
Universe Bonds	-2.06

Source: BlackRock, from January 2006 to March 2025.

The analysis also shows that the other relevant assets have negative betas, driven by the fact that their interest rate exposure (duration risk) largely offsets the inflation hedging characteristics. Exhibit 6 to the right illustrates this through a comparison between U.S. Short-Term TIPS and Canadian RRBs. We see that U.S. Short-Term TIPS have a much larger proportion of risk driven by inflation, compared to RRBs where the risk profile is dominated by interest rates.

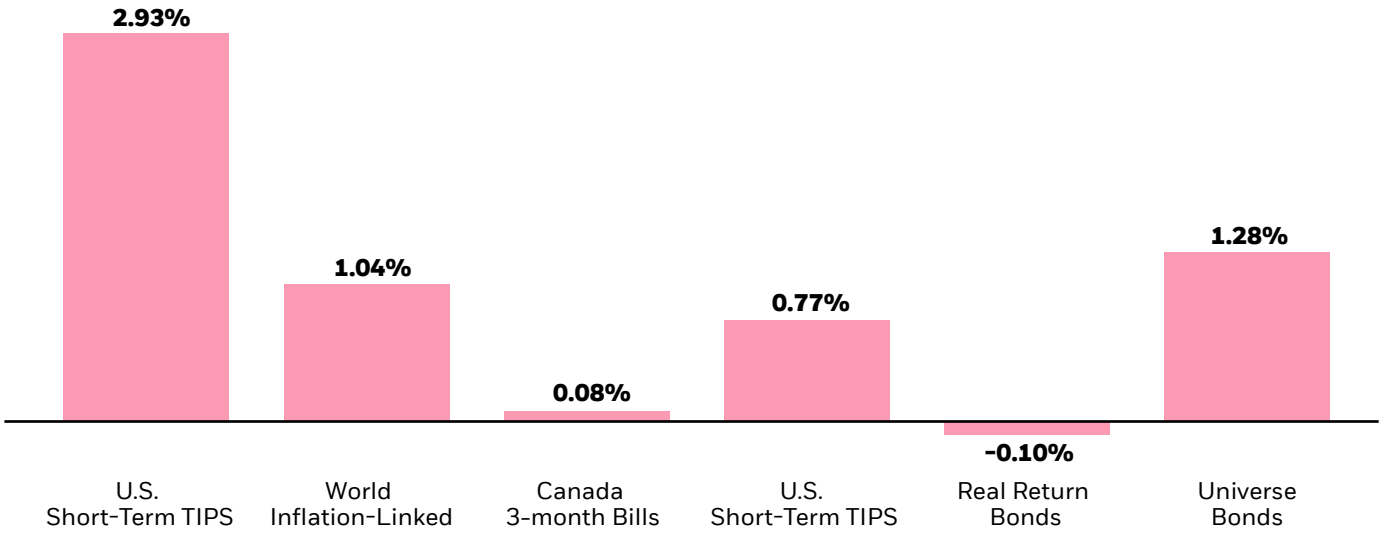
Exhibit 6: Risk decomposition



Source: BlackRock, as of March 31, 2025.

Finally, we compared the average performance of various fixed income indices under high inflation regimes (>2%) versus the average performance under low inflation regimes (<2%). Once again, the hedged U.S. Short-Term TIPS performed the best among the group (see Exhibit 7 below).

Exhibit 7: Average performance differences between high (>2%) and low (<2%) inflation regimes



Source: BlackRock, from January 2006 to March 2025.

