CME Group

CME Overnight Repo-Backed Benchmarks Methodology

RepoFunds Rate Euro “RFR Euro”
RepoFunds Rate Sterling “RFR Sterling”
RepoFunds Rate JBOND “RFR JBOND”

CME Group Benchmark Administration Limited

Version 1.2.2

Publication Date: March 13th, 2023
## Version Control

<table>
<thead>
<tr>
<th>VERSION</th>
<th>KEY CHANGES</th>
<th>APPROVAL DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Creation of the &quot;benchmark family&quot;</td>
<td>December 16th, 2020</td>
</tr>
<tr>
<td>1.1</td>
<td>• Validation checks</td>
<td>April 20th, 2021</td>
</tr>
<tr>
<td></td>
<td>• Renaming JBOND RIR to RFR JBOND</td>
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<td>1.2</td>
<td>• Specials Filtering Methodology</td>
<td>October 27th, 2021</td>
</tr>
<tr>
<td></td>
<td>• Data Sufficiency and Integrity criteria</td>
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<tr>
<td>1.2.1</td>
<td>• Clarification to eligibility of repo trades</td>
<td>October 12th, 2022</td>
</tr>
<tr>
<td>1.2.2</td>
<td>• Annual Review</td>
<td>March 10th, 2023</td>
</tr>
<tr>
<td>Section</td>
<td>Page</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>1. Introduction</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>1.1. CME Group and CME Group Benchmark Administration Limited</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>1.2. Regulatory and IOSCO Compliance</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2. Description of benchmarks</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>2.1. RepoFunds Rate Euro Benchmarks (“RFR Euro”)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>2.2. RepoFunds Rate Sterling (“RFR Sterling”)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>2.3. RepoFunds rate JBOND (“RFR JBOND”)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>2.4. Trading Venues</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>3. Eligible Repo Transactions</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>3.1. RFR EUR, RFR Sterling, RFR JBOND</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>4. Special Collateral Filtering Algorithm</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>5. Calculation Methodology</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>5.1. RFR EUR, RFR Sterling, RFR JBOND</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>6. Data Sufficiency, Validations and Publications</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>6.1. Data Sufficiency and Integrity</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>6.2. Pre-publication Validations</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>6.3. Publication</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>6.4. Error Policy</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>7. Governance</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>7.1. Oversight Committee</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>7.2. Review of the Methodology</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>7.3. Review of the Methodology - Consultation Process</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>7.4. Cessation</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>7.5. Records Retention</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>7.6. Auditing</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>7.7. Data Licensing and Distribution</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>7.8. Complaints Procedures</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>8. Appendix I – Key Terms &amp; Definitions</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>9. Appendix II – ESG Disclosures</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>
1. Introduction

CME Overnight Repo-Backed Benchmarks is a suite of benchmarks administered by CME Group Benchmark Administration Limited (“CBA” or the “Administrator”) and intended to measure the cost of secured one-day repo funding of sovereign bonds issued by a sub-set of Eurozone Countries, the United Kingdom and Japan.

These benchmarks, are registered as a “Benchmark Family”:

- RepoFunds Rate Euro (“RFR EUR”)
- RepoFunds Rate Sterling (“RFR Sterling”)
- RepoFunds Rate JBOND (“RFR JBOND”)

1.1. CME Group and CME Group Benchmark Administration Limited

As a leading and diverse derivatives market operator, CME Group is the parent of four U.S.-based designated contract markets (“DCMs”): Chicago Mercantile Exchange Inc. (“CME”), Board of Trade of the City of Chicago, Inc. (“CBOT”), New York Mercantile Exchange, Inc. (“NYMEX”), and the Commodity Exchange, Inc. (“COMEX”) (collectively, the “CME Group Exchanges”). These exchanges offer a wide range of products available across all major asset classes, including futures and options based on interest rates, equity indexes, foreign exchange, energy, metals, and agricultural commodities. CME Group offers futures trading through the CME Globex® electronic trading platform (“Globex”), fixed income trading via BrokerTec, foreign exchange trading on the EBS platform, and central counterparty clearing services through CME Clearing, a division of CME.

CBA capitalizes on CME Group’s wealth of electronic transaction-based data in the calculation of its indices and benchmarks. CME Group Benchmark Administration Limited (CBA) is authorized and supervised by the UK Financial Conduct Authority (FCA). CBA is the Benchmark Administrator of the CME Overnight Repo-Backed Family of Benchmarks, with Chicago Mercantile Exchange Inc. providing calculation agent and distribution services.

