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# FR CANADIAN FIXED INCOME INDICES

METHODOLOGY



**FTSE  
RUSSELL**  
An LSEG Business

## CONTENTS

### ABOUT THIS DOCUMENT

Intended Readership	3
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### INTRODUCTION

Background	3
Purpose and Basic Principles	3

### INDEX TYPES

Overview of Canadian Bond Index Family	3
Available Data Types	4

### GENERAL SELECTION CRITERIA

Sector Selections	5
Selection Times	5
Calculation Times	5
Calculation Price Basis	5
Credit Grades	5

### FORMULAS

Clean Price	6
Gross Price Index	6
Total Return Index	7
Interest Paid this Year	7
Average Coupon	7
Average Life	8
Average Duration	8
Average Convexity	8
Average Redemption Yield	8
Average Current Yield	8
Market Value	9

## ABOUT THIS DOCUMENT

### Intended Readership

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## INTRODUCTION

### Background

The FR Canadian Bond Indices are calculated by LSEG Datastream. Datastream has been calculating domestic government bond indices since 1985, based on the formulation recommended by EFFAS (European Federation of Financial Analysts Societies).

FTSE Russell an LSEG business aims to offer as transparent and flexible a set of bond indices as possible. To this end, each index contains only those bonds that follow the rules agreed by the subcommittee and all indices have been rigorously back tested. All Canadian series are calculated from January 2003. databases give, the depth of coverage – in the number of securities and in their attributes – is difficult to match.

### Purpose and Basic Principles

The main purposes of bond indices are to act as a benchmark for portfolio management, as an indicator of market performance and development, the basis of comparison for different markets.

Bond index calculations should abide by several basic principles. They should reflect the experience of the average holder in the sector, should have objective criteria for underlying selection and all calculations and selection criteria should be published.

The Canadian bond index suite is derived on the basis of an all traded index methodology. The indices include all traded issues and are primarily aimed at long term investors whose portfolio would tend to encompass both liquid and illiquid bonds.

## INDEX TYPES

### Overview of the Canadian Bond Index Family

Index Group Name	Mnemonic	Constituents (Mnemonic)
FR Canadian All Bond Index	TRCNALL	LTRCNALL
FR Canadian Corporate All Bond Index	TRCNCLL	LTRCNCLL
FR Canadian Financial All Bond Index	TRCNFLL	LTRCNFLL
FR Canadian Government All Bond Index	TRCNGLL	LTRCNGLL
FR Canadian Industrial All Bond Index	TRCNILL	LTRCNILL
FR Canadian Non Financial All Bond Index	TRCNPLL	LTRCNPLL
FR Canadian Provincial All Bond Index	TRCNPLL	LTRCNPLL

For each segment, indices for 9 additional maturity bands are provided. Maturity band details are on the following page.

## Available Data Types

<b>Datatype Description</b> (for a definition, see pages 6-9)	<b>Data Type</b>
Total Return Index	RI
Gross Price Index	PI
Clean Price Index	CI
Average Redemption Yield	RY
Redemption Yield Annulized	RA
Average Coupon	CO
Average Life	L
Average Duration	DU
Average Convexity	CX
Interest Paid This Year	XD
Market Value	MV
Average Current Yield	IY

## GENERAL SELECTION CRITERIA

<b>Feature</b>	<b>Requirement</b>
<b>Currency of Denomination</b>	Canadian Dollar
<b>Market of Issue</b>	Canada
<b>Bond Rating</b>	Excluding non-investment grade
<b>Remaining Term-to-Maturity</b>	Greater or equal to 1 year and Less than 50 years
<b>Coupon Type</b>	Bullet Bonds including callable bonds
<b>Minimum Amount Outstanding</b>	Corporate equal and over 100M, Government equal and over 50M
<b>Excluded</b>	Floating Rate Notes Convertibles CMBS/MBS/ABS Hybrid Bonds Variable Rate Bonds
<b>Band</b>	<b>Criteria</b>
<b>1-3 Years</b>	Bonds between 1 – 2.999 years
<b>1-5 Years</b>	Bonds between 1 – 4.999 years
<b>3-5 Years</b>	Bonds between 3 – 4.999 years
<b>5-7 Years</b>	Bonds between 5 – 6.999 years
<b>5-10 Years</b>	Bonds between 5 – 9.999 years
<b>7-10 Years</b>	Bonds between 7 – 9.999 years
<b>10+ Years</b>	Bonds equal and greater than 10 years
<b>10-20 Years</b>	Bonds between 10 – 19.999 years
<b>15+ Years</b>	Bonds equal and greater than 15 years

## Sector Selections

The indices are set up in the following sectors using the INDG information stored to Datastream.