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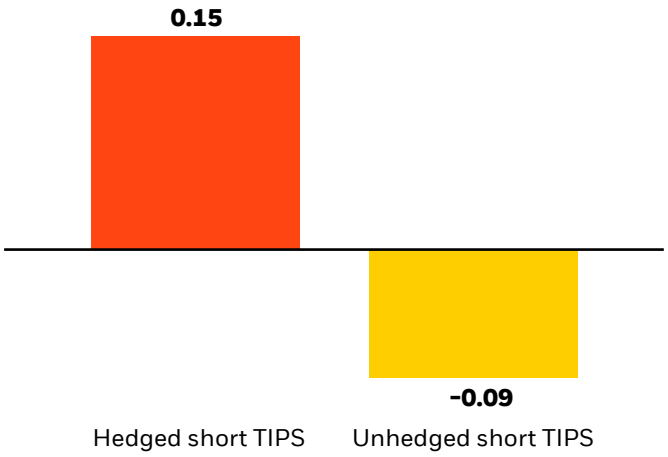
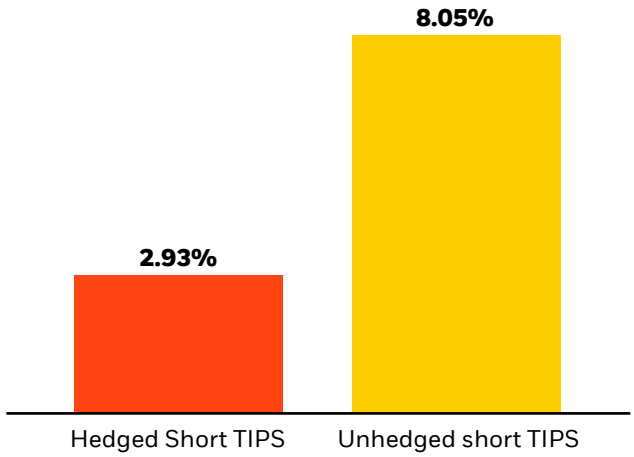
Exhibit 8: Correlation with Canadian CPI



Source: BlackRock, from October 2002 to March 2025.

Exhibit 9: Annualized volatility



Source: BlackRock, from October 2002 to March 2025.

When considering an allocation to foreign fixed income, we also revisited our currency hedging approach. Building on the research conducted in 2012, we concluded that the foreign fixed income exposure should be fully hedged to preserve the inflation hedging characteristics and low risk profile. Exhibits 8 and 9, above, highlight the impact of currency hedging in both respects.

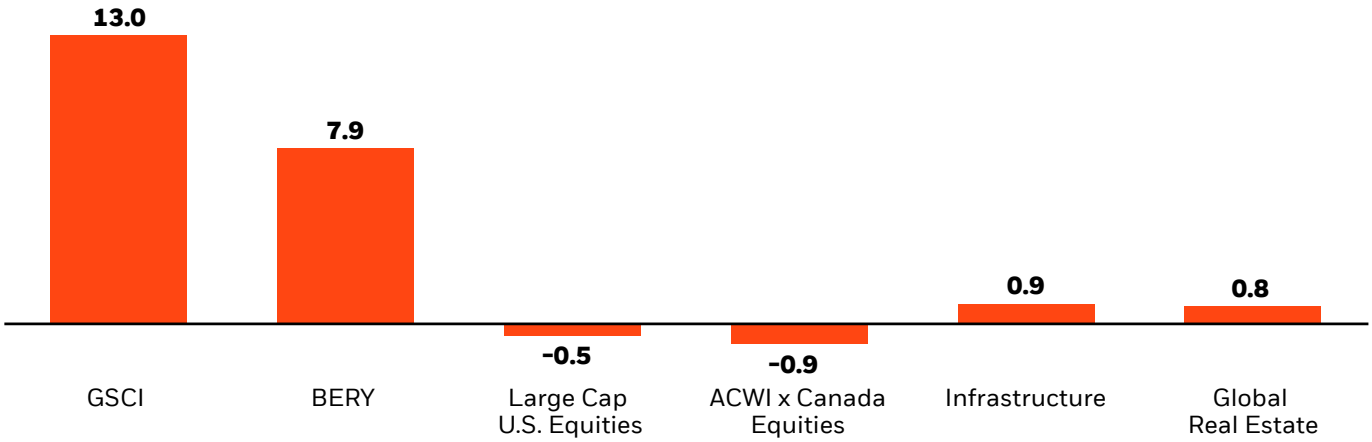
Commodities

Commodities offer one of the most effective hedges against unexpected (shock) inflation, thereby providing essential inflation protection (see Exhibit 10).

However, there is an opportunity cost to holding commodities over the long-term, given the lack of risk premia compared to equities. Investors can think of this as the insurance premium paid to insure against shock inflation risk. To address this challenge, BlackRock partnered with Bloomberg to develop an improved commodities index, seeking to strike a more appealing balance between inflation hedging characteristics and return expectation. This resulted in the launch of the Bloomberg Enhanced Roll Yield Index (BERY) in June 2021.