1.2. Regulatory and IOSCO Compliance

CME Overnight Repo-Backed Benchmarks are a family of benchmarks, designed on the basis of industry best practices and the IOSCO Principles for Financial Benchmarks. This will include but is not limited to the creation of an Oversight Committee and a published methodology.

CME Overnight Repo-Backed Benchmarks are available for use under the UK Benchmark Regulation (BMR)¹.

¹ https://www.fca.org.uk/markets/benchmarks/regulation
2. Description of benchmarks

2.1. RepoFunds Rate Euro Benchmarks ("RFR Euro")

RFR Euro Benchmarks are one-day, secured Euro repo benchmarks, created with the intent to measure the effective cost of overnight funding of sovereign collateral. Benchmarks are calculated from repo trades that use Euro area sovereign government bonds denominated in EUR as the underlying collateral and are executed on the BrokerTec Regulated Market operated by CME Amsterdam B.V.\(^2\) and BondVision multilateral trading facility ("MTF")\(^3\) EuroMTS Limited\(^4\).

RFR Euro is calculated on an Act/360 day-count convention and its publication follow the BrokerTec EU Repo Holiday Calendar.

The RFR Euro Benchmarks consists of the following benchmarks:

- RepoFunds Rate Austria ("RFR Austria")
- RepoFunds Rate Belgium ("RFR Belgium")
- RepoFunds Rate Finland ("RFR Finland")
- RepoFunds Rate France ("RFR France")
- RepoFunds Rate Germany ("RFR Germany")
- RepoFunds Rate Italy ("RFR Italy")
- RepoFunds Rate Ireland ("RFR Ireland")
- RepoFunds Rate Netherlands ("RFR Netherlands")
- RepoFunds Rate Portugal ("RFR Portugal")
- RepoFunds Rate Spain ("RFR Spain")
- RepoFunds Rate Euro ("RFR Euro"): based on the combination of the above ten (10) individual countries.

2.2. RepoFunds Rate Sterling ("RFR Sterling")

RepoFunds Rate Sterling ("RFR Sterling") is a one-day, secured Sterling repo benchmark. The benchmark is calculated from repo trades that use UK sovereign government bonds denominated in Sterling as the underlying collateral, executed on the BrokerTec operated by BrokerTec Europe Limited\(^5\) and centrally cleared. Underlying collateral includes DBV\(^6\), general collateral and specific collateral trades.

RFR Sterling is reported on an ACT/ACT day-count convention and its publication follows the BrokerTec UK Gilt Repo Holiday Calendar.

\(^3\) Article 4(1)(22) of MiFID
\(^4\) https://www.mtsmarkets.com/products/mts-bondvision
\(^6\) Delivery by Value
2.3. RepoFunds Rate JBOND (“RFR JBOND”)

RepoFunds Rate JBOND is a tomorrow-next, secured Japanese Yen repo index, calculated from eligible repo trades that use Japanese sovereign government bonds denominated in Japanese Yen as the underlying collateral, executed on the JBOND Repo Trading System electronic trading platform, and centrally cleared through the Japan Securities Clearing Corporation. JBond Totan Securities Co., Ltd. is headquartered in Tokyo, Japan and operates the JBOND Repo System under the relevant PTS license.

RFR JBOND is reported on an ACT/365 day-count convention and its publication follow the Japanese settlement calendar.

2.4. Trading Venues

BrokerTec Europe Limited and EuroMTS Limited are MTFs and are regulated in accordance with the laws applicable in the UK or EEA.

CME Amsterdam B.V. is a Regulated Market, authorised by the Dutch Minister of Finance.

JBond Totan Securities Co., Ltd. is regulated in accordance with the laws of Japan.

7 https://jbond.co.jp/_us/index.html
8 https://www.jpx.co.jp/jso/en/
9 https://www.jbond.co.jp/_us/profile.html
10 https://www.boj.or.jp/en/about/outline/holi.htm/
3. Eligible Repo Transactions

The Benchmarks are calculated on transactions executed on regulated trading venues and no discretion is exercised by the Administrator in the determination process, as described in the Calculation Methodology section.

