



## Synthetic Canada Real Return Bond Replication Strategies to Help Manage Inflation-Linked Liability Risk

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**Canada Real Return Bonds (RRBs) are federal government issued and guaranteed bonds where coupon payments and principal are adjusted to inflation. The inflation-sensitive aspect of RRBs has made them an attractive asset for Canadian investors, particularly for those employing liability-driven investment (LDI) strategies. A successful inflation hedging solution supplements nominal bonds by providing exposure to both the realized inflation and inflation breakeven (market implied) rate so that portfolio cashflows and valuation move in line with that of liabilities that are sensitive to inflation.**

The Government of Canada (GoC) announced the decision to stop the issuance of Canada RRBs in November 2022 citing lack of demand.<sup>1</sup> Since the announcement, the liquidity, duration and availability of the outstanding pool of RRBs have been decreasing.

<sup>1</sup> GoC Press release of 3<sup>rd</sup> November 2022. The Federal Government had been issuing RRBs regularly since 1991.

Unless the federal government begins reissuing RRBs, investors will likely require alternatives to RRBs in their portfolios, where the replicating strategies will proxy the RRB returns to a satisfactory level. To achieve this outcome, solutions structured on fixed income and commodities show promising results. At first, we review potential solutions structured with fixed income solutions to best replicate Canada RRBs, and later work will focus on commodities-based alternatives. The paper outlines how the use of simple fixed income-based derivatives allow investors to replicate Canada RRB returns with low tracking and tight long-term cumulative fit.

Our analysis shows that for investors looking to replicate the Canadian RRB exposure with fixed income instruments, combining Canada nominal bonds with a long position in zero coupon US inflation swaps provides the best fit. Another attractive option particularly when considering its added benefit of deeper liquidity, is to combine the Canada nominal bonds with the long US breakeven trade using short US Treasuries and long US TIPS exposure.

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## 1 Canada RRB market and alternatives

With the announcement by the GoC to cease the issuance of RRBs, liquidity has been steadily decreasing. Larger portfolios of RRBs can still be managed with secondary market liquidity. However, rebalancing portfolios of RRBs takes a longer timeframe and may come with higher transaction costs.

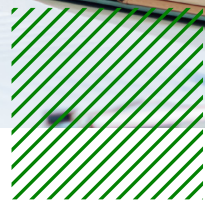
In absence of renewed RRB issuance by the GoC, liquidity will continue to worsen. Over time, the duration of the outstanding pool of RRBs will decrease to a point where it will fall short of the duration requirement of pension plans that use RRBs to hedge long dated inflation-linked liabilities. The Canadian overall RRB market is limited and provides few inflation-linked instruments. GoC-issued RRBs are more liquid than Provincial RRBs. The Corporate RRB market is virtually non-existent in Canada.

There are several possible alternatives to Canada RRBs. Investors may consider the merits of these alternative strategies by looking at their ability to minimize transaction costs and provide closer tracking against Canada RRBs. In the fixed income space, the most promising alternatives to Canada RRBs can be structured with the US Treasury Bonds and Treasury Inflation Protected Securities (TIPS) bonds by forming a long inflation breakeven trade and combining the position with Canadian nominal bonds. TIPS is the U.S. bonds government equivalent of Canada's RRBs, offering the benefits of far better liquidity. TIPS-based solutions, however, introduce a degree of inflation breakeven basis between Canadian and US inflation risks, as well as currency risks that need to be hedged.

## 2 Synthetic replication of Canada RRBs

The key in replicating Canada RRBs is to obtain synthetic exposure to the Canada breakeven inflation rate. This can be done in a couple of different ways working with existing instruments that provide cashflows linked to an inflation index (such as the Canada Consumer Price Index (CPI) (and its equivalent in the U.S.)). Examples of such securities are RRB in Canada and TIPS in the United States. These securities offer coupons and capital adjusted for the realized CPI. 1) A simple transaction consisting

of going long the inflation linked bond and short the nominal bond results in the inflation breakeven rate exposure. 2) Other financial derivatives instruments such as Zero-Coupon Inflation Swaps (ZCIS) can also provide exposure to the inflation breakeven rates. Capital efficient overlay exposure to breakeven rates can be structured with simple derivatives contracts such as swaps, repos and forwards.



### 3 Overview of Canada Real Return Bonds replication strategies

We assess the merits of replication strategies in terms of fit against Canada RRBs over a long-term investment horizon. Four alternatives to Canada RRBs are considered:

- a. Portfolio 1 consists of Canada Nominal Bonds
- b. Portfolio 2 consists of US TIPS currency hedged back to CAD
- c. Portfolio 3 consists of Canada Nominal Bonds + Long US 10-yr Zero Coupon Inflation Swap (currency hedged)
- d. Portfolio 4 consists of Canada Nominal Bonds + Long US TIPS, short US nominal bonds (currency hedged)

The addition of U.S. TIPS and ZCIS complements an inflation solution designed around traditional Canada RRBs by enhancing liquidity through access to a deeper secondary market with tighter bid/offer.