BERY is a broad-based, long-only commodity index harvesting the risk premium embedded in commodity curves. It bridges the traditional gap between liquidity and performance, mitigating the impact of negative carry and roll congestion while still offering high capacity.

Exhibit 10: Beta to inflation shock



Source: BlackRock, from December 2003 to March 2025. Note: Indices from left to right: S&P GSCI, Bloomberg Enhanced Roll Yield, S&P 500, MSCI ACWI x Canada, Dow Jones Brookfield Global Infrastructure, FTSE EPRA/NAREIT Developed.

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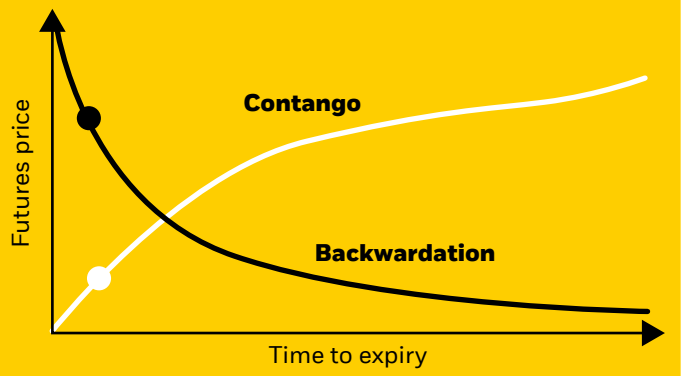
Breakdown of commodity futures returns
Due to rolling process, the returns of a commodity futures-based strategy are therefore a function of three variables:

- Spot return – changes in the commodities spot price
- Collateral return – interest earned on investment of cash collateral
- Roll return – gains or loses from 'rolling' commodities futures contract



Contango

An expiring contract is sold and a longer-term contract is purchased at a **higher price**

- May **negatively** impact long futures position

Contango example: Certain goods like oil or grain are costly to store and as a result the futures price of these goods may include a "cost of carry." E.g., the price today for a barrel of oil may be $80 but a futures contract for a barrel to be received three months from now may be $85, reflecting the added cost to the seller of storing that good until the buyer can take ownership. All else equal, the futures price will "roll" to the spot price today, reflecting a $5 loss to the buyer.

Backwardation

An expiring contract is sold and longer-term contract is purchased at a **lower price**

- May **positively** impact long futures position

Backwardation example: If future demand for a good is forecast to be lower than it is today, the futures market will reflect that lower demand via a lower futures price. E.g., at the end of winter, demand for natural gas to heat homes in the summer will be lower, so producers will be willing to sell their future supply at a lower rate today to lock in sales. All else equal, the futures price will "roll" to the spot price, resulting in a gain to the contract buyer.

BERY seeks to incorporate the curve premium by selecting up to four contracts across the term structure to benefit from the long-run structural shape of commodities futures curves. By avoiding concentration in a single contract and allocating up to four contracts along the curve (see Exhibit 11), BERY seeks to avoid a sudden move on the futures price curve, which could lead to high roll costs. This helps to reduce sensitivity to short-lived price shocks.

BERY also incorporates the backwardation premium by providing greater exposure to commodities that trade in backwardation as opposed to contango. The index optimizes for commodity allocation based on the difference in steepness of futures curves across commodities, allocating more to contracts with a greater backwardation premium.

