
NOVEMBER 2023

GOVERNMENT BOND INDICES

METHODOLOGY



**FTSE
RUSSELL**

An LSEG Business

CONTENTS

Intended Readership	3
Introduction	3
Index Types	4
Index Constituents	6
Constructing List Mnemonics	9
Formulas	10

Intended Readership

This document supports data use by FTSE Russell an LSEG business Indices client. Clients receive the data as part of their desktop license or may be licensed to use the Indices in a separate licensing agreement.

Introduction

Background

The Government 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).

In 1990, stimulated by the difficulty of outperforming the Dutch Government Bond Indices because of the way in which serial redemption bonds were treated, EFFAS began a review of its methodology for calculating indices. An EFFAS sub committee was formed including members of the EFFAS commission as well as representatives from the UK Institute of Actuaries, ISMA, the French Comite de Normalisation Obligataire, LSEG Datastream, and other international institutions involved in the calculation of bond indices.

The Government Bond indices reflect the revised calculation methods recommended by the EFFAS sub-committee.

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 series were originally calculated to 30th December 1988, now most markets are calculated to an earlier start date.

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 on which market options and futures may be derived and a comparator for different markets.

Bond index calculations should abide by different 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.

Due to the various users of bond indices who all have different requirements there are 3 types of bond indices calculated. The All traded index is largely required by domestic investors as they are long term investors whose portfolio would tend to encompass both liquid and illiquid bonds. As price collection in some regions may be difficult, a proxy is needed for the all traded which depends on a sample of bonds yet tracks the all traded well. This is referred to as the tracker index.

On the other hand, international investors are often more interested in the more liquid bonds within the sector. These are known as the benchmark indices.

Index Type

All Bond, Tracker and Benchmark

There are three indices for the government bond sector in each market:

- Datastream All-bond Index
- Datastream Tracker Index
- Datastream Benchmark Index

The majority of series are based on 100 on 31/12/88. However, where possible, histories have been calculated to an early date.

Selection – All Bond Index

The All-Bond Index covers all traded bonds, irrespective of liquidity, and primarily of interest to long term domestic investors with portfolios covering the complete sector.

Selection – Tracker Index

The bonds used in calculating the Tracker index are selected from those in the equivalent All-Bond index in order of decreasing market value (Clean price x amount outstanding/100) until:

- 20 or more bonds have been selected and at least 25% of the group by market value has been included,
or
- More than 50% of the group by market value is included.
- The tracker index also includes any bond representing more than 5% of the market, and any bond identical in size to the smallest selected.

The constituents of the tracker are such that the resulting index closely tracks the performance of the All-bond index.

Selection – Benchmark Index

Benchmark indices are based on single bonds. The bond chosen for each series is the most representative bond available for the given maturity band at each point in time.

Benchmarks are selected according to the accepted conventions within each market. Generally, the benchmark bond is the latest issue within the given maturity band; consideration is also given to yield, issue size and coupon.

Unlike the Tracker and All indices, new bonds are reviewed daily for benchmark selection. At the beginning of each month all bonds and constituent list reviewed, and any changes made. Benchmark constituent lists from September 2005 are stored on a daily basis.

A comprehensive set of Benchmark indices is available – in most markets 2, 3, 5, 7 and 10 year series are available and where appropriate, longer maturity are covered. The table on the following page gives availability for each market.

Datastream Benchmark Indices - Time Series Availability

Datastream Benchmark Indices	
Country	Available Maturities
Australia	2, 3, 5, 7, 10
Austria	2, 3, 5, 7, 10, 30
Belgium	2, 3, 5, 7, 10, 15, 30
Canada	2,3,5,7, 10,20,30
Czech Republic	2, 3, 5, 7, 10, 15
Denmark	2, 3, 5, 7, 10, 20
Euroland	2, 3, 5, 7, 10, 15, 20, 30
Finland	3, 5, 10
France	2, 3, 5, 7, 10, 15, 20, 30, 50
Germany	2, 3, 5, 7, 10, 20, 30
Greece	2, 3, 5, 10, 15
Hungary	2, 3, 5, 10
Ireland	2, 3, 5, 7, 10, 15
Italy	2, 3, 5, 7, 10, 15, 30
Japan	2, 3, 5, 7, 10, 15, 20, 30
Netherlands	2, 3, 5, 7, 10, 30
New Zealand	2, 3, 5, 7, 10
Norway	5, 7, 10
Poland	2,3,5,7, 10,20
Portugal	2, 3, 5, 7, 10
South Africa	3, 5, 4, 10, 30
Spain	2, 3, 5, 7, 10, 15, 30
Sweden	2, 3, 5, 7, 10, 15
Switzerland	2, 3, 5, 7, 10
United Kingdom	2, 3, 5, 7, 10, 15, 20, 30, 50
United States	2, 3, 5, 7, 10, 30

Index Constituents

Selection

Selection rules follow the recommendations made by the EFFAS sub-committee.

