



FTSE Climate Risk-Adjusted Carry and Roll Down (CaRD) Government Bond Index Series

v1.0



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Section 1

Introduction

1.0 Introduction

1.1 FTSE Climate Risk-Adjusted Carry and Roll Down (CaRD) Government Bond Index Series

- 1.1.1 The FTSE Risk-Adjusted Carry and Roll Down Government Bond Index Series (Climate CaRD, also refer to the “Index” in this document), seeks to reflect a targeted exposure to the sovereign bonds in the underlying FTSE Climate Risk-Adjusted Government Bond Index Series (Climate WGBI and its variants, also refer to the “base universe” in this document). The weightings for each Index in the Series are determined by an optimization process that aims to maximize the carry and roll down of the Index subject to duration and country weight constraints of the base universe.
- 1.1.2 The FTSE Climate WGBI and its variants within the FTSE Climate Index Series measure the performance of fixed-rate, local currency, investment-grade sovereign bonds based on the market capitalization of its index eligible debt, as well as by incorporating a tilting methodology that adjusts index weights according to each country’s relative climate risk performance, measured across three distinct and quantitative, climate-related pillars: transition risk; physical risk; and resilience.
- 1.1.3 The FTSE Climate Risk-Adjusted Carry and Roll Down (CaRD) Government Bond Index does take account of ESG factors in its design.

1.2 FTSE Russell

FTSE Russell is a trading name of FTSE International Limited, Frank Russell Company, FTSE Global Debt Capital Markets Limited (and its subsidiaries FTSE Global Debt Capital Markets Inc. and FTSE Fixed Income Europe Limited), FTSE Fixed Income LLC, The Yield Book Inc. and Beyond Ratings

- 1.2.1 FTSE Russell hereby notifies users of the index that it is possible that factors, including external factors beyond the control of FTSE Russell, may necessitate changes to, or the cessation, of the index and therefore, any financial contracts or other financial instruments that reference the index or investment funds which use the index to measure their performance should be able to withstand, or otherwise address the possibility of changes to, or cessation of, the index.
- 1.2.2 Index users who choose to follow this index or to buy products that claim to follow this index should assess the merits of the index’s rules-based methodology and take independent investment advice

before investing their own or client funds. No liability whether as a result of negligence or otherwise is accepted by FTSE Russell or any members of the FTSE Russell Policy Advisory Board or FTSE Russell Asia Pacific Regional Equity Advisory Committee (or any person concerned with the preparation or publication of these Ground Rules) for any losses, damages, claims and expenses suffered by any person as a result of:

- any reliance on these Ground Rules, and/or
- any errors or inaccuracies in these Ground Rules, and/or
- any non-application or misapplication of the policies or procedures described in these Ground Rules, and/or
- any errors or inaccuracies in the compilation of the Index or any constituent data.



Section 2

Management Responsibilities

2.0 Management Responsibilities

2.1 FTSE Fixed Income LLC (FTSE)

2.1.1 FTSE is the benchmark administrator of the index series.¹

2.1.2 FTSE is responsible for the daily calculation, production and operation of the index series and will:

- maintain records of the index weightings of all constituents;
- make changes to the constituents and their weightings in accordance with the Ground Rules;
- carry out the periodic index reviews of the index series and apply the changes resulting from the reviews as required by the Ground Rules;
- disseminate the indexes.

2.2 Amendments to these Ground Rules

2.2.1 These Ground Rules shall be subject to regular review (at least once a year) by FTSE Russell to ensure that they best reflect the aim of the index series. Any proposals for significant amendments to these Ground Rules will be subject to consultation with FTSE Russell advisory committees and other stakeholders if appropriate. The feedback from these consultations will be considered by the FTSE Russell Index Governance Board before approval is granted.