Exhibit 11: Commodities futures curves

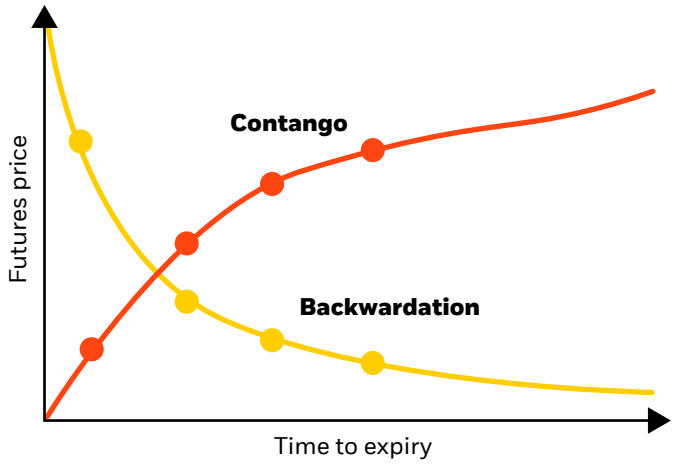


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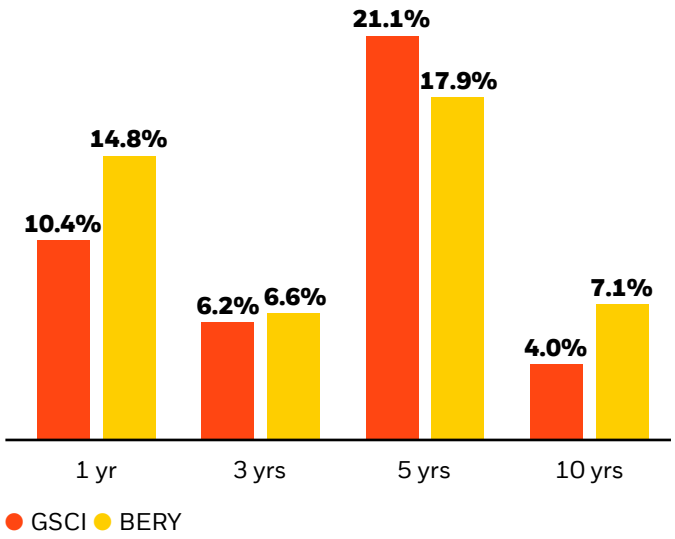
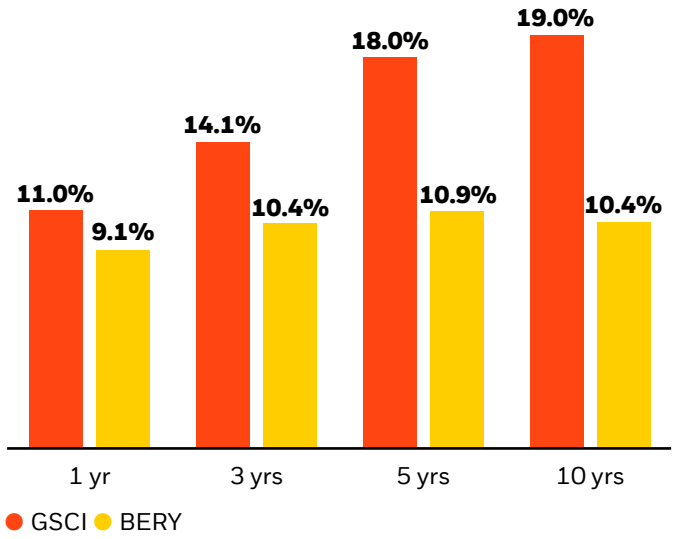
Exhibit 12: Historical return comparison



Source: BlackRock, from January 2003 to March 2025, in CAD.
Note: BERY Index launched on June 4, 2021; longer-term analysis uses back-tested data.

