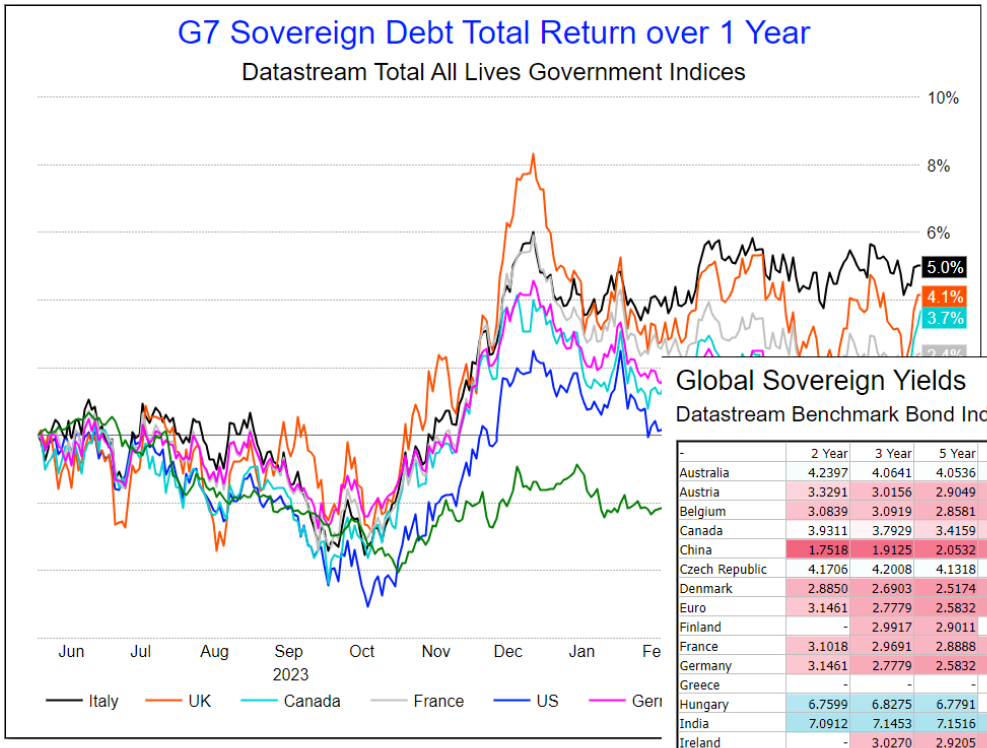
Datastream Calculated Bond Indices

Government domestic markets

The purpose of this publication is to outline the government fixed income indices calculated and selected by Datastream since 1990. It is intended to explain how they are calculated, constructed, and highlight why they can be a measure of the performance of fixed income markets across global government domestic markets. This document will also display the different formulae used to calculate the 12 different datatypes.