2.2.2 As provided for in the Statement of Principles for FTSE Russell Fixed Income Indices, where FTSE Russell determines that the Ground Rules are silent or do not specifically and unambiguously apply to the subject matter of any decision, any decision shall be based as far as practical on the Statement of Principles. After making any such determination, FTSE Russell shall advise the market of its decision at the earliest opportunity. Any such treatment will not be considered as an exception or change to the

¹ The term administrator is used in this document in the same sense as it is defined in Regulation (EU) 2016/1011 of the European Parliament and of the Council of 8 June 2016 on indices used as benchmarks in financial instruments and financial contracts or to measure the performance of investment funds (the European Benchmark Regulation) and [The Benchmarks \(Amendment and Transitional Provision\) \(EU Exit\) Regulations 2019](#) (the UK Benchmark Regulation). FTSE Fixed Income LLC administers the Index Series in line with the third country transitional provisions contained within Article 51(5) of the European Benchmark Regulation and the third country transitional provisions as amended by Article 42(5) of the UK Benchmark Regulation.

Ground Rules, or to set a precedent for future action, but FTSE Russell will consider whether the Ground Rules should subsequently be updated to provide greater clarity.



Section 3

FTSE Russell Index Policies

3.0 FTSE Russell Index Policies

These Ground Rules should be read in conjunction with the following policy documents which can be accessed using the links below or by contacting fi.index@lseg.com. These policies are reviewed annually and any changes are approved by the FTSE Russell Index Governance Board.

3.1 Statement of Principles for FTSE Fixed Income Indices (the Statement of Principles)

Indices need to keep abreast of changing markets and the Ground Rules cannot anticipate every eventuality. Where the Ground Rules do not fully cover a specific event or development, FTSE Russell will determine the appropriate treatment by reference to the Statement of Principles for FTSE Fixed Income Indices which summarises the ethos underlying FTSE Russell's approach to index construction. The Statement of Principles is reviewed annually and any changes proposed by FTSE Russell are presented to the FTSE Russell Policy Advisory Board for discussion before approval by the FTSE Russell Index Governance Board.

The Statement of Principles for Fixed Income Indices can be accessed using the following link: [Statement of Principles Fixed Income Indices.pdf](#)

3.2 Queries and Complaints

FTSE Russell's complaints procedure can be accessed using the following link:

[Benchmark Determination Complaints Handling Policy.pdf](#)

3.3 Recalculation Policy and Guidelines

The Recalculation Policy and Guidelines for Fixed Income Indices document is available from the FTSE Russell website using the link below or by contacting fi.index@lseg.com.

[Fixed Income Recalculation Policy and Guidelines.pdf](#)

3.4 Policy for Benchmark Methodology Changes

Details of FTSE Russell's policy for making benchmark methodology changes can be accessed using the following link:

[Policy for Benchmark Methodology Changes.pdf](#)

3.5 FTSE Russell Governance Framework

To oversee its indices, FTSE Russell employs a governance framework that encompasses product, service and technology governance. The framework incorporates the London Stock Exchange Group's three lines of defence risk management framework and is designed to meet the requirements of the IOSCO Principles for Financial Benchmarks², the European benchmark regulation³ and the UK benchmark regulation⁴. The FTSE Russell Governance Framework can be accessed using the following link:

[FTSE Russell Governance Framework.pdf](#)

² IOSCO Principles for Financial Benchmarks Final Report, FR07/13 July 2013

³ Regulation (EU) 2016/1011 of the European Parliament and of the Council of 8 June 2016 on indices used as benchmarks in financial instruments and financial contracts or to measure the performance of investment funds

⁴ [The Benchmarks \(Amendment and Transitional Provision\) \(EU Exit\) Regulations 2019](#) (the UK Benchmark Regulation).

Section 4

Composition and Design Criteria

4.0 Composition and Design Criteria

4.1 The FTSE Climate Risk-Adjusted Carry and Roll Down Government Bond Index Series (“Climate CaRD Index”) seeks to reflect a targeted exposure to the sovereign bonds in the underlying benchmark (“Base Universe”). The weightings within each of the Climate CaRD Index are determined by an optimization process that aims to maximize the overall index-level carry and roll down, subjects to country-level duration and market value weight constraints to be matched with the Base Universe. Within the Climate CaRD Index Series, there are 4 index variants, see below for respective base universe for each of the variant.