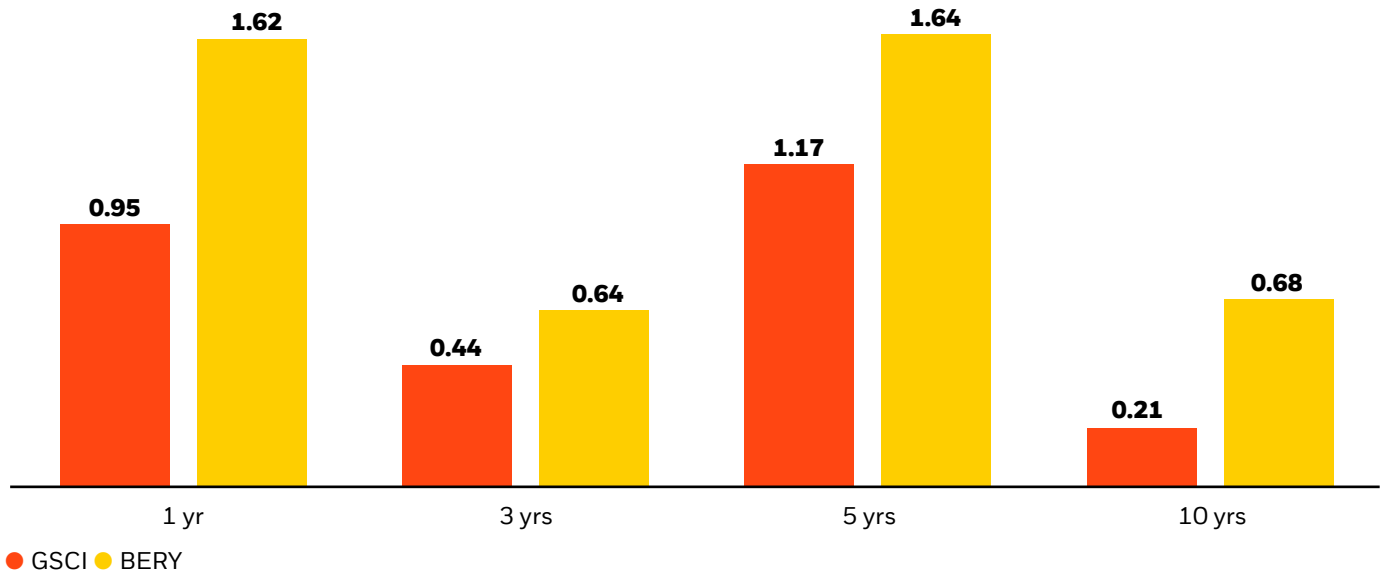
Exhibit 13: Historical risk comparison



Source: BlackRock, from January 2003 to March 2025, in CAD.
Note: BERY Index launched on June 4, 2021; longer-term analysis uses back-tested data.

Exhibits 12 and 13 provide a historical comparison of the returns and risk from both our current commodities exposure (S&P GSCI) and BERY. Exhibit 14 illustrates the combination of these dynamics and highlights that **BERY could offer a meaningfully improved risk-adjusted return profile**, while still providing significant protection against shock inflation (Exhibit 10). In addition, the replacement ETF that we intend to use to access the BERY index exposure will have ongoing expenses that are more than 50% lower than the current S&P GSCI ETF.

Exhibit 14: Risk-adjusted performance comparison



Source: BlackRock, from January 2003 to March 2025, in CAD.
Note: BERY Index launched on June 4, 2021; longer-term analysis uses back-tested data.

Increasing fixed income diversification

Fixed income investments carry two primary risk factors:

- **Rate risk** – The risk that increases (or decreases) in interest rates may reduce (or increase) the market value of a bond. Longer term bonds are most sensitive to interest rate changes and carry more interest rate risk relative to shorter term bonds. Rate risk can help offset equity risk, since longer term bonds often carry relatively low correlations to stocks.
- **Credit risk** – The risk that the borrower will default on their loans and bondholders will not be paid back. This risk is more of a concern for investors in corporate bonds rather than government-backed bonds. Credit risk can offer potentially greater long-term growth because corporate borrowers generally pay a higher yield to offset this risk for creditors.

Historically, Canada LifePath portfolios have held a broad-based, diversified index, such as the Canada Universe Bond Index, giving exposure to both factors. Our latest research explored whether retirement outcomes could be improved using more precise fixed income allocations, which evolve over a lifetime, in line with our GPS framework:

- Younger participants should have higher credit and rate exposure, to provide growth; and
- Older participants should have less credit and rate exposure, to provide protection.

For the retirement vintage specifically, it is also important to understand how much duration the portfolio should have. Therefore, our research also aimed to estimate the duration of liabilities for a 65-year-old.

$$\text{MADA}_{66}{}^{7} = \frac{\Sigma_{i=66}^{115} \$1 \frac{1}{(1+d)^{(i-65)}} (i-65) p_{66|i}}{PV(1+d)} p_{65|66}$$

Where d is the discount rate, and $p_{66|i}$ the cumulative survival rate between age 66 and i.

Using this computation, we estimate that the current duration of liability for a 65-year-old Canadian is between 6.5 and 7.5 years.

