



March 6, 2000

## ARE REAL-RETURN BONDS STILL AN ATTRACTIVE ALTERNATIVE?

### Key Points

- Last year, North American bond markets have taken a beating. However, there is one bond category that has not suffered losses: real return bonds (RRBs). Are RRBs still an attractive alternative?
- Conventional long bonds are expected to outperform as inflationary pressures subside and the overall bond market outlook brightens.
- However, owing to the price asymmetry detected, RRBs remain an attractive alternative:
  - If, on the one hand, the market does well, so will RRBs, though to a lesser extent.
  - On the other hand, if the market does poorly, RRBs will offset losses.

### Days in the sun for RRBs

Over the last year, North American bond markets have taken a beating. Their performance since January 1999 has been the worst since the 1994 bear market. However, there is one bond category that has not suffered losses: real return bonds (RRBs). These have returned 5.5% in 1999, significantly outperforming conventional long bonds and money market instruments. In this weekly economic letter, we take a closer look at the relative performance of RRBs and assess their role in bond portfolio management.

### 1999: A Disappointing Year

30-Year Canadian benchmark bond price



Source: NBF research

### What is a real-return bond?

The government of Canada began issuing real-return bonds in November 1991. Its RRBs pay semiannual interest at a real rate. Unlike standard fixed-coupon bonds, the interest payments on them are adjusted for changes in the consumer price index published monthly by Statistics Canada (the all-items CPI, before seasonal adjustment).

The semiannual coupon payments are calculated as follows:

$$\text{Coupon payment}_i = \text{real coupon rate}/2 * (\text{principal} + \text{inflation compensation}_i)$$

where

$$\text{Inflation compensation}_i = ((\text{principal} * \text{reference CPI}_i / \text{reference CPI}_{\text{base}}) - \text{principal})$$

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The reference CPI for the first day of a calendar month is the CPI for the third preceding calendar month. The reference CPI for any other day of the month is calculated by linear interpolation between the reference CPI for the first of the month and the reference CPI for the first of the following month. The reference CPI<sub>base</sub> is the reference CPI of the original issue date of the bond series.

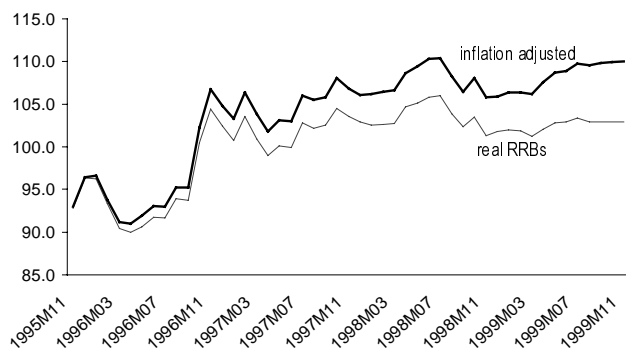
At maturity, bondholders receive, in addition to a coupon interest payment, a final payment equal to the principal amount plus inflation compensation accrued from the original issue date;

$$\text{Final payment} = \text{principal} + ((\text{principal} * \text{reference CPI}_{\text{maturity}} / \text{reference CPI}_{\text{base}}) - \text{principal})$$

In short, when inflation accelerates the return on RRBs rises, and vice-versa. To calculate returns and evaluate performance, RRB prices must be adjusted for changes in consumer prices (chart below).

### Real RRBs & Inflation Adjusted RRBs

Canadian Government issue: 04.25% Maturing 01 DEC 2021 - price



Source: NBF research

Our analysis uses the 2021 RRBs, first issued in 1991, and focuses on the last four years.

### When do RRBs outdo conventional long bonds?

The next chart shows returns of RRBs and conventional long bonds for the years 1996 through 1999. RRBs, with their inflation adjustment, returned an average 6.30% over these four years, while conventional 30-year bonds

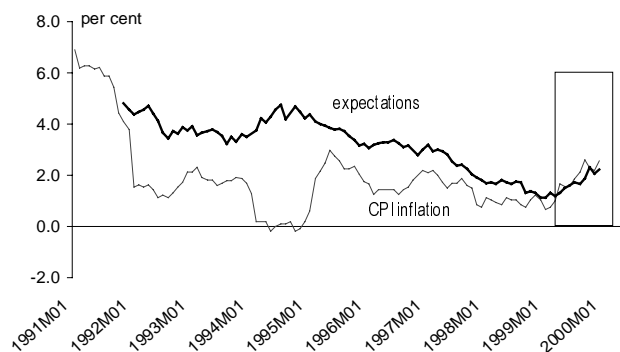
returned an average 13.7%. In short, conventional bonds usually outperform RRBs.