4.1.1 FTSE Climate Risk-Adjusted Carry and Roll Down (CaRD) World Government Bond Index (Base Universe: FTSE Climate Risk-Adjusted World Government Bond Index)

FTSE Climate WGBI is the base universe, which is composed of the same countries in the standard FTSE WGBI. As of March 2021, index eligible markets include below 22 countries, denominated in a variety of currencies:

Americas		Asia Pacific and Japan	
Canada		Australia	
Mexico		Japan	
United States		Malaysia	
		Singapore	
EMEA			
Austria	Ireland	Denmark	
Belgium	Italy	Norway	
France	Netherlands	Poland	
Finland	Spain	Sweden	
Germany	Israel	United Kingdom	

The FTSE WGBI measures the performance of fixed-rate, local currency, investment-grade sovereign bonds. Each individual index composition is based on the sovereign markets and constituents of the FTSE WGBI. A new market entering the FTSE WGBI will also enter the Climate WGBI, and Climate CaRD WGBI at the same time. Markets being removed from the WGBI because they are subjected to FTSE WGBI’s exit criteria will also be removed from the Climate WGBI and Climate CaRD WGBI. To be eligible for the FTSE WGBI, markets must satisfy minimum market size, credit rating and market

accessibility level criterion. These criteria are assessed on an annual basis each September, however, markets that no longer meet the minimum credit quality are removed from the index at the next month's profile.

For full details on the design criteria and calculation assumptions for the FTSE WGBI please refer to the FTSE Fixed Income Index Guide.

4.1.2 FTSE Advanced Climate Risk-Adjusted Carry and Roll Down (CaRD) World Government Bond Index (Base Universe: FTSE Advanced Climate Risk-Adjusted World Government Bond Index)

FTSE Advanced Climate WGBI is the base universe, which has the same constituents as the standard FTSE Climate WGBI, only with different Climate Pillar Tilts (see Rule 4.2 Design Criteria for details).

4.1.3 FTSE Climate Risk-Adjusted Carry and Roll Down (CaRD) European Government Bond Index (Base Universe: FTSE Climate Risk-Adjusted European Government Bond Index)

FTSE Climate EGBI is the base universe, which is composed of the same countries in the standard FTSE EGBI, which consists of the Eurozone-participating countries that meet the WGBI criteria. As of March 2021, index eligible markets include below 9 countries, denominated in EUR:

EMEA	
Austria	Ireland
Belgium	Italy
France	Netherlands
Finland	Spain
Germany	

The FTSE EGBI measures the performance of fixed-rate, local currency, investment-grade sovereign bonds. Each individual index composition is based on the sovereign markets and constituents of the Eurozone markets within the FTSE WGBI. A new market entering the FTSE EGBI will also enter the Climate EGBI and Climate CaRD EGBI at the same time. Markets being removed from the EGBI because they are subjected to FTSE WGBI's exit criteria will also be removed from the Climate EGBI and Climate CaRD EGBI.

For full details on the design criteria and calculation assumptions for the FTSE EGBI please refer to the FTSE Fixed Income Index Guide.

4.1.4 FTSE Advanced Climate Risk-Adjusted Carry and Roll Down (CaRD) European Government Bond Index (Base Universe: FTSE Advanced Climate Risk-Adjusted European Government Bond Index)

FTSE Advanced Climate EGBI is the base universe, which has the same constituents as the standard FTSE Climate EGBI, only with different Climate Pillar Tilts (see Section 4.2 Design Criteria for details).

4.2 Design criteria and calculation assumptions for the FTSE Climate Risk-Adjusted Carry and Roll Down Government Bonds Index Series