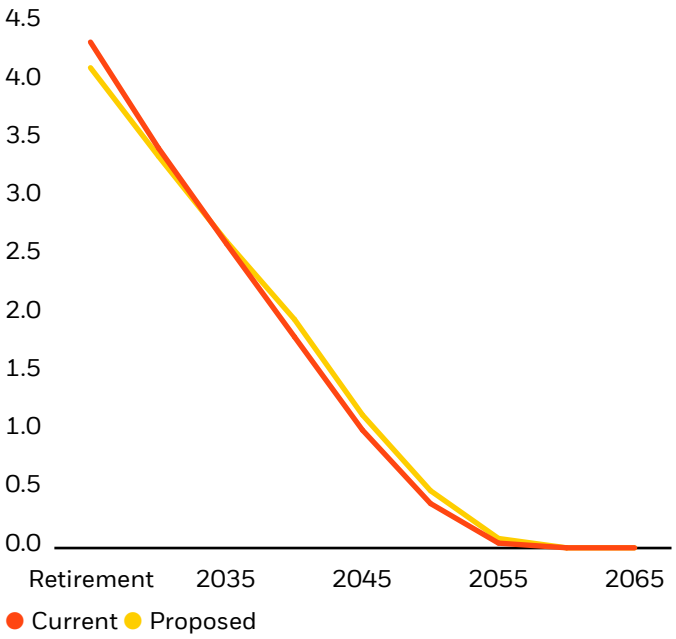
Based on these insights, we recommend adding the Canadian Long Bond exposure along most of the glidepath to balance the lower duration introduced by short-term TIPS. We also reaffirm that the Universe Bond is an appropriate exposure for most of the fixed income allocation in retirement. Exhibit 15, below, provides a comparison of key characteristics for these two exposures and Exhibit 16 shows a comparison of portfolio duration before and after the proposed changes.

Exhibit 15: Universe Bond and Long Bond comparison

	Duration	OAS[8]	DTS[9]
Universe Bond Index	**7.2**	**49.9**	**358.9**
Long Bond Index	**14.6**	**88.3**	**1,287.7**

Source: BlackRock, as of March 31, 2025.

Exhibit 16: Portfolio duration comparison



Source: BlackRock, as of March 31, 2025.

7 Note: MADA_n (Mortality Adjusted Duration at age n) represents the duration of an annuity, adjusted to account for mortality risk at a specific age n. **8** Option-Adjusted Spread (OAS) represents the yield spread over a benchmark curve, adjusted for embedded options, and is used to assess credit and liquidity risk in fixed income securities. **9** Duration Times Spread (DTS) is the product of a bond's spread duration and its option-adjusted spread (OAS), providing a measure of credit spread.

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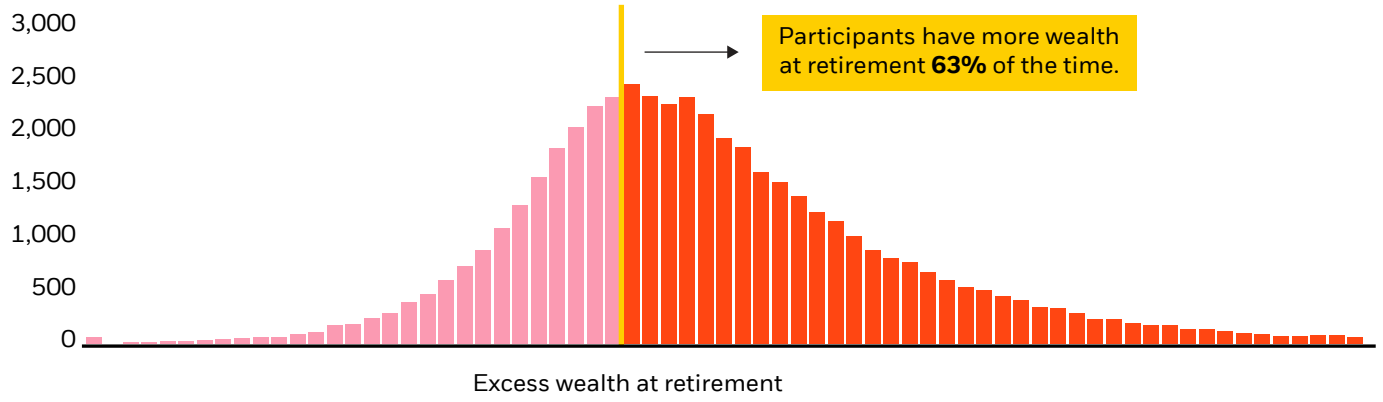
Outcome analysis