Global Sovereign Yields

Datastream Benchmark Bond Indices

-	2 Year	3 Year	5 Year	7 Year	10 Year	15 Year	20 Year	30 Year	50 Year
Australia	4.2397	4.0641	4.0536	4.2707	4.3173	-	-	-	-
Austria	3.3291	3.0156	2.9049	2.9163	3.0237	-	-	3.1578	-
Belgium	3.0839	3.0919	2.8581	2.8788	3.0102	3.2385	-	3.4956	-
Canada	3.9311	3.7929	3.4159	3.3517	3.3922	-	3.3610	3.2869	-
China	1.7518	1.9125	2.0532	2.2085	2.2911	2.3370	2.4783	2.5694	2.6370
Czech Republic	4.1706	4.2008	4.1318	4.1725	4.1965	4.3113	-	-	-
Denmark	2.8850	2.6903	2.5174	2.6209	2.5355	-	-	2.6439	-
Euro	3.1461	2.7779	2.5832	2.5349	2.5216	3.2345	2.7280	2.6814	-
Finland	-	2.9917	2.9011	-	3.0035	-	-	-	-
France	3.1018	2.9691	2.8888	2.8746	3.0114	3.2345	3.3213	3.4619	2.9420
Germany	3.1461	2.7779	2.5832	2.5349	2.5216	-	2.7280	2.6814	-
Greece	-	-	-	-	4.0500	4.4680	-	-	-
Hungary	6.7599	6.8275	6.7791	-	6.8199	-	-	-	-
India	7.0912	7.1453	7.1516	7.1569	7.0676	7.1451	-	7.2336	-
Ireland	-	3.0270	2.9205	2.7672	2.8032	3.0155	-	-	-
Italy	3.4194	3.3442	3.4219	3.5835	3.8404	4.1965	-	4.4225	-
Japan	0.3323	0.3985	0.5633	0.7011	0.9927	1.4820	1.8067	2.1124	-
Mexico	11.0286	10.6964	10.4856	10.3860	10.3240	10.2900	10.4300	-	-
Netherlands	2.9741	2.8420	2.7613	2.7357	2.8258	-	-	2.8592	-
New Zealand	-	4.7335	4.6285	4.6704	4.8233	-	-	-	-
Norway	-	-	3.5361	3.5657	3.5751	-	-	-	-
Poland	5.0349	5.2679	5.4165	5.5059	5.6072	-	5.9606	-	-
Portugal	3.2491	3.0113	2.7434	2.8126	3.0672	-	-	-	-
South Africa	-	9.5150	9.1206	11.5530	11.9428	-	-	13.4129	-
South Korea	3.4502	3.4481	3.4798	3.4910	3.5166	3.4954	3.4254	3.4110	-
Spain	3.2150	3.0854	3.0069	3.0513	3.2839	3.5004	-	3.8162	-
Sweden	2.6442	2.4386	2.3375	2.3013	2.3086	-	-	-	-
Switzerland	1.0699	1.0502	0.8972	0.9001	0.8379	-	-	-	-
United Kingdom	4.8426	4.4977	4.0646	4.0283	4.1852	4.4213	4.5859	4.5516	4.1670
United States	4.7507	4.4989	4.3188	4.2862	4.2858	-	-	4.4364	-

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Background

Datastream has been calculating domestic government bond indices since 1985, based on the formulation recommended by EFFAS (European Federation of Financial Analysts Societies).

Datastream 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. Additionally, you can view and analyse the constituents of each index on a monthly historical basis. 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 by Datastream. 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 and tracks the All traded. 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.

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 to 100 on 31/12/88. However, where possible, histories have been calculated to an earlier date.

Selection – All Bond Index

The All-bond index covers all traded bonds, irrespective of liquidity, and is 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 bonds representing more than 5% of the market, and any bonds 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, liquidity, 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 lists are 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 maturities are covered.

The following table gives availability for each market.

Datastream Benchmark Index	
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
China	2, 3, 5, 7, 10, 15, 20, 30, 50
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
India	2, 3, 5, 7, 10, 15, 30
Indonesia	2, 3, 5, 7, 10, 15, 20, 30
Ireland	2, 3, 5, 7, 10, 15
Italy	2, 3, 5, 7, 10, 15, 30
Japan	2, 3, 5, 7, 10, 15, 20, 30
Mexico	2, 3, 5, 7, 10, 15, 20
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
Singapore	2, 3, 5, 7, 10, 15, 20, 30
South Africa	3, 5, 4, 10, 30
South Korea	2, 3, 5, 7, 10, 15, 20, 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
Zero Coupon 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.

	Included	Excluded
Australia	Selection of Commonwealth bonds	Off the run issues
Austria	Anleihen	Floating rate notes 3Zero coupon bonds From 1st January 1993, withholding tax appliesto bonds issued prior to 1st January 1984. These bonds are excluded from 1st January1993
Belgium	OLOs Classical issues	Irredeemables 3Lots
Canada	Canada issues	Callable bonds
Denmark	Selection of government bonds	Zero coupon bonds 3Variable rate bonds

Eurozone	See member countries	
Finland	Selection of government bonds	
France	OATs Emprunts d'Etat BTANs	Variable rate bonds 3FELIN issues 3ORT issues 3Index linked 3Perpetual bonds
Germany	Bundesanleihen Bundesobligationen Bundeschatzanweisungen Deutsche Einheit Treuhandanstalt	Floating rate notes 3Unquoted issues/savings bonds
Greece	Government Issues	Floating rate notes
Hungary	Government Issues	Floating rate notes
Ireland	Government issues	
Italy	BTPs CTOs	CCT 3CTE 3BTE
Luxembourg*	Selection of government bonds	FIPs
Japan	JGBs	Discount bonds 3Private placements
Netherlands	DSLs	Callable bonds 3Irredeemables 3Issues 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 3Bonds with amount in issue less than 100 milllion
United States	Treasury notes Treasury bonds	Flower bonds Strips