	FTSE Climate Risk-Adjusted Carry and Roll Down WGBI	FTSE Advanced Climate Risk-Adjusted Carry and Roll Down WGBI	FTSE Climate Risk-Adjusted Carry and Roll Down EGBI	FTSE Advanced Climate Risk-Adjusted Carry and Roll Down EGBI
Coupon	Fixed-rate			
Minimum maturity	At least 1 year			
Minimum credit quality	Entry: A- by S&P and A3 by Moody's, for all new markets Exit: Below BBB- by S&P and Baa3 by Moody's			
Weighting	Alternatively weighted. The country weights of base universe are determined by Climate scores and pillars. The final weights of each Index in the Series are determined by performing an optimization process, see Optimization Methodology section below.			
Country climate scores	Updated annually and applied each May month-end rebalance. The cut-off for input data is May 1 of each year.			
Country climate scores Assessment Cohort	Local currency sovereign bond markets eligible for the WGBI.		Local currency sovereign bond markets eligible for the EGBI.	
Climate Pillars and tilt calibration	<ul style="list-style-type: none"> Geometric tilt • Transition risk: 0.25 • Physical risk: 1 • Resilience: 1 	<ul style="list-style-type: none"> Geometric tilt • Transition risk: 1 • Physical risk: 1 • Resilience: 1 	<ul style="list-style-type: none"> Geometric tilt • Transition risk: 0.5 • Physical risk: 0.25 • Resilience: 0.5 	<ul style="list-style-type: none"> Geometric tilt • Transition risk: 1 • Physical risk: 1 • Resilience: 1
Reinvestment of cash flow	At daily average of the local currency one-month Eurodeposit rate, calculated from the actual scheduled payment date of the cash flow through the end of the reporting period.			
Rebalancing	Once a month on the last business day of the month			
Calculation frequency	Daily			
Settlement date	Monthly: Settlement is on the last calendar day of the month. Daily: Same day settlement except if the last business day of the month is not the last calendar day of the month; then, settlement is on the last calendar day of the month.			
Fixing date ⁴	Each month, the upcoming month's index constituents for the base universe are "fixed" on the profile fixing date ⁵ . The Index is "fixed" on profile fixing date as well.			
Base date	December 31, 2006			

⁵ Fixing dates provide a clear reference point for index users to know in advance of any changes to the composition of the index for the upcoming month. Index rules stipulate that there must be a minimum of four (4) business days following each index fixing date and before calendar month-end in all of the following business regions: US, UK, Eurozone, Japan, and Australia. The annual schedule of fixing dates is made available on the website at www.yieldbook.com/m/indices

4.3 Pricing Methodology

- 4.3.1 The Index is calculated Monday through Friday except Christmas Day (observed) and New Year's Day (observed). Each local market will observe its own holiday calendar: if a local market is on holiday, the closing prices used for that day will be the closing prices from the previous day. The local market pricing source and snap time used for the pricing of the Index follows the convention of the FTSE World Government Bond Index. For more details please see the index guide on the website www.yieldbook.com/m/indices.

4.4 Index Quality

- 4.4.1 An index quality is assigned to each index bond as of profile fixing. The quality is first mapped to the Standard & Poor's Financial Services LLC ("S&P") rating. If a bond is not rated by S&P but it is rated by Moody's Investors Service, Inc ("Moody's"), the S&P equivalent of the Moody's rating is assigned to the index quality. If a bond is rated by neither S&P nor Moody's, the bond is not assigned an index quality. If a bond is rated as investment-grade by one rating agency and high-yield by the other, the S&P equivalent of the investment-grade rating is assigned to the index quality. These ratings remain unchanged for the entire performance month.

4.5 Maturity

- 4.5.1 In addition to the broad categories published, sub-sector breakdowns are also provided for many of the fixed income indices. One such sub-division is based on the remaining maturity of the underlying securities. The maturity sector buckets are defined by including all underlying issues with a remaining average life at least equal to the lower bound, but less than the upper bound of the particular category. For example, the one- to three-year sector of the FTSE Climate WGBI includes all securities in the Climate WGBI with a remaining average life of at least one year, but less than three years. The set of bonds is then held constant for the calculation month, even if the average life drops below the lower bound of the maturity bucket.

4.6 Optimization Methodology

- 4.6.1 The bonds in each Index are divided into sectors based on their country of issuance and maturity sector buckets (see "Maturity" section above). The maturity sectors considered are 1-3 years, 3-5 years, 5-7 years, 7-10 years, 10-15 years and 15 years+. For each sector, expected returns are computed by assuming that yield curves and option adjusted spreads remain constant over the following twelve months. Using the above inputs, the sector-level optimization aims to maximize the Index's twelve-month expected return, while the individual country weights and interest rate risks are both matched to the base universe.

The Index Series optimizes on a local basis (LO variants). The optimization process will ensure that:

- i) Individual country modified durations will be the same as those in the base universe, and
- ii) The country-level market value weights remain the same as their starting levels. Country market value weights are anchored to their original value in the base universe. Within each country, sector weights can fluctuate without any cap on monthly turnover.