The allocation choice between the alternatives should consider striking a balance between liquidity,

cost, speed of implementation and basis risk against Canada inflation breakeven rate in the context of each portfolio's specific inflation hedging objective. The analysis of the portfolios shows the following:

- a. Portfolio 1 provides a decent short-term fit but relatively less appealing long-term historical fit against the Canada RRB Index
- b. Portfolio 2 shows the least appealing historical fit, both in terms of tracking and long-term fit against the Canada RRB Index, compared to the other portfolios
- c. Portfolio 3 provides the best short and long-term fit; however, liquidity may be challenging for larger portfolios
- d. Portfolio 4 provides a good balance of short-term and long-term fit versus RRBs along with ample liquidity

We elaborate on the analysis<sup>2</sup> below.

<sup>2</sup> Annualized Tracking Error: is the annualized standard deviation of the difference in daily returns between the replicating Portfolio and its benchmark. It helps understanding the short-term fitness variability of the portfolio against its benchmark.

Cumulative Return RMSE: is the square root of the cumulative squared differences in daily returns between the replicating Portfolio and its benchmark and is an indicator of cumulative variability of the long-term fitness of the replication portfolio.

Cumulative Return Deviation: is the cumulative differences in daily returns between the replicating Portfolio and its benchmark.

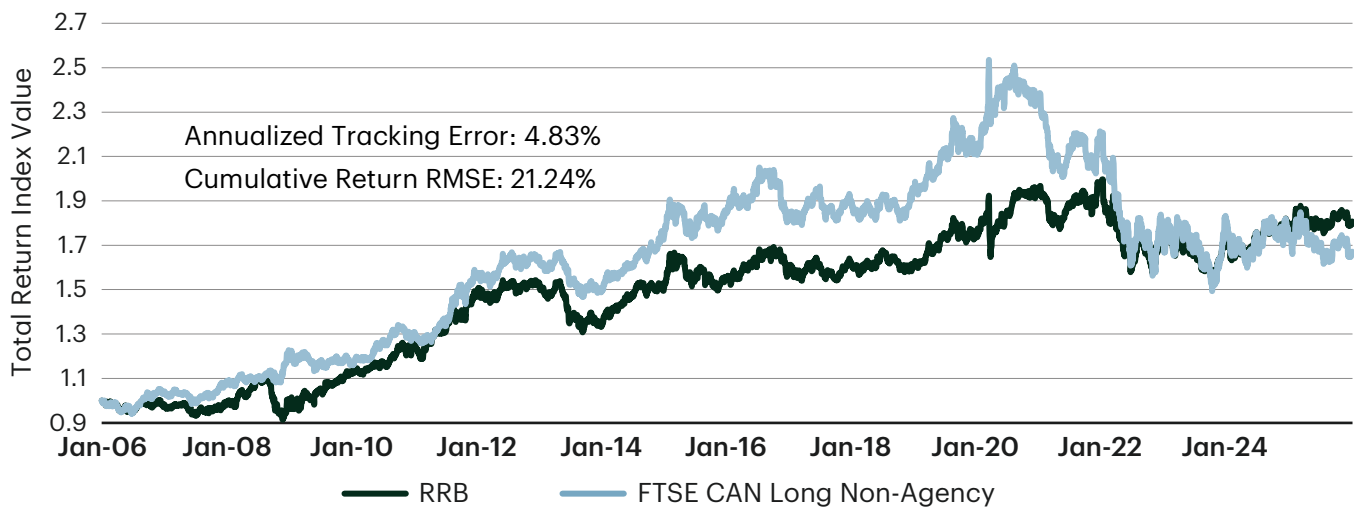
# 4 Canada Real Return Bonds replication strategies (Detailed)

## a. Portfolio 1: Canada Nominal Bonds

We first look at the historical performance of Canada nominal bonds against Canada RRBs. In a stable inflation regime, we would generally expect RRBs and nominal bonds to track closely. However, inflation expectations volatility tends to increase during periods of higher inflation or economic uncertainty. RRBs are expected to perform strongly when market participants are concerned with increased inflation risk. Nominal bonds tend to outperform during

periods of economic volatility when deflationary pressures dominate. Our analysis of Canada nominal bonds as a substitute to RRBs showed a poor fit with a high annualized and cumulative tracking error. Given that the period analyzed (2006–2025) was largely characterized by stable, low inflation, these results were slightly surprising. Going forward, we expect the tracking to be even higher if inflation expectations become more volatile.