Please note that the Luxembourg Bonds are only used for calculation within the Eurozone 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
China	29/06/07	All, Tracker & Benchmark
Czech Rep	31/07/98	All & Benchmark
Denmark	31/12/84	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
India	29/06/07	All & Benchmark
Indonesia	31/03/16	All & Benchmark
Ireland	31/12/84	All, Tracker & Benchmark
Italy	30/12/88	All, Tracker & Benchmark
Japan	31/12/81	All, Tracker & Benchmark
Mexico	30/06/10	All & 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
Singapore	31/12/08	All & Benchmark
South Africa	31/08/00	All & Benchmark
South Korea	30/03/12	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
Eurozone	01/01/99	All, Tracker & Benchmark

Constructing Index Mnemonics

You can review and analyse the index values in Datastream for Office, Datastream Charting and Datastream Web Services (DSWS). More information about using the indices is given in How to use the indices and constituent lists.

The mnemonics for the indices are constructed as follows.

All Bond and Tracker

Mnemonic format = tccssbb, where:

t	Index Type	A = All, T = Tracker
cc	Country Code	see country codes table
ss	Sector	GV = Government
bb	Maturity Band	AL = All bonds within the index type G1 = 1-3 years G2 = 3-5 years G3 = 5-7 years G4 = 7-10 years G5 = 10+ years UN = Undated bonds

For example, the US All and Tracker mnemonics are AUSGVAL and TUSGVAL respectively.

Benchmark

Mnemonic format = BMccmmY, where:

BM	Index Type	BM = Benchmark
cc	Country Code	see Country Code Table
mm	Maturity (years)	See table for availability
Y	Years	

For example, the US Ten year benchmark mnemonic is BMUS10Y.

Country Codes

Country Codes									
Australia	AU	Denmark	DK	Hungary	HN	New Zealand	NZ	Spain	ES
Austria	OE	Eurozone	EM	India	IA	Norway	NW	Sweden	SD
Belgium	BG	Finland	FN	Ireland	IR	Poland	PO	Switzerland	SW
Canada	CN	France	FR	Italy	IT	Portugal	PT	United Kingdom	UK
China	CA	Germany	BD	Japan	JP	South Africa	SA	United States	US
Czech Republic	CZ	Greece	GR	Netherlands	NL	South Korea	KO		

Constructing List Mnemonics

You can display constituent lists of bonds for each month's All and Tracker index values since the start date and daily benchmark lists from September 2005 (monthly prior to this date).

All and Tracker list mnemonics have the general format tccsssmmyybb, where:

t	Index Type	A=All, T=Tracker
cc	Country Code	The Datastream two-character code
sss	Sector	GVT = Government
mm	Month	01 = January, 12 = December
yy	Year	24 = 2024
bb	Maturity Band	AL = All Maturities G1 = 1-3Y G2 = 3-5Y G3 = 5-7Y G4 = 7-10Y G5 = 10+Y UN = Undated (UK ONLY)

For example, the mnemonic for the All list for United States 7-10Y for January 2024 is AUSGVT0124G4.

Benchmark list mnemonics have the general format tccsddmmyybb.

t	Index Type	B=Benchmark
cc	Country Code	The Datastream two-character code
S	Sector	G = Government
dd	Day	Standard day of the month – 18 = eighteenth
mm	Month	01 = January, 12 = December
yy	Year	24 = 2024
Bb	Maturity Band	B1 = 2Y B2 = 3Y B3 = 5Y B4 = 7Y B5 = 10Y B6 = 15Y B7 = 20Y B8 = 30Y B0 = 50Y

For example, the mnemonic for the Benchmark list for United States 10Y for 2nd January 2024 is BUSG020124B5.