The optimization is done on a monthly basis and targets the sector combinations with the highest expected returns. The bonds in the remaining sectors of the universe are assigned zero weight and will be excluded from the Index. Leverage and negative weights are not allowed in the optimization.

Figure 1 provides more information on the optimization process. The illustration uses Climate CaRD WGBI as an example. The same also applies to Advanced Climate CaRD WGBI; Climate CaRD EGBI; Advanced Climate CaRD EGBI, only the base universe will be replaced respectively in the formula.

Figure 1. Optimization Details

Objective Function:

$$\text{Maximize: } \sum (\text{Bucket Market Value})_{\text{Climate CaRD WGBI}} \times (\text{Bucket Carry and Roll Down})$$

Country Market Value Constraint (Within Each Country):

$$\sum (\text{Bucket Market Value})_{\text{Climate CaRD WGBI}} = \sum (\text{Bucket Market Value})_{\text{Climate WGBI}}$$

Country Modified Duration Constraint (Within Each Country):

$$\left[\sum (\text{Bucket Market Value})_{\text{Climate CaRD WGBI}} \times (\text{Bucket Modified Duration}) \right] / \sum (\text{Bucket Market Value})_{\text{Climate CaRD WGBI}} = \left[\sum (\text{Bucket Market Value})_{\text{Climate WGBI}} \times (\text{Bucket Modified Duration}) \right] / \sum (\text{Bucket Market Value})_{\text{Climate WGBI}}$$

4.7 Return Computation

- 4.7.1 Total returns are computed on the assumption that each security is purchased at the beginning of the period and sold at the end of the period. An issue's total rate of return is the percentage change in its total value over the measurement period. The components of total return for each security are price change, principal payments, coupon payments, accrued interest, and reinvestment income on intra-month cash flows. The total returns are market capitalization weighted using the security's beginning-of-period market value (see Figure 2). In the case of multi-currency or non-base indices, the total return also includes currency movement (see Figure 3).

Figure 2. Total rate of return calculation methodology

Beginning-of-Period Value

(Beginning Price + Beginning Accrued) x Beginning Par Amount Outstanding

End-of-Period Value

[(Ending Price + Ending Accrued) x (Beginning Par Amount Outstanding - Principal Payments)] + Coupon Payments + Principal Payments + Reinvestment Income

Total Rate of Return (%)

$$\left[\left(\frac{\text{End-of-Period Value}}{\text{Beginning-of-Period Value}} \right) - 1 \right] \times 100$$

A note on precision: Returns are computed to at least six decimal places but reported to a maximum of five. In addition, owing to rounding errors inherent in computer floating-point arithmetic, the last digit in any reported value may sometimes be off by one from its true value.

Figure 2. Total rate of return calculation methodology for base currency returns, unhedged

Total Rate of Return (%)

$$\left\{ \left[1 + \left(\frac{\text{Local Currency Return}}{100} \right) \right] \times \left(\frac{\text{End-of-Month Spot Rate}}{\text{Beginning-of-Month Spot Rate}} \right) - 1 \right\} \times 100$$

This equation holds true only if the spot rates are quoted as base currency per unit of foreign currency.

4.7.2 The monthly currency-hedged return is calculated by using a rolling one-month forward exchange contract as a hedging instrument. The face value of the contract is equal to the estimated end-of-month full market value. To calculate this value, the bond's yield is assumed to be unchanged from the beginning of the month. Any known cash flows are then taken into account, such as coupon or principal payments, and interest expected to accrue for the period is also added in. This calculation leaves the intra-month changes in bond prices from yield movements unhedged. Any principal movement resulting from yield change is then settled at end-of-month spot exchange rates. Figure 3 gives an example of the calculation formula from the point of view of a US investor.