**Backtest: Long Canada Non Agency Nominal Bonds 2006-2025**



**Cumulative Return Deviation**



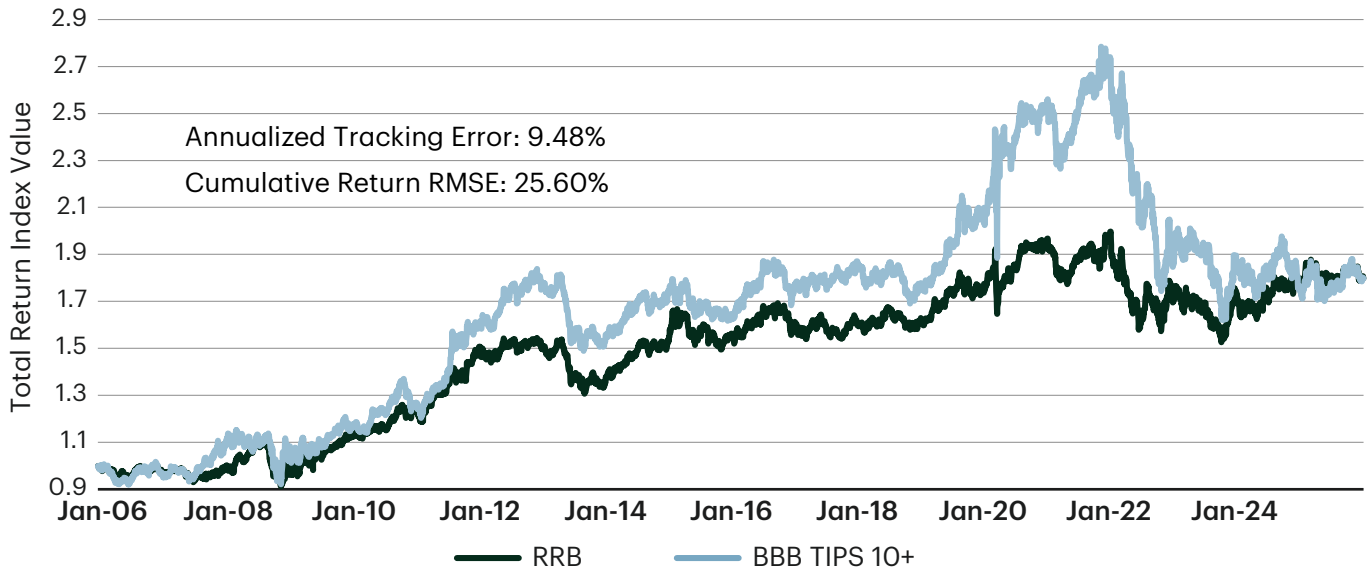
Source: TD Asset Management Inc. As at 31<sup>st</sup> December 2025.

## b. Portfolio 2: US TIPS currency hedged

US TIPS principal and coupons are linked to realized US inflation as measured by the US CPI. Historically, US and Canadian inflation have moved somewhat in tandem. However, the analysis finds the fit of currency-hedged TIPS to be poor against RRBs. This

may be due to the gaps between the monetary and fiscal policies of Canada and the US, which in turn create different yield curve movements and drives the variability between Canada RRBs and US TIPS securities returns.

### Backtest: Long US TIPS 2006-2025



### Cumulative Return Deviation



Source: TD Asset Management Inc. As at 31<sup>st</sup> December 2025.

### c. Portfolio 3: Canada Nominal Bonds + Long 10-year Zero Coupon Inflation Swap (currency hedged)

The third and fourth iterations are designed with Canadian nominal duration exposure to leverage the fact that RRBs and Canadian nominal bonds share sensitivity to the same Canadian interest rates curve. The third iteration combines Canadian nominal bond exposure with a US 10-year ZCIS.

The ZCIS solution is structured as follows:

- Long Canada nominal bond
- Long fixed for float 10-year USD ZCIS
- USD/CAD currency forward periodically calibrated to the fluctuating market value of the ZCIS

A ZCIS is a standard over the counter (OTC) derivatives instrument by which a payment defined in terms of a fixed rate on a notional amount is exchanged for a payment defined in terms of the inflation rate realized over a predetermined time horizon. The ZCIS contractual rate provides a fairly accurate estimate of the “breakeven” inflation rate.

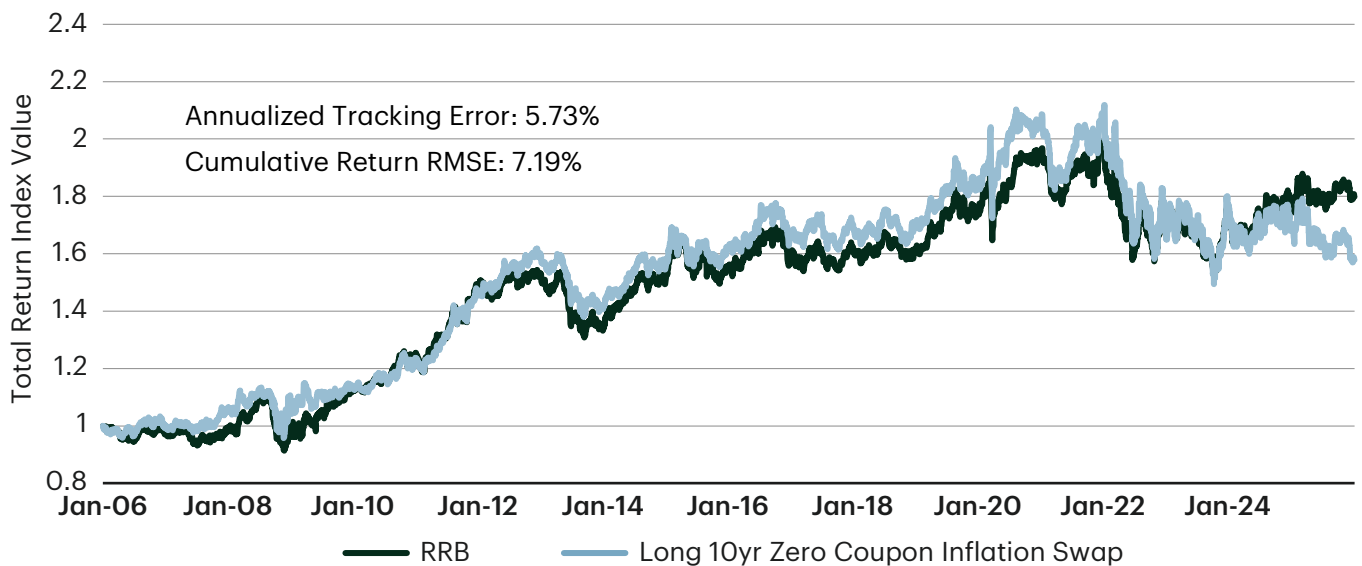
The fixed rate of ZCIS indicates the market’s anticipated inflation rate over the contract period. The ZCIS payoff is defined as the difference between the fixed payment leg which corresponds to the current expected rate of inflation and the variable payment leg which corresponds to the realized rate of inflation as measured by the cumulative change in the headline CPI.