Viewing Constituent Lists: DFO and Charting

You can use the list mnemonics as input for the Datastream add-in for Excel to obtain data on any applicable bond datatype. There are also additional datatypes specific to the Datastream index constituent lists and indices:

- BIAII - Amount in issue at the start of the month for which the list was created
- BIEFT - Date up to which the bond was included in the index
- BMCON10 - Used with a benchmark index mnemonic, this datatype will return the last 10 changes to the underlying benchmark

Navigator Explorer – Index Search

The Explorer allows you to navigate to the particular index required starting with Supplier, Index Group, Market and Type. The Datastream Calculated Proprietary indices are navigated this way:

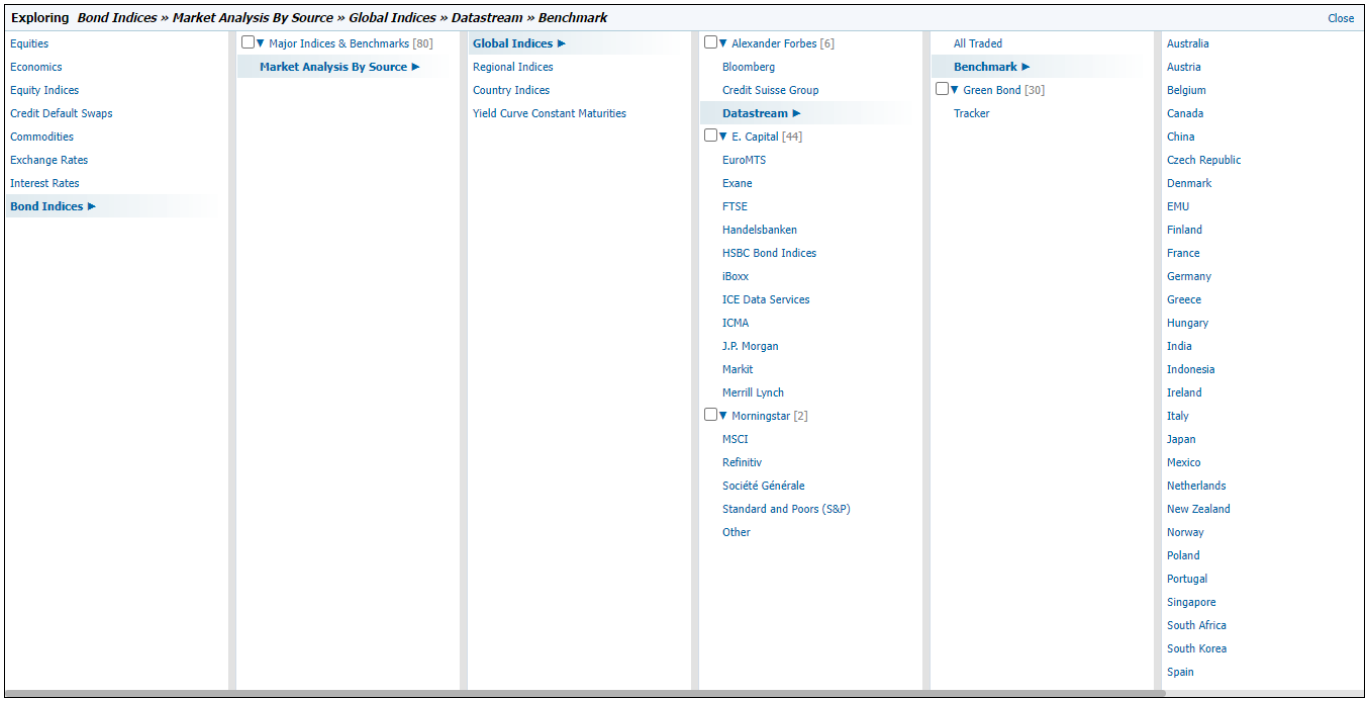
Supplier - Datastream

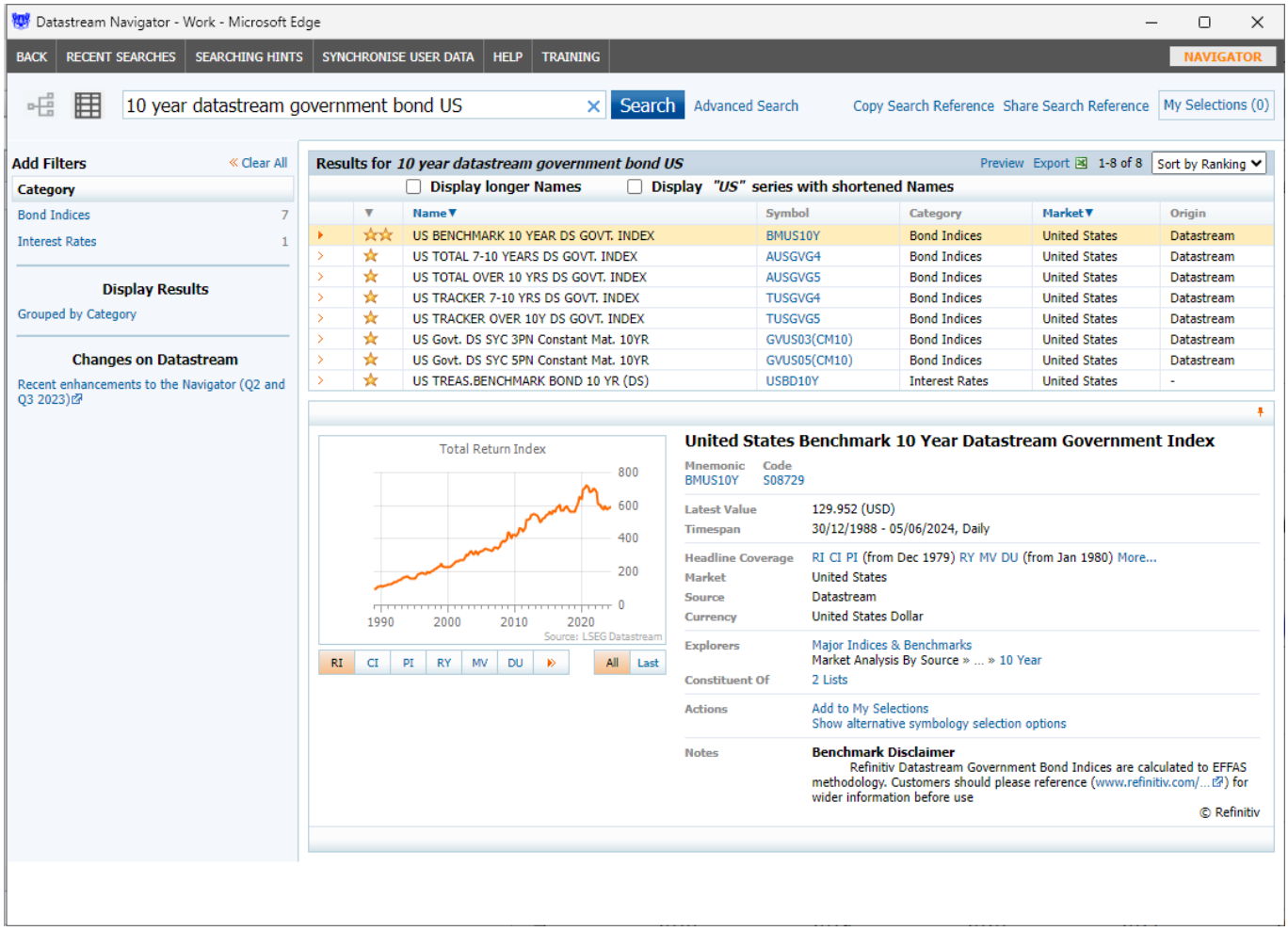
Index Group - All Traded, Benchmark or Tracker

Market - Individual Markets for each group

Type - Maturity Band

The screenshots show how to navigate to the Datastream Bond Indices Explorer lists and a text search for the United States 10Y benchmark.