Generally Included

Bullet bonds	Bonds with purchase funds
Callable bonds	Partly paid bonds (treated as if fully paid)
Bonds with serial redemptions	Graduated Rate bonds once the last coupon fixing has been applied

Generally Excluded

Bonds with less than one year to maturity	Indexed bonds
Floating rate bonds	Puttable bonds - unless the option is in the past and has not been taken up
Securities from the same market sample which have inconsistent tax status	Extendable bonds
Convertible bonds	Bonds with sinking funds (where redeemed proportion is not fixed)
Bonds with attached warrants	Very small or illiquid bonds

Bonds to be included in the indices are selected on the last working day of the month prior to that being calculated.

Once a bond has been included in a maturity band for that month, it remains in that index until the end of the month, unless the bond is called, is made fungible or becomes illiquid. Undated bonds are included in a specific Index band "UN", which is currently only available for the UK market.

If at any time there are insufficient bonds to calculate an index, calculation is suspended until sufficient bonds again exist. This accounts for different start dates for indices where there has been long term unavailability of sufficient bonds.

Most government markets have specific bond types that are to be included into the index. There are also many specific market rules to consider when making index selections. The table on the next page gives an idea as to some of these specific market rules.

GOVERNMENT BOND INDICES METHODOLOGY

Country	Included	Excluded
Australia	Selection of Commonwealth bonds	Off the run issues
Austria	Anleihen	Floating rate notes; Zero coupon bonds; From 1st January 1993, withholding tax applies to bonds issued prior to 1st January 1984. These bonds are excluded from 1st January 1993
Belgium	OLOs Classical issues	Irredeemables; Lots
Canada	Canada issues	Callable bonds
Denmark	Selection of government bonds	Zero coupon bonds Variable rate bonds
Euroland	See member countries	
Finland	Selection of government bonds	
France	OATs Emprunts d'Etat BTANs	Variable rate bonds; FELIN issues; ORT issues; Index linked; Perpetual bonds
Germany	Bundesanleihen Bundesobligationen Bundeschatzanweisungen Deutsche Einheit Treuhandanstalt	Floating rate notes; Unquoted issues/savings bonds
Greece	Government Issues	Floating rate notes
Hungary	Government Issues	Floating rate notes
Ireland	Government issues	
Italy	BTPs; CTOs	CCT;CTE;BTE
Luxembourg*	Selection of government bonds	FIPs
Japan	JGBs	Discount bonds; Private placements
Netherlands	DSLs	Callable bonds; Irredeemables; Issues with denominations less than 1000
New Zealand	Selection of New Zealand bonds	Off the run issues
Norway	Selection of government bonds	
Poland	Government Issues	Floating rate notes
Portugal	OTs	OTRVs
South Africa	GOVI	
Spain	Bonos del Estado Obligacion Estado	
Sweden	Statsobligationslan Statskuldvaxlar	
Switzerland	Staatsanleihen	
United Kingdom	Gilts	Index linked Bonds with amount in issue less than 100 million

*Please note that the Luxembourg Bonds are only used for calculation within the Euroland series.

Markets Available

Indices are currently calculated for the government sector in each of the following markets:

Market	Start Date	Index Types Available
Australia	27/02/87	All, Tracker & Benchmark
Austria	31/12/84	All, Tracker & Benchmark
Belgium	31/12/84	All, Tracker & Benchmark
Canada	31/12/84	All, Tracker & Benchmark
Czech Rep	31/07/98	All & Benchmark
Denmark	31/12/84	All, Tracker & Benchmark
Euroland	01/01/99	All, Tracker & Benchmark
Finland	30/12/88	All, Tracker & Benchmark
France	31/12/84	All, Tracker & Benchmark
Germany	31/12/79	All, Tracker & Benchmark
Greece	31/03/99	All & Benchmark
Hungary	29/01/99	All & Benchmark
Ireland	31/12/84	All, Tracker & Benchmark
Italy	30/12/88	All, Tracker & Benchmark
Japan	31/12/81	All, Tracker & Benchmark
Netherlands	31/12/79	All, Tracker & Benchmark
New Zealand	30/12/88	All & Benchmark
Norway	30/12/88	All & Benchmark
Poland	29/12/00	All, Tracker & Benchmark
Portugal	31/12/92	All, Tracker & Benchmark
South Africa	31/08/00	All & Benchmark
Sweden	31/12/84	All, Tracker & Benchmark
Spain	30/12/88	All, Tracker & Benchmark
Switzerland	28/11/80	All, Tracker & Benchmark
United Kingdom	31/12/79	All, Tracker & Benchmark
United States	31/12/79	All, Tracker & Benchmark

Constructing List Mnemonics

You can display constituent lists of bonds for each month's all and tracker index value since start date and daily benchmark lists from September 2005 (Monthly prior to this date), using the "Static" data delivery option in DFO or another Datastream Excel Add-in.

All the Tracker list mnemonics have the general format tccssmmyybb where:

t	Index type	A = All, T = Tracker
cc	Country Code	The Standard Datastream two character code
sss	Sector	GVT = Government
mm	Month	01 = January, 12 = December
yy	Year	98 = 1989
Bb	Maturity Band	AL = All Mats G1 = 1-3Y G2 = 3-5Y G3 = 5-7Y G4 = 7-10Y G5 = 10+Y UN = Undated (UK Only)

All list example = US 7-10Y for January 2006 = AUSGVT0106G4

Benchmark list mnemonics have the general format tccsddmmyybb where:

- For monthly lists follow All and Tracker structure but use benchmark maturity band symbols.
- For daily lists (After 1st September 2005) use the daily benchmark structure

Monthly Structure:

t	Index type	B = Benchmark
cc	Country Code	The Standard Datastream two character code
S	Sector	GVT = Government
mm	Month	01 = January, 12 = December
yy	Year	98 = 1989
Bb	Maturity Band	B1 = 2Y B2 = 3Y B3 = 5Y B4 = 7Y B5 = 10Y B6 = 15Y B7 = 20Y B8 = 30Y B0 = 50Y

Benchmark list example = US 10Y for the 0nd January 2006 = BUSGVT0106B5

Daily Structure:

t	Index type	B = Benchmark
cc	Country Code	The Standard Datastream two character code
S	Sector	GVT = Government
dd	Day	Standard day of the month – 18 = eighteenth
mm	Month	01 = January, 12 = December
yy	Year	07 = 2007
Bb	Maturity Band	B1 = 2Y B2 = 3Y B3 = 5Y B4 = 7Y B5 = 10Y B6 = 15Y B7 = 20Y B8 = 30Y B0 = 50Y

Benchmark list example = US 10Y for the 0nd January 2006 = BUSG020106B5

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: NC_t is the amount called for redemption at time t N_t is the amount remaining in issue (ex the amount called) at time t R_t 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 P^* is the same as P.</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:

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

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.

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

Average Life (L):

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.

ABOUT FTSE RUSSELL

FTSE Russell is a leading global provider of index and benchmark solutions, spanning diverse asset classes and investment objectives. As a trusted investment partner we help investors make better-informed investment decisions, manage risk, and seize opportunities.

Market participants look to us for our expertise in developing and managing global index solutions across asset classes. Asset owners, asset managers, ETF providers and investment banks choose FTSE Russell solutions to benchmark their investment performance and create investment funds, ETFs, structured products, and index-based derivatives. Our clients use our solutions for asset allocation, investment strategy analysis and risk management, and value us for our robust governance process and operational integrity.

For over 35 years we have been at the forefront of driving change for the investor, always innovating to shape the next generation of benchmarks and investment solutions that open up new opportunities for the global investment community.

CONTACT US

To Learn more, visit ftse-russell/indices; email Index_Queries@lseg.com

Disclaimer

© 2023 London Stock Exchange Group plc and its applicable group undertakings (the "LSE Group"). The LSE Group includes (1) FTSE International Limited ("FTSE"), (2) Frank Russell Company ("Russell"), (3) FTSE Global Debt Capital Markets Inc. and FTSE Global Debt Capital Markets Limited (together, "FTSE Canada"), (4) FTSE Fixed Income Europe Limited ("FTSE FI Europe"), (5) FTSE Fixed Income LLC ("FTSE FI"), (6) The Yield Book Inc ("YB") and (7) Beyond Ratings S.A.S. ("BR"). All rights reserved.