Sector Name	Sector Creation Details
All	All bonds available once all general criteria has been met
Government	Bonds identified on DS as Government and have met the general criteria
Corporate	Bonds identified on DS as financial & industrial and have met the general criteria
Provincial	Bonds identified on DS as semi-government and agency and have met the general criteria
Financial	Bonds identified on DS as financial have met the general criteria
Industrial	Bonds identified on DS as and have met the general criteria
Non Financial	All bonds excluding ones identified on DS as Financial. All bonds must meet the general criteria

## Selection Times

Index lists are selected on the 1st working day of each month using values and details as of the last working day of the previous month.

## Calculation Times

Index data is calculated at approx 4am London time for the previous days bond prices.

## Calculation Price Basis

The ongoing pricing of the Canadian Fixed Income Indices relies both on LSEG Composite Prices sourced from Canadian contributors as well as evaluated prices of the LSEG Pricing Service specialists.

Calculated history is based on prices from Initram, this pricing source for the indices was replaced on 11/20/09 by LSEG pricing. Since the switch, LSEG composite prices are used to provide a best available price. LSEG Pricing Service evaluated prices are also used from 12/01/11 if it is appropriate to reassess composite pricing.

## Credit Grades

To determine whether a corporate bond is eligible, several sources are taken into account, including ratings data.

## FORMULAS

Notation			
$Z_t$	Value of criterion Z at time t	$Y$	Redemption yield to assumed maturity
$Z_{t-1}$	Value of criterion Z at time (t-1)	$L$	Life to assumed maturity
$Z_0$	Initial value of criterion Z	$D$	Duration
$Z_{i,t}$	Value of criterion Z for the ith security at time t	$X$	Convexity
$P$	Clean price of the bond (without accrued interest) Based on a middle price	$C$	Coupon rate%
$P_{i,t}$	Clean price of the ith bond at time t	$G_{i,t}$	Value of any coupon payment received from the ith bond at time t or since time (t-1). If none, the value = 0
$P^*_{i,t}$	Clean price of the ith bond at time t, adjusted for any partial serial redemptions. At all othertimes it is the same at the unadjusted price P	$R$	Redemption price of the bond
$A$	Accrued interest to the "normal" settlement date	$N$	Nominal value of amount outstanding is known, otherwise the issued amount
$P^*$	<p>For serial bonds: When a serial bond is partly redeemed the price of the bond may jump as a result of the rump of the issue being quoted ex the partial redemption. Market convention assumes that the part of the bond being called for redemption is now worth the redemption price, and on the premise that the investor should not gain or lose money on this partial redemption, the current price is adjusted according to the following formula:</p> <p>Where: <math>NC_t</math> is the amount called for redemption at time t  <math>N_t</math> is the amount remaining in issue (ex the amount called) at time t  <math>R_t</math> is the redemption price of the bonds being called at time t</p> <p>Note: This assumes any moneys from the partial redemption are available for reinvestment on the ex date as opposed to the actual early redemption date. At other times <math>P^*</math> is the same as <math>P</math>.</p>		

### Clean Price Index (CI):

$$CI_0 = 100$$

$$CI_t = CI_{t-1} * \frac{\sum_i P_{i,t} * N_{i,t}}{\sum_i P_{i,t-1} * N_{i,t-1}}$$

### Gross Price Index (PI):

The accrued interest (AI) in the gross price is given by:

$$AI_t = \frac{\sum_i A_{i,t} * N_{i,t}}{\sum_i P_{i,1} * N_{i,t-1}}$$

where the summations are over the bonds currently in the index. For some indices the values currently go back to 12/30/1988.