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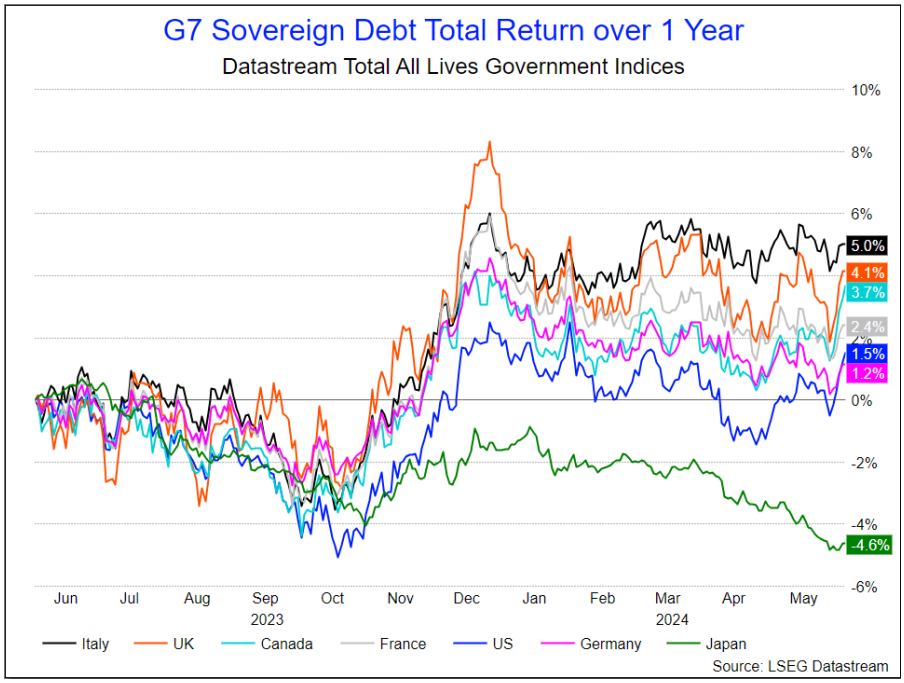
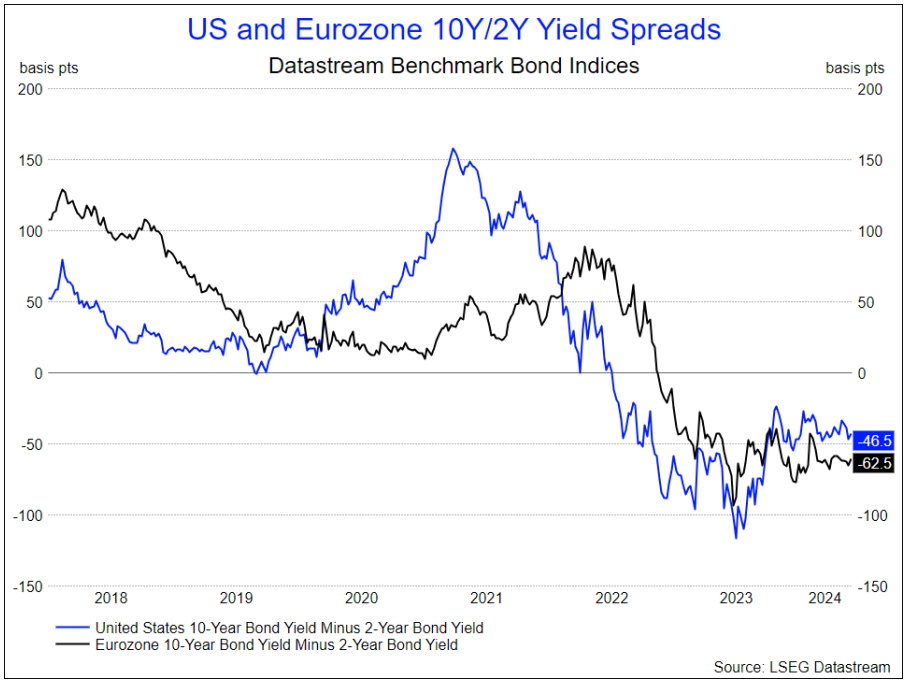
How to Use Indices and Constituents in Datastream

You can retrieve the indices and their constituents in Datastream for Office (DFO) and Datastream Charting.

This chart shows the total return for G7 government bond markets over the past year, using the RI datatype and rebasing the values to the start of the chart.



This chart shows the maturity spread between the 10Y benchmark yield and the 2Y benchmark yield. The difference is multiplied by 100 to display basis points.



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Formulae

	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^*	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: $\boldsymbol{P_t^* * N_{t-1} = P_t * N_t + R_t * NC_t}$ Where: $\boldsymbol{NC_t}$ is the amount called for redemption at time t $\boldsymbol{N_t}$ is the amount remaining in issue (ex the amount called) at time t $\boldsymbol{R_t}$ is the redemption price of the bonds being called at time t 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.		

Clean Price Index (CI)

$CI_0 = 100$

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

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

Gross Price Index (PI)

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

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

where the summations are over the bonds currently in the index. The Index values currently go back to 30/12/88. The Gross Price Index (PI) is then:

$PI_t = CI_t * (1 + AI_t)$

Total Return Index (RI)

$RI_0 = 100$

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

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 <M>t falls within the period between the drawing date and the next serial redemption date. For such bonds the calculation is:

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

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.

XDts = 0

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

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

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

Average Coupon (CO)

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

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

Average Life (L)

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

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

Average Duration (DU)

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

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

Average Convexity (CX)

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

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

Average Redemption Yield (RY)

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

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:

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

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

Market Value (MV)

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

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

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