As with most swaps, the ZCIS is initially valued at par. Over time, the path of realized inflation and the variation in market expected inflation rate (breakeven) will impact the value of the swap. From the inflation protection buyer perspective, the value of the swap will go up when inflation realizes above the swap contractual rate. The ZCIS outstanding net swap mark-to-market exposure is calculated daily, and the corresponding collateral is exchanged between counterparties. Summarizing key features of US ZCIS:

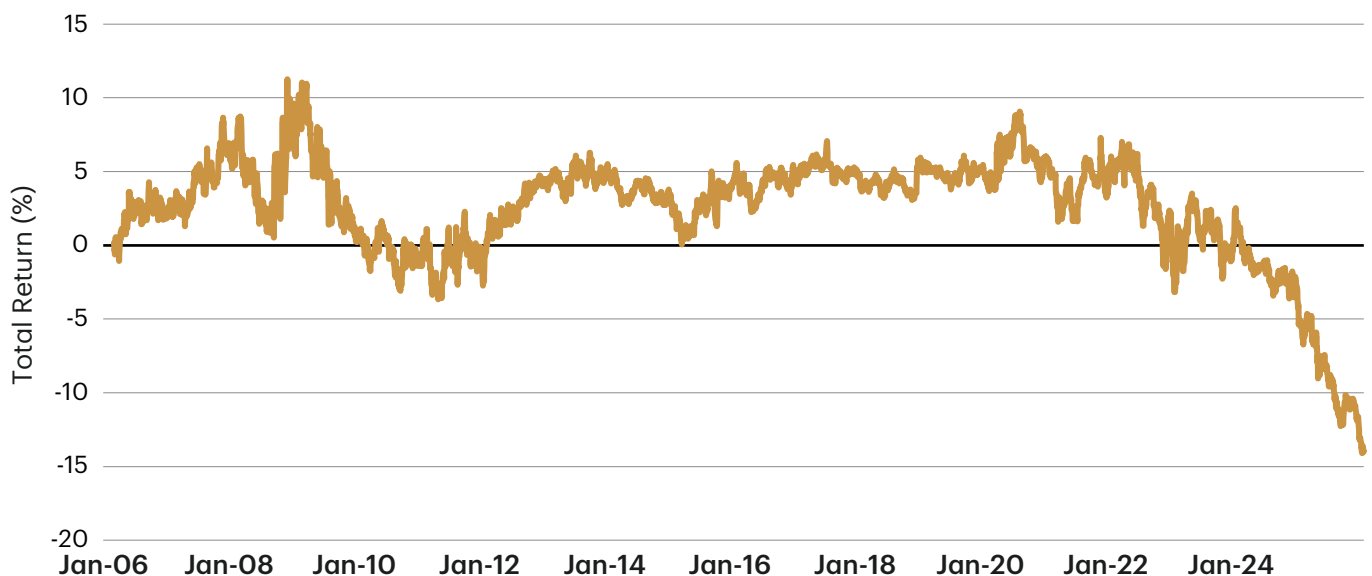
- Standard but highly customizable derivatives contract.
- Liquidity – Not as high as US treasuries or TIPS. Blocks of USD 150 million clear with minimal market impact
- Mid-to-offer spread is estimated to be between 2 and 3 yield basis points (bps) depending on tenor and market conditions
- Can be terminated by buying out the counterparty at the contract market value before maturity
- Governed by bilateral International Swaps and Derivatives Association (ISDA) agreement that need to be in place between the investor and the dealer-bank offering ZCIS

The USD/CAD currency risk embedded in the USD ZCIS is hedged with a currency forward. The currency forward hedge notional is periodically rebalanced to the prevailing market value of the ZCIS. Hedging Canadian inflation with a US CPI based derivative is imperfect by design. The strategy incurs the basis risk between 1) US and Canada inflation breakeven rates and 2) realized respective US and Canada CPIs. The historical return of the Portfolio 3 ZCIS strategy against the Canada RRB benchmark is shown in the following chart.

## Backtest: Canada Nominal + 10yr US ZCIS 2006-2025



### Cumulative Return Deviation



Source: TD Asset Management Inc. As at 31<sup>st</sup> December 2025.

Compared to Portfolio 2, the annual tracking error is low, but where the strategy really shines is in its cumulative return error RMSE (Root Mean Square Error) of only 7.19%, significantly less than Portfolios 1 and 2. The reasonable proxy makes the ZCIS strategy a viable option to replicate the return of Canada RRBs.