FTSE Russell® is a trading name of FTSE, Russell, FTSE Canada, FTSE FI, FTSE FI Europe, YB and BR. "FTSE®", "Russell®", "FTSE Russell®", "FTSE4Good®", "ICB®", "The Yield Book®", "Beyond Ratings®" and all other trademarks and service marks used herein (whether registered or unregistered) are trademarks and/or service marks owned or licensed by the applicable member of the LSE Group or their respective licensors and are owned, or used under licence, by FTSE, Russell, FTSE Canada, FTSE FI, FTSE FI Europe, YB or BR. FTSE International Limited is authorised and regulated by the Financial Conduct Authority as a benchmark administrator.

All information is provided for information purposes only. All information and data contained in this publication is obtained by the LSE Group, from sources believed by it to be accurate and reliable. Because of the possibility of human and mechanical error as well as other factors, however, such information and data is provided "as is" without warranty of any kind. No member of the LSE Group nor their respective directors, officers, employees, partners or licensors make any claim, prediction, warranty or representation whatsoever, expressly, or impliedly, either as to the accuracy, timeliness, completeness, merchantability of any information or of results to be obtained from the use of FTSE Russell products, including but not limited to indexes, data and analytics, or the fitness or suitability of the FTSE Russell products for any particular purpose to which they might be put. Any representation of historical data accessible through FTSE Russell products is provided for information purposes only and is not a reliable indicator of future performance.

No responsibility or liability can be accepted by any member of the LSE Group nor their respective directors, officers, employees, partners or licensors for (a) any loss or damage in whole or in part caused by, resulting from, or relating to any error (negligent or otherwise) or other circumstance involved in procuring, collecting, compiling, interpreting, analysing, editing, transcribing, transmitting, communicating, or delivering any such information or data or from use of this document or links to this document or (b) any direct, indirect, special, consequential or incidental damages whatsoever, even if any member of the LSE Group is advised in advance of the possibility of such damages, resulting from the use of, or inability to use, such information.

No member of the LSE Group nor their respective directors, officers, employees, partners or licensors provide investment advice and nothing in this document should be taken as constituting financial or investment advice. No member of the LSE Group nor their respective directors, officers, employees, partners or licensors make any representation regarding the advisability of investing in any asset or whether such investment creates any legal or compliance risks for the investor. A decision to invest in any such asset should not be made in reliance on any information herein. Indexes cannot be invested in directly. Inclusion of an asset in an index is not a recommendation to buy, sell or hold that asset nor confirmation that any particular investor may lawfully buy, sell or hold the asset or an index containing the asset. The general information contained in this publication should not be acted upon without obtaining specific legal, tax, and investment advice from a licensed professional.

The information contained in this report should not be considered "research" as defined in recital 28 of the Commission Delegated Directive (EU) 2017/593 of 7 April 2016 supplementing Directive 2014/65/EU of the European Parliament and of the Council ("MiFID II") and is provided for no fee.

Past performance is no guarantee of future results. Charts and graphs are provided for illustrative purposes only. Index returns shown may not represent the results of the actual trading of investable assets. Certain returns shown may reflect back-tested performance. All performance presented prior to the index inception date is back-tested performance.

Back-tested performance is not actual performance, but is hypothetical. The back-test calculations are based on the same methodology that was in effect when the index was officially launched. However, back-tested data may reflect the application of the index methodology with the benefit of hindsight, and the historic calculations of an index may change from month to month based on revisions to the underlying economic data used in the calculation of the index.

This document may contain forward-looking assessments. These are based upon a number of assumptions concerning future conditions that ultimately may prove to be inaccurate. Such forward-looking assessments are subject to risks and uncertainties and may be affected by various factors that may cause actual results to differ materially. No member of the LSE Group nor their licensors assume any duty to and do not undertake to update forward-looking assessments.

No part of this information may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without prior written permission of the applicable member of the LSE Group. Use and distribution of the LSE Group data requires a licence from FTSE, Russell, FTSE Canada, FTSE FI, FTSE FI Europe, YB, BR and/or their respective licensors.



**FTSE
RUSSELL**
An LSEG Business