**The Gross Price Index (PI) is then:**

$$PI_t = CI_t * (1 + AI_t)$$

**Total Return Index (RI):**

$$RI_0 = 100$$

$$RI_t = RI_{t-1} * \frac{\sum_i (P_{i,t} + A_{i,t} + CP_{i,t} + G_{i,t}) * N_{i,t-1}}{\sum_i (P_{i,t-1} + A_{i,t-1} + CP_{i,t-1}) * N_{i,t-1}}$$

where the summations are over the bonds currently in the index. CP is an adjustment made for bonds which have ex-dividend periods - when a bond goes ex-dividend, CP has a value equal to the next coupon payment; outside the ex-dividend period CP=0.

This compensates for the sharp drop in accrued interest when a bond goes ex-dividend. For any bonds currently in the index that have serial redemption features, an adjustment is made when t falls within the period between the drawing date and the next serial redemption date. For such bonds the calculation is:

$$RI_t = RI_{t-1} * \frac{\sum_i N_{i,t-1} * (P_{i,t} + A_{i,t}) + G_{i,t} * (N_t + NC_{i,t}) + CP_{i,t} * (N_t + NC_{i,t}) + NC_{i,t} * (R_{i,t} + A_{i,t})}{\sum_i N_{i,t} * (P_{i,t-1} + A_{i,t-1}) + NC_t * (R_t + A_{i,t-1}) + CP_{i,t} * (N_t + NC_{i,t})}$$

Note: when t = drawing date,  $N_{i,t-1} = N_{i,t} + NC_{i,t}$

**Interest Paid this Year (XD):**

The interest paid this year calculation gives the accumulated income expressed as a percentage of the gross price index. It is reset at the start of each year. The interest paid calculation enables the total return index to be adjusted for portfolios subject to tax on income received.

$$XD_{ts} = 0$$

where ts = the time at the end of each calendar year

$$XD_t = xd_{t-1} + PI_{t-1} * \frac{\sum_i G_{i,t} * N_{i,t-1}}{\sum_i (P_{i,t-1} + A_{i,t-1}) * N_{i,t-1}}$$

where the summations are over the bonds currently in the index.

**Average Coupon (CO):**

$$CO_t = \frac{\sum_i C_{i,t} * N_{i,t}}{\sum_i N_{i,t}}$$

where the summations are over the bonds currently in the index.

**Average Life (L):**

$$L_t = \frac{\sum_i L_{i,t} * N_{i,t}}{\sum_i N_{i,t}}$$

where the summations are over the bonds currently in the index.

**Average Duration (DU):**

$$DU_t = \frac{\sum_i D_{i,t} * (P_{i,t} + A_{i,t}) * N_{i,t}}{\sum_i (P_{i,t} + A_{i,t}) * N_{i,t}}$$

where the summations are over the bonds currently in the index.

**Average Convexity (CX):**

$$CX_t = \frac{\sum_i X_{i,t} * (P_{i,t} + A_{i,t}) * N_{i,t}}{\sum_i (P_{i,t} + A_{i,t}) * N_{i,t}}$$

where the summations are over the bonds currently in the index.

**Average Redemption Yield (RY):**

$$RY_t = \frac{\sum_i Y_{i,t} * D_{i,t} * (P_{i,t} + A_{i,t}) * N_{i,t}}{\sum_i D_{i,t} * (P_{i,t} + A_{i,t}) * N_{i,t}}$$

where the summations are over the bonds currently in the index. Yields are compounded according to the conventions of the market (for example, semi-annually in the UK and USA and annually in France).

**Average Redemption Yield - Annualised (RA)**

This is calculated according to the previous formula, except that all yields are compounded annually. This facilitates cross-country comparisons.

**Average Current Yield (IY):**

The current yield of a bond is also known as a flat, running or interest yield. It is given by:

$$IY_t = \frac{100 * \sum_i C_{i,t} * N_{i,t}}{\sum_i P_{i,t} * N_{i,t}}$$

where the summations are over the bonds currently in the index.



**Market Value (MV):**

$$MV_t = \sum_i (P_{i,t} + A_{i,t}) * N_{i,t}$$

where the summations are over the bonds currently in the index. The value is expressed in local currency, in thousands.

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