Relative Performance			
Conventional bonds (2023) Vs RRBs (2021)			
Date	total return (rrb)	total return (2023)	Gain/Loss
Dec-95			
Dec-96	10.61	15.8	-5.22
Dec-97	4.40	20.9	-16.48
Dec-98	3.53	17.9	-14.38
Dec-99	5.54	-3.3	8.85
average	<b>6.30</b>	<b>13.66</b>	<b>-7.36</b>

However, there are occasions when RRBs do better than conventional bonds. As noted in our introduction, this happened in 1999. Why 1999? To answer this question, it is useful to look at the behaviour of inflation expectations as derived using the differential between conventional nominal long bond yields and the yield on RRBs. As illustrated in the next chart, last year, both actual inflation and inflation expectations were on the mend. Moreover, actual inflation exceeded inflation expectations. As a result, RRBs outperformed.

### When Do RRB's Outperform?

Canadian CPI inflation rate & inflation expectations derived using the difference between the nominal & real long bond government yield



Source: NBF research

The intuition is quite straightforward. Rising CPI inflation translates into higher inflation compensation on RRB's. Meanwhile, rising inflation expectations mainly reflect a rise in conventional bond yields (falling bond prices).

Looking forward, are RRBs still an attractive alternative to conventional bonds? From our viewpoint, RRBs will

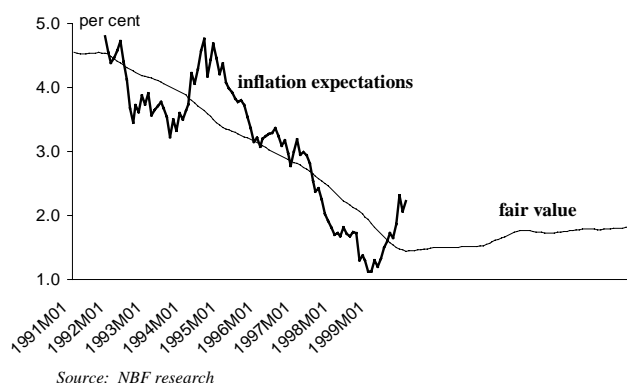
continue to do well, but conventional bonds will outperform. Here's why.

For starters, CPI inflation is not likely to continue accelerating over the coming year as it did last year. Putting it differently, the RRBs inflation compensation will remain high, but won't be much larger.

Moreover, we believe inflation expectations have peaked. Long-run inflation expectation has been trending up since the beginning of 1999. The next chart shows that the recent rise in the long-run inflation expectation puts it well above fair value<sup>1</sup>.

### Heading Lower

*Inflation expectations & fair value (10-Year moving average)*

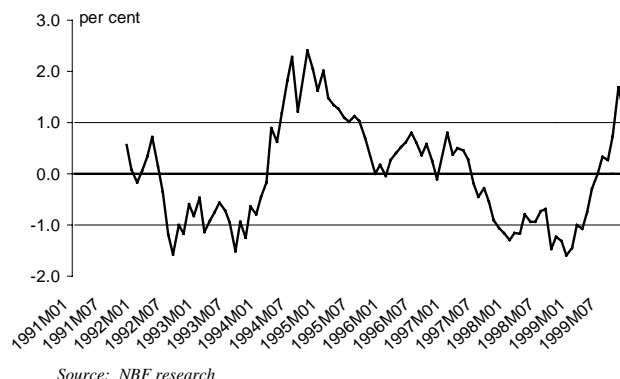


The current overshooting is even more apparent when we focus on the difference between the two series (actual versus fair value). In the next chart, this difference is normalized and shown against bands of one standard deviation above and below the fair value proxy. The magnitude of deterioration in today's long-run inflation expectation (exceeding fair value by more than one standard deviation) is similar to that of 1994-95. In short, inflation expectations are expected to return toward fair value, as conventional long bonds rally.

<sup>1</sup> This proxy for the "fair value" of the long-run inflation expectation can be derived from a 10-year moving average of CPI inflation.

### Overshoot

*Inflation expectations: deviations from fair value*

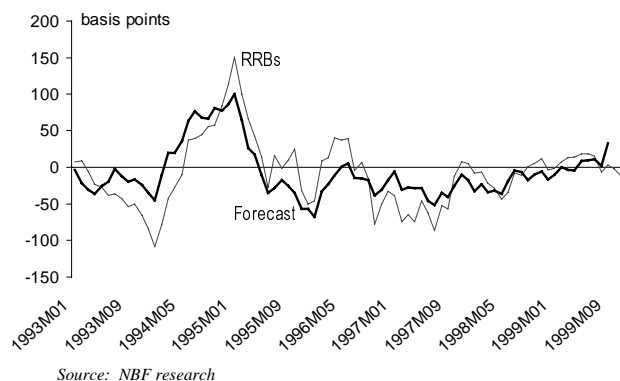


Having said this, RRBs remain an attractive alternative. To understand why, it is necessary to consider certain key characteristics of RRB performance.