Exhibit 17: Distribution of excess wealth at retirement



Source: BlackRock, actual results may vary. For illustrative purposes only and not representative of any specific accounts or portfolios. Data is based on results of a Monte Carlo simulation that captures outcomes across a 45-year investment horizon. Relative wealth at retirement is derived from a comparison of LifePath model allocations before and after the research implementation. Excess wealth at retirement is calculated based on the number of positive outcomes produced by the Monte Carlo simulation out of 10,000 total observations. Frequency represents number of simulated observations. No representation is made that an investor will achieve results similar to those shown. Actual excess wealth could be higher or lower based upon a number of factors and circumstances not addressed herein. Please see page titled "Assumptions and methodologies" in Appendix for additional information.

Our comprehensive simulation engine modelled the potential improvements from these research enhancements across diverse market scenarios using the following assumptions:

- Typical Canadian income profile;
- 10% annual savings rate; and
- Full investment lifecycle from age 20 to 65.

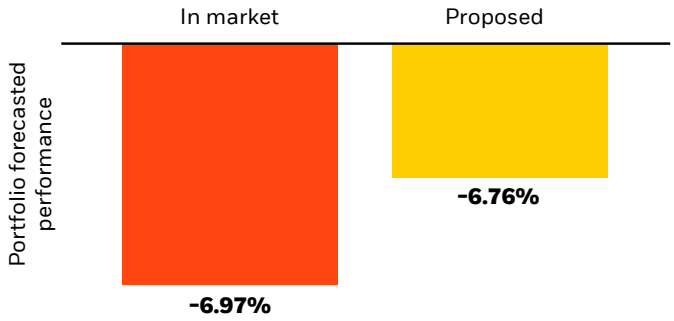
Exhibit 17 illustrates that the combination of our research enhancements could provide greater excess wealth at retirement 63% of the time, compared to the current Canada LifePath portfolios.

We also conducted stress testing to assess the resiliency of the proposed enhancements under a range of scenarios, of which we highlight two timely examples:

- **High inflation** environments paired with energy market dynamics (Exhibit 18); and
- **Global trade protectionism** (Exhibit 19).

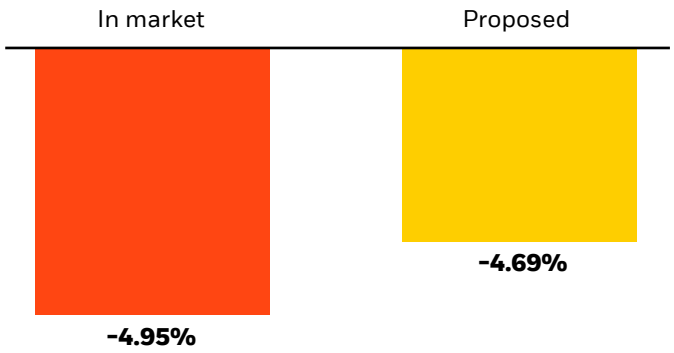
In both challenging environments, our proposed enhancements consistently demonstrated superior performance and improved risk management capabilities compared to the current portfolios.

Exhibit 18: High inflation and energy shock



Source: BlackRock, March 2025.

Exhibit 19: Global trade protectionism



Source: BlackRock, March 2025.

Conclusion

BlackRock's mission is to help more people invest better to live better. Canada LifePath has made investing for retirement easier and more affordable for millions of Canadians since 2007. Yet, as the world continues to evolve, so too must our portfolios. This is why our forward-looking, research-driven process is critical to delivering improved retirement outcomes.

These latest research enhancements will better prepare us for the future by enhancing our toolkit to manage different risks across the lifecycle. By further increasing the precision of our inflation hedging allocations and introducing more diversification into the fixed income allocation, **we expect to deliver better retirement outcomes for Canadians 63% of the time.**

Summary of changes

Career stage	Lifecycle insight	Portfolio changes
Early	Young plan members need less inflation hedging assets and should maximize growth exposure.	Further reduce inflation hedging assets and re-allocate to global equity.
Mid	Dynamically managing lifecycle risks becomes increasingly important on the approach to retirement.	Add Canadian Long Bonds to increase diversification and increase the toolkit for managing risks.
Near/In Retirement	Focus on protecting against shock (not total) inflation.	Add hedged short-term TIPS and next-generation commodities index exposure to enhance the inflation hedging basket.