ZCIS also offers operational advantages. ZCIS terms are flexible and once in place, the contract is low touch and does not require periodic rollovers

associated with other derivatives like futures or delayed settlement bonds (sell/buyback repos). On the downside, ZCIS implementation can be cumbersome as it requires a bilateral ISDA. While liquidity exists, it is somewhat limited as only select US counterparties make markets for ZCIS. ZCIS transaction costs are reasonably competitive with a mid to offer yield spread of 2 to 3 bps.

#### d. Portfolio 4: Canada Nominal Bonds + Long US TIPS, short US nominal bonds (currency hedged)

The fourth strategy consists of replicating Canada RRBs by combining a long position in Canada nominal bonds with the US inflation breakeven rate trade. The strategy consists of the following:

- Long Canada nominal bond
- Long US TIPS
- Short US Treasuries
- USD-CAD currency-forward periodically calibrated to the net market value of the long/short positions

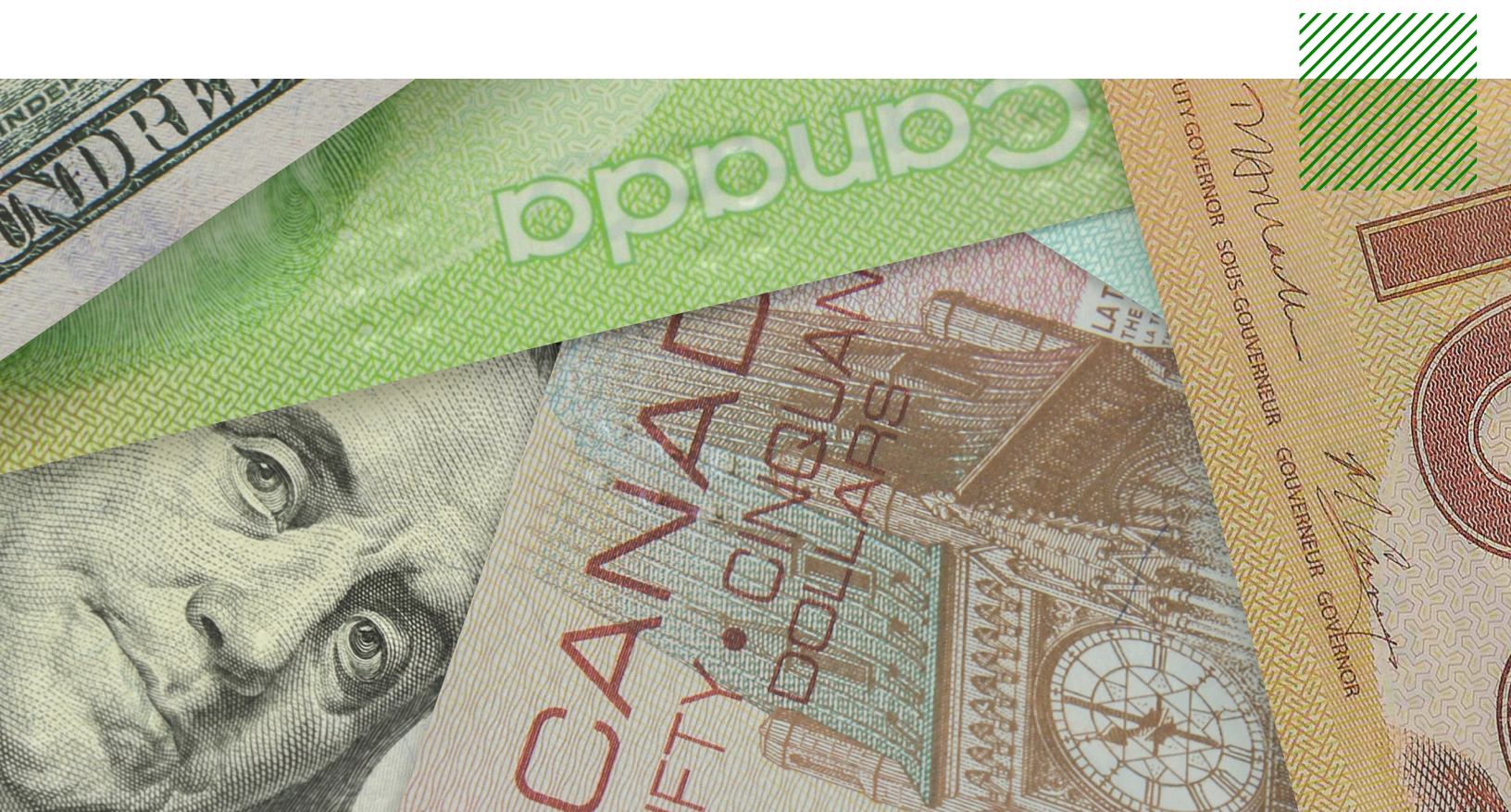
##### Long Inflation Linked Bond, short nominal

This portfolio is based on the inflation-capturing trade of long Canada RRBs, short Canada nominal or the US equivalent of long TIPS, short Treasuries. The simple long-short trade net exposure is the inflation breakeven rate. The long RRB/TIPS and short nominal bond trade can be structured synthetically using repos and reverse repos<sup>3</sup> or simply by using the proceeds of the short leg to finance the long leg<sup>4</sup>.