- 1. Ties to conventional-bond performance.** Swings in RRB prices are driven mostly – to the tune of about 60% – by swings in conventional bond prices. The following chart shows the yearly change in real-return yields together with a forecast generated from the yearly change in nominal-return yields. There is clearly a close relationship between the two.

### Mostly Driven by Nominal Bonds

*Yearly RRBs yield change & forecast generated using yearly yield change in 30-Year Bonds*

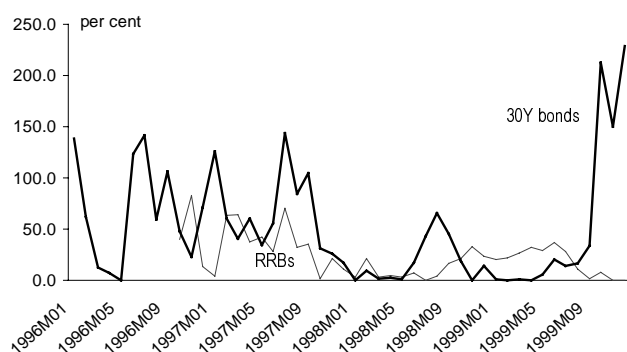


- 2. Less volatility.** Real-return bonds, however, are much less volatile than nominal-return bonds (chart below). The reason is quite straightforward: since RRBs provide protection against inflation, they are

not subject to the same cyclical pressures as nominal-return bonds.

**A Lot Less Volatile Than Conventional Bonds...**

*Volatility: RRBs Vs 30-Year Bond prices*



Source: NBF research

**Rising prices, low inflation expectations.** A rise in conventional bond prices has less impact when inflation expectations are low, because the RRB inflation compensation is expected to be more modest. The elasticity drops to 0.25.

**Falling prices, high inflation expectations.** The impact on RRB prices of a drop in conventional bond prices is much smaller than the impact of a rise. When inflation expectations are high, a 1% decline in conventional bond prices translates into a 0.40% decline in RRB prices. Conventional bond prices fall because of the deteriorating inflation outlook, but RRBs don't fall as much because their inflation compensation is expected to increase.

**Falling prices, low inflation expectations.** When long-run inflation expectations are low, the impact of falling conventional bond prices is small to the point of insignificance.

3. **Asymmetry (1).** Real-return bond prices have a particularly interesting feature: their relationship with conventional bond prices is asymmetrical. A rise in conventional bond prices translates into nearly the same rise in RRB prices, but a fall in conventional bond prices has very little impact on RRB prices.
4. **Asymmetry (2).** There is another type of asymmetry: RRB prices are even more sensitive to a rise in conventional bond prices when long-run inflation expectations (defined as the difference between conventional and RRB yields) are high. The intuition is quite straightforward: since a rise in inflation expectations usually signals a rise in inflationary pressures, the inflation compensation of RRBs is expected to increase, making RRBs more attractive.

RRBs Key Characteristics		
Sensitivity to fluctuations in conventional bond prices		
conventional bond prices	Inflation expectation	
	High	Low
Rise	0.81 (7.07)	0.25 (1.12)
Fall	0.40 (3.22)	0.10 (0.80)
RRB M/M % chg correlation with		
conventional long bonds	56	
with non-linearities	67	
short rates	18	

*T-stats in parenthesis*

The second part of our table shows that we can explain much more of the RRB fluctuation by introducing nonlinearities. With the nonlinearities, fluctuations in conventional bond prices explain nearly 70% of all movements in RRB prices, as opposed to 56% without the nonlinearities.

These RRB performance characteristics are summarized in the table below, which distinguishes four sets of circumstances:

**Rising prices, high inflation expectations.** The impact of conventional bond price changes is strongest when conventional bond prices are rising and inflation expectations are high. This is because the RRB inflation compensation is expected to increase. In these circumstances, a 1% increase in conventional bond prices translates into a 0.81% increase in RRB prices.

## Bottom line

Conventional long bonds are expected to outperform as inflationary pressures subside and the overall bond market outlook brightens. However, owing to the price asymmetry detected, RRBs remain an attractive alternative. If, on the one hand, the market does well, so will RRBs, though to a lesser extent. On the other hand, if the market does poorly, RRBs will offset losses. Having said this, the more uncertain the bond market outlook, the more weight should be given to RRBs in portfolios.