Appendix

FTSE Canada Long Term Overall Bond Index: The FTSE Canada Long Term Overall Bond Index (the "Index") provided by FTSE Global Debt Capital Markets Inc. (the "Index Provider") is a market capitalization-weighted index consisting of a broadly diversified range of bonds which may include any or all of federal, provincial, corporate (including certain qualifying asset-backed securities) and municipal bonds. The securities included in the Index consist primarily of semi-annual pay fixed rate bonds issued domestically in Canada and denominated in Canadian dollars, with an investment grade rating (as determined by the Index Provider) and a remaining effective term to maturity of at least ten years.

ICE 0–5 Year U.S. TIPS (CAD Hedged): The ICE U.S. Treasury 0-5 Year Inflation Linked Bond Index (the "Index") is provided by ICE Data Indices, LLC (the "Index Provider") and consists of inflation-protected public obligations of the U.S. Treasury, commonly known as "TIPS," that have a remaining maturity of more than one year. TIPS are securities issued by the U.S. Treasury that are designed to provide inflation protection to investors. TIPS are income-generating instruments whose interest and principal payments are adjusted for inflation — a sustained increase in prices that erodes the purchasing power of money.

Bloomberg Enhanced Roll Yield Index: The Bloomberg Enhanced Roll Yield Index (the "Index") is designed to be a liquid and diversified benchmark for commodity investments. The Index provides broad-based long exposure to commodities through synthetic positions in futures contracts with no single commodity or sector controlling the Index.

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Assumptions and methodologies

Estimated impact of excess wealth at retirement

Excess wealth figures are generated using Monte Carlo simulation, which is a statistical modeling technique that forecasts a set of potential future outcomes based on the variability and randomness of asset class returns. The model does not reflect every factor that can have a significant impact on excess wealth results. Any changes in the assumptions applied to the model would affect the results shown in this material.

General assumptions

- Sample Participant joins the workforce at age 20.
- Sample Participant assumed retirement age is 65.
- Sample Participant income as determined by the annual Canadian Income Survey ("CIS") dataset, a key data point in our lifecycle model.
- Sample Participant contributes to the CAP plan (starting at the "Contributing since age") throughout his or her career with no periods of unemployment (i.e. Sample Participant stays with the same employer throughout his/her working career).
- The calculation assumes no leakage (i.e., no CAP assets are withdrawn prior to retirement).
- The calculation assumes all figures are in real (today's) dollars.
- Contributions to the CAP plan are made at the end of each month.
- CRA limits are not considered.
- Balances in the CAP plan are allocated to the selected asset classes/strategies for the entire time period until retirement at age 65.
- Assumed return and assumed risk are based on the target date asset class allocations that correspond to the expected retirement age selected by the user and the long-term capital market assumptions provided by the BlackRock Investment Institute ("BII").

BlackRock publishes capital market assumptions periodically. Long-term capital market assumptions are subject to high levels of uncertainty regarding future economic and market factors that may affect actual future performance. There is no guarantee that the capital market assumptions will be achieved, and actual returns could be significantly higher or lower than those shown. Capital market assumptions should not be relied on as a forecast or prediction of future events, and they should not be construed as guarantees as to returns that may be realized in the future from any investment or asset class described herein. Ultimately, the value of these assumptions is not in their accuracy as estimates of future returns, but in their ability to capture relevant relationships and changes in those relationships as a function of economic and market influences. Because of the inherent limitations associated with the use of capital market assumptions and projections, the user should not rely exclusively on the projected outcomes when making a decision. The projected outcomes cannot account for the impact that economic, market, and other factors may have on the implementation and on-going management of an actual retirement plan. Unlike actual outcomes, the projected outcomes do not reflect actual trading, liquidity constraints, fees, expenses, and other factors that could impact an investor's realized future returns. Indexes are unmanaged and do not reflect any management fees, transaction costs or expenses. It is not possible to invest directly in an index.

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