Using repos, the expected net annual cost of financing the long and short bond positions is

estimated to be between 15 and 25 bps which is the expected difference between the US TIPS repo borrow cost and US treasury reverse repo lending rate. The long and short positions' duration offset each other, resulting in little to no net interest rates (duration) risk. The trade resulting net exposure is the RRB/TIPS breakeven inflation rate net of annual financing cost.

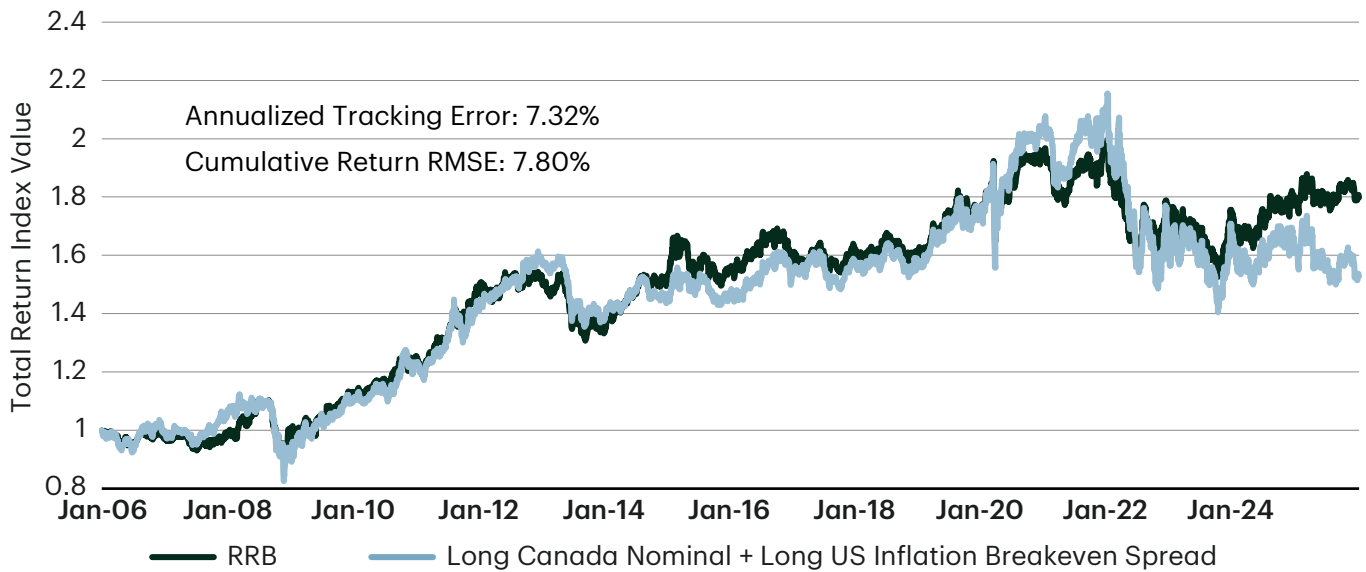
Conceptually, Portfolios 3 and 4 both add a synthetic exposure to the US breakeven rate (market implied expected future US inflation) exposure to Canada nominal (Canadian rates duration exposure). The difference between 3 and 4 lies in the substitution of the ZCIS with a long TIPS, short Treasuries trade structured using repos and reverse repos. As in Portfolio 3, the USD/CAD currency risk embedded in the USD exposure of the TIPS/Treasuries trade is hedged with currency forwards. The amount of currency forwards notional hedge is periodically rebalanced and calibrated to the net market value of the long-short positions. The historical efficacy of replicating Portfolio 4 against its RRB benchmark is shown in the following chart.



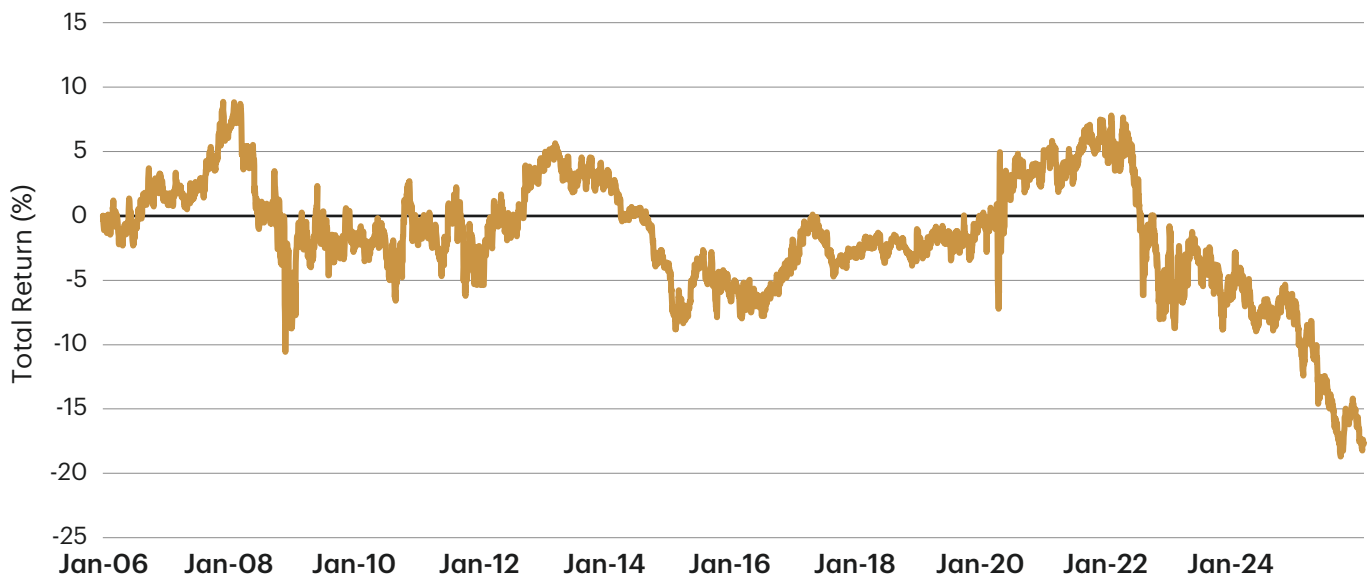
<sup>3</sup> This arrangement is usually traded under a Global Master Repurchase Agreement (GMRA).