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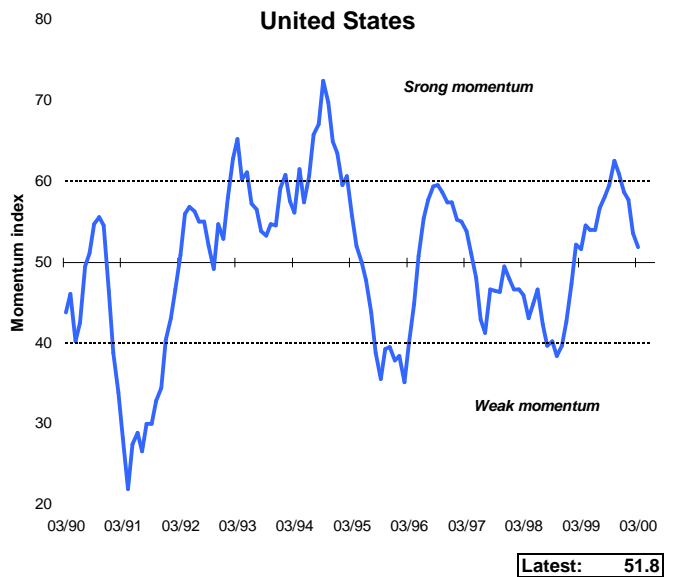
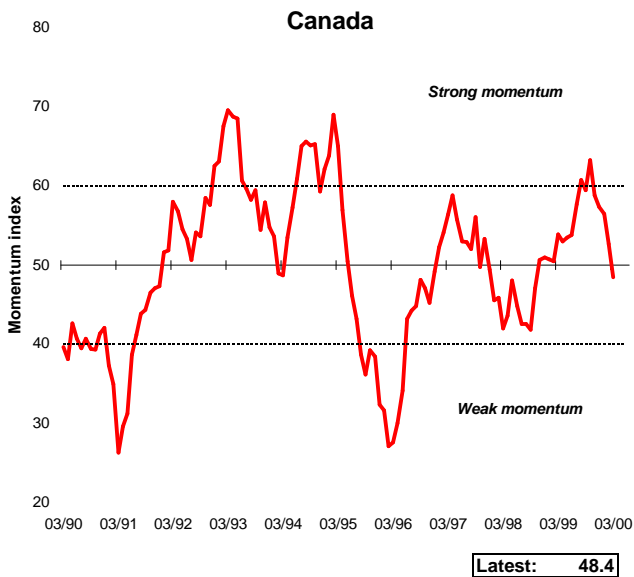
**NBF Economic Scoreboard**

Canada	
Market Movers:	Bullish ← Neutral → Bearish
Employment	●
GDP	●
Consumer Prices	●
Retail Sales	●
Housing Starts	●
Industrial Prices	●
International Trade	●
Manufacturing Activity	●
<b>Overall Reading</b>	✓

United States	
Market Movers:	Bullish ← Neutral → Bearish
Employment	●
Employment Cost Index	●
Retail Sales	●
NAPM	●
GDP	●
Consumer Prices	●
Industrial Production	●
International Trade	●
Producer Prices	●
Durable Goods' Orders	●
<b>Overall Reading</b>	✓

The **Economic Scoreboard** is used to measure cyclical risk for the bond market. For each market mover, we calculate the monthly deviation from short-term trend (where positive deviations are bearish and negative deviations are bullish). The indicators are then summed-up using equal weights to generate the **overall reading** of cyclical momentum.

**Economic Momentum**



Economic momentum is the 12-month cumulative sum of our scoreboard's overall reading. When deviations exceed 10%, momentum is considered to be very strong/weak.

ECONOMIC CALENDAR : CANADA &  
UNITED STATESThe Week Ahead  
(Mar. 6 – Mar. 10)

## US Indicators

Date	Time	Release	Month	Previous	<i>Estimate</i>	
					Consensus	NBF
07-Mar	8:30	Productivity	1999Q4	5.0%	6.5%	6.3%
09-Mar	10:00	Wholesale trade	January	1.1%	0.5%	0.5%

## Canadian Indicators

Date	Time	Release	Month	Previous	<i>Estimate</i>	
					Consensus	NBF
07-Mar	8:30	Capacity utilization	1999Q3	86.0%	86.5%	86.7%
08-Mar	8:30	Housing starts	February	148K	151K	150K
08-Mar	8:30	Help-wanted index	February	168	170	170
10-Mar	7:00	Employment	February	44.3K	28K	30K
		Unemployment rate		6.8%	6.8%	6.8%

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