Figure 3. Total rate of return calculation methodology, currency-hedged

Beginning-of-Period Value

$$[(\text{Beginning Price} + \text{Beginning Accrued}) \times \text{Beginning Par Outstanding}] \times \left[\left(\frac{\text{Beginning-of-Period}}{\text{Spot Exchange Rate}} \right) \left(\frac{\text{US Dollar}}{\text{Local Currency}} \right) \right]$$

End-of-Period Value

$$\left[\left(\frac{\text{End-of-Period Local Currency Value, Assuming Unchanged Yield}}{\text{End-of-Period Local Currency Value, Assuming Unchanged Yield}} \right) + \left(\frac{\text{Known Intra-Month Cash Flows and Interest Expected to Accrue}}{\text{Known Intra-Month Cash Flows and Interest Expected to Accrue}} \right) \right] \times \left[\left(\frac{\text{Beginning-of-Period One-Month Forward Exchange Rate}}{\text{Beginning-of-Period One-Month Forward Exchange Rate}} \right) \left(\frac{\text{US Dollar}}{\text{Local Currency}} \right) \right] + \left[\left(\frac{\text{Change in Market Value of Principal Amount Due to Yield Change}}{\text{Change in Market Value of Principal Amount Due to Yield Change}} \right) \times \left(\frac{\text{End-of-Period Spot Exchange Rate}}{\text{End-of-Period Spot Exchange Rate}} \right) \left(\frac{\text{US Dollar}}{\text{Local Currency}} \right) \right]$$

This equation holds true only if the spot rates are quoted as base currency per unit of foreign currency.

4.8 Available Indices in the Series

Index Name	Universe	Objective	Constraint	Optimization Date ⁶	Vendor code
FTSE Climate Risk-Adjusted CaRD World Government Bond Index	FTSE Climate WGBI	Maximize carry and roll down as measured by the Index 12-month expected return	Country-level modified duration and market values equal to that of the Universe	Fixing Date ⁷	SBCCWGU (in USD terms) SBCCWGUC (hedged in USD terms)
FTSE Advanced Climate Risk-Adjusted CaRD World Government Bond Index	FTSE Advanced Climate WGBI	Maximize carry and roll down as measured by the Index 12-month expected return	Country-level modified duration and market values equal to that of the Universe	Fixing Date ⁶	SBACCWU (in USD terms) SBACCWUC (hedged in USD terms)
FTSE Climate Risk-Adjusted CaRD European Government Bond Index	FTSE Climate EGBI	Maximize carry and roll down as measured by the Index 12-month expected return	Country-level modified duration and market values equal to that of the Universe	Fixing Date ⁶	SBCCEGL (in LCL terms)
FTSE Advanced Climate Risk-Adjusted CaRD European Government Bond Index	FTSE Advanced Climate EGBI	Maximize carry and roll down as measured by the Index 12-month expected return	Country-level modified duration and market values equal to that of the Universe	Fixing Date ⁶	SBACCEL (in LCL terms)

4.9 Chronological Summary of Events

4.9.1 The construction of the FTSE Climate Risk-Adjusted Carry and Roll Down Government Bond Index Series is driven by the same events that mark the FTSE Climate Risk-Adjusted World Government Bond Index Series, for more information, please see the FTSE Fixed Income Index Guide. Unless otherwise stated, the Index follows the general methodology for FTSE fixed income indices. For details, please also refer to FTSE Fixed Income Index Guide.

4.10 Data availability and accessibility

4.10.1 Index information, including index profiles, analytics and returns, and historical data, for the FTSE Climate Risk-Adjusted Carry and Roll Down Government Bond Index Series is available on <https://www.yieldbook.com/m/indices> FTSE Russell also makes data for its indices available through a number of data and analytic vendors.

⁶ Bond carry and roll down, modified duration and market value are calculated on the Optimization Date with a settlement date of the corresponding Month End. Individual bond par amounts are derived by the optimization process on the Optimization Date. Such par amounts are then used for the corresponding month-end rebalancing.

⁷ Fixing dates provide a clear reference point for index users to know in advance of any changes to the composition of the index for the upcoming month. Index rules stipulate that there must be a minimum of four (4) business days following each index fixing date and before calendar month-end in all of the following business regions: US, UK, Eurozone, Japan, and Australia. The annual schedule of fixing dates is made available on the website at www.yieldbook.com/m/indices



Appendix A: Further Information

A Glossary of Terms used in FTSE Russell's Ground Rule documents can be found using the following link:
[Fixed Income Glossary of Terms.pdf](#)

For contact details please visit the FTSE Russell website or contact FTSE Russell client services at
fi.index@lseg.com.

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