<sup>4</sup> This arrangement is traded under a Global Master Securities Lending Agreement (GMSLA).

## Backtest: Long Canada Nominal + Long US Inflation Breakeven Spread 2006-2025



### Cumulative Return Deviation



Source: TD Asset Management Inc. As at 31<sup>st</sup> December 2025.

Compared to Portfolio 3, we find that the Portfolio 4 historical return tracks that of the RRB benchmark with a higher annualized tracking error (7.32% vs 5.73%) and similar cumulative long-term fit (7.80% vs 7.19%). While the replicating power of Portfolio 4 is not as strong as that of the ZCIS strategy, it still offers a proxy tracking that should help achieve the objective of a close replication of the return of the Canada RRBs. However, what this strategy takes away with a slightly higher tracking error, it makes

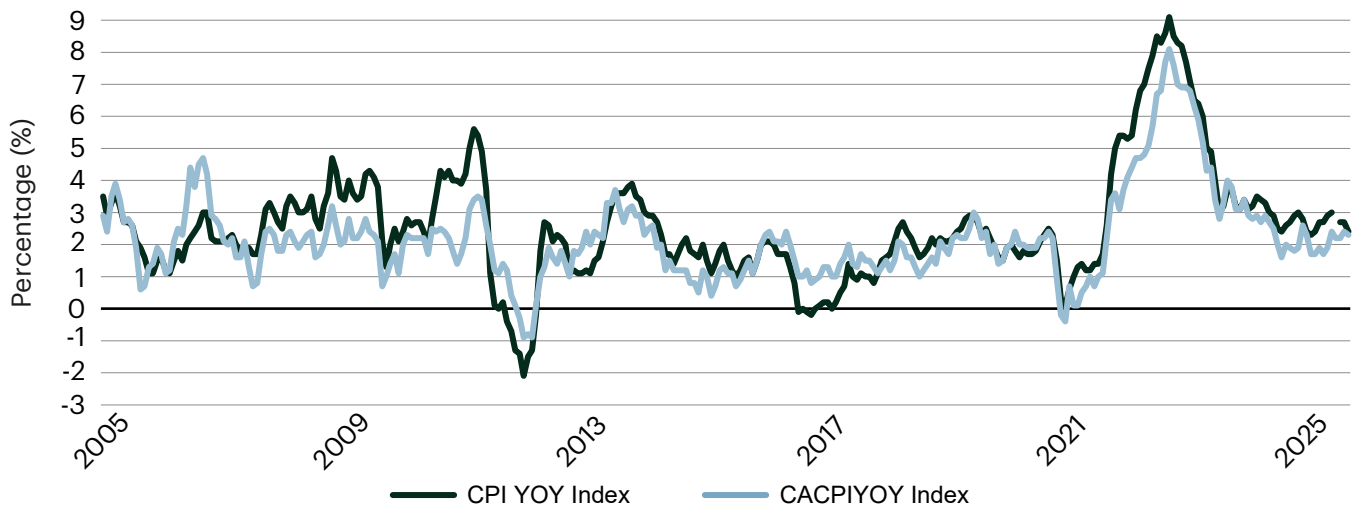
up for with additional liquidity. The US TIPS market is highly liquid with a mid to offer yield spread of less than 0.3 bps. The market provides adequate depth to implement large portfolio sizes in the billions range in a matter of days or weeks. With the currency risk of the strategy hedged and the CAD rates duration exposure preserved, the basis risk between the US and Canada breakeven rates and realized inflation is the main driver of the tracking error of Portfolios 3 and 4.

## 5 Risk considerations: Basis risk between US and Canada breakeven inflation rates

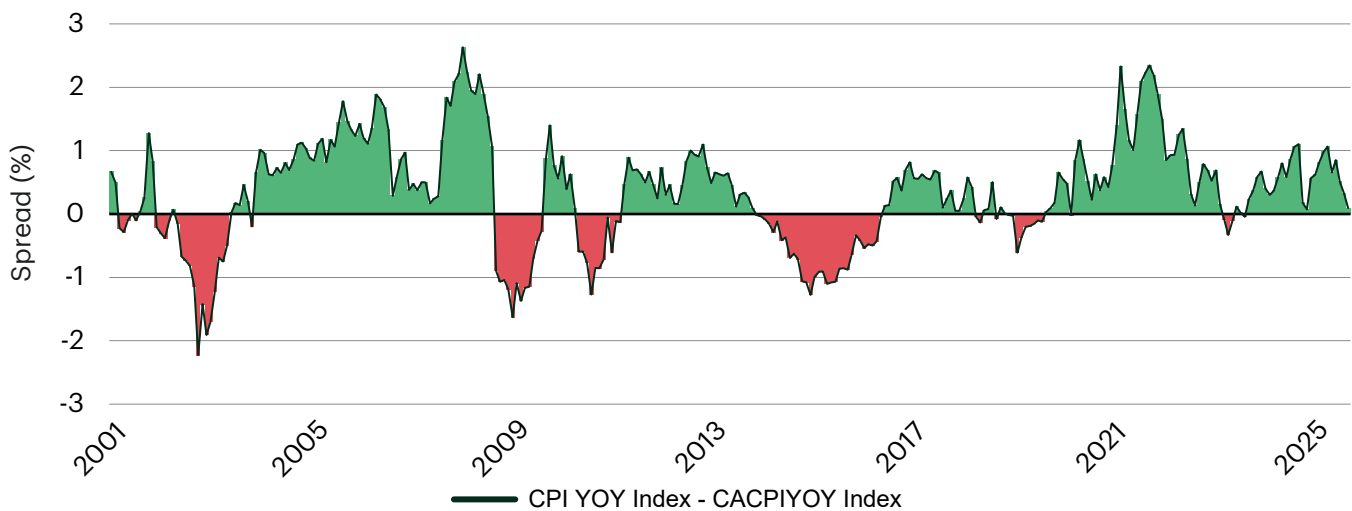
Hedging the Canada break even inflation rate with financial instruments tied to the US CPI is imperfect by design. The main economic risk of concern is the basis risk between the changes in the US and Canada inflation breakeven rates as well as differences between the realized inflation figures. On a reassuring note, the analysis above showed the historical effectiveness in terms of short- and long-term fit<sup>5</sup> of US based TIPS and ZCIS strategies (Portfolios 3 and 4) against returns of the Canada

RRB index. Given the tight economic integration of the Canadian and American economies, the intuitive expectation that the inflation levels generally move in tandem is largely supported by the empirical evidence. Looking at the historical data between 2001 and 2026<sup>6</sup> shown below, we find that the average spread between the year over year US and Canadian price indices {CPI YOY vs CACPI YOY} has been around ~35 bps over the period.

**US and Canada yoy CPI Indexes March 2001 to Jan 31<sup>st</sup> 2026**



**Spread between US and Canada CPI Indexes March 2001 to Jan 31<sup>st</sup> 2026**



Source: TD Asset Management Inc. As at January 2026.

<sup>5</sup> Annualized tracking error and long term fit as measured by the cumulative RMSE.

<sup>6</sup> Bloomberg data from March 2001 to end of January 2026.

## 6 Summary: Synthetic inflation hedging strategies

	Portfolio 1	Portfolio 2	Portfolio 3	Portfolio 4
	Canada Nominal Bonds	US TIPS (Currency Hedged)	Canada Nominal + ZCIS (Currency Hedged)	Canada Nominal + Long US TIPS, short U.S. Treasuries (Currency Hedged)
<b>Liquidity</b>	+++	+++	++	+++
	<i>Comment: Daily social size RRB: 5mm, TIPS: 200mm+ ZCIS: 50mm-150mm</i>			
<b>Tracking CAD CPI / Breakeven</b>	+	+++	+++	+++
	<i>Comment: RRB indexed to Canada CPI. TIPS/ZCIS US CPI (small basis risk)</i>			
<b>CAD curve duration tracking</b>	+++	+	+++	+++
<b>Transaction Cost</b>	+++	+++	++	+++
	<i>Comment: Bid/offer: RRB 4bps, TIPS 2bps, ZCIS; 5bps</i>			
<b>Documentation</b>	N/A	GMRA	ISDA	GMRA
	<i>Comment: Tight MTM collateralization</i>			
<b>Collateral Requirement</b>	N/A	N/A	Required	Required
<b>Risk</b>	low	low	Rollover Risk	Rollover Risk
	<i>Comment: ZCIS, low maintenance once in place</i>			
<b>Key takeaways</b>	Not a good proxy to RRB returns	U.S. version of Canada RRBs. High liquidity. US CAD duration basis risk significant	Sufficient liquidity, smallest cumulative tracking vs RRBs, low operational maintenance once trade is in place	Most liquid, good fit vs Canada RRBs. More taxing operationally (repos / fx hedges rollover)

Source: TD Asset Management Inc.

## Conclusion

As highlighted in the RRBs portfolios replication summary table above – the choice of a RRB replication strategy will depend on multiple factors and comes down to the trade-off between US/CAD realized and market expected inflation basis risk, liquidity and costs associated with each of the alternatives at different portfolio sizes. While none of the proposed solutions perfectly replicates Canada RRB returns, Portfolios 3 and 4 offer reasonable replication and are attractive alternatives, at different levels of tracking, liquidity and operational convenience, to replace investors' RRB portfolio exposures in the coming years.

This paper reviewed fixed income based RRBs replication strategies. Other alternatives to RRBs to manage inflation risk include commodities, which historically have performed strongly in rising and elevated inflationary environments and may also have their place in the portfolios of investors interested in inflation hedging solutions. ■

# Replication Strategies



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