3.1. RFR EUR, RFR Sterling, RFR JBOND

Repo transaction eligible for inclusion in the calculation of the Benchmarks must be executed on one of the regulated trading venues relevant to their respective markets (BrokerTec Europe Limited, CME Amsterdam B.V., EuroMTS Limited and JBOND Repo System) within nominated market hours.

- Quotes must be available to all dealers on the relevant market prior to being executed (no bilateral or off-platform trades);
- Trades must be centrally cleared;
- Repo term, from settlement date to maturity date, of one business day;
- Trades must be conducted at a fixed rate;
- Settle on the day for which the Benchmark is being calculated (“Common Settlement”);
- Repo collateral to be any bill, bond, floating-rate note, or inflation-linked bond issued by the sovereign government of the relevant country or, in the case of RFR Euro, by the sovereign government of the Eurozone countries listed in RepoFunds Rate Euro (“RFR Euro”);
- Collateral must be denominated in the respective domestic currencies;

Repo trade must be DBV, general collateral or special collateral.

The set of eligible trades is the aggregation of Overnight, Tom-Next and Spot-Next trades with the same start and end value dates, executed within the specified market hours:

- **Spot-Next and Tom-Next trades:**
  - BrokerTec Europe Limited, CME Amsterdam B.V. and EuroMTS Limited: 6:45am to 5:15pm (GMT/BST)
  - JBOND Repo System: 7:30am to 6:00pm (JST)

- **Overnight trades**
  - All trades executed from market opening until the relevant clearing house deadline.
4. Special Collateral Filtering Algorithm

Repo markets execute a mix of trade types, usually described as “general collateral” or “special collateral”.

Unlike “general collateral”, special collateral trades (special trades) precisely identify the ISIN of the security to be used as collateral. Normally it happens when a special security is in high demand and the transacted repo rate tends to be below typical market levels, often by a significant spread.

In order to calculate benchmarks that best represent the one-day cost of funding, the calculation filters out all special collateral trades below a given threshold prior to undertaking the final VWAR calculation.

All repo trades labelled as special collateral are combined by settlement date and by individual benchmark, and are sorted by descending rate. Then, the bottom 25% of trades are removed from the population. The remaining filtered set of special collateral trades are combined with the general collateral trades, for the final VWAR calculation.

The same filtering process is also applied to the calculation of RFR Euro as a whole; the entire set of special repo trades executed in the ten (10) individual Eurozone countries listed above, is aggregated in a single set and the filtering algorithm described above is applied.
5. Calculation Methodology

The Calculation Methodology has been designed to measure the cost of secured one-day repo funding of sovereign bonds, including considerations about the size and liquidity of the market as well as its dynamics.

No expert judgement is applied to the determination of the Benchmarks; input data are transactions only, as contributed entirely and directly from the relevant trading venues.

5.1. RFR EUR, RFR Sterling, RFR JBOND

After the specials filtering process is applied and 25% of special trades have been removed, the remaining set is combined with repo trades labelled as GC (general collateral) to form the set of trades eligible for calculation.

Each benchmark is the volume-weighted average rate of eligible repo trades (general collateral and filtered specials), and is calculated as follows:

\[
RFR = \frac{\sum_i rate(i) \times quantity(i)}{\sum_i quantity(i)}
\]

where \(rate(i)\) and \(quantity(i)\) are the repo rate and nominal size of repo trade \(i\), and the sum is the total of all repo trades in the defined set of eligible repo trades for that day’s benchmark.

Benchmark values are calculated and published up to 3 (three), rounded decimal places.
6. Data Sufficiency, Validations and Publications

6.1. Data Sufficiency and Integrity

The input data used for the calculation of the benchmarks are checked by the Calculation Agent for anomalies once received from each Trading Venue.

Each benchmark will be calculated and published as long as there is at least one (1) eligible transaction in the observation period. If there are no eligible transactions available to calculate the benchmark, the previous day values will be re-used and published.

Specifically, for RFR EUR, the benchmarks are calculated only if both sets of input data (CME Amsterdam B.V. and EuroMTS Limited) are available. If one or both sets of input data are unavailable, the previous day values will be re-used and published.

The Administrator regularly reviews the underlying markets and reports to the Oversight Committee any concern caused by persistent lack of transactional activity in a specific benchmark.

If the previous day value is re-used for more than three consecutive business days, the Administrator must promptly convene the Oversight Committee to assess available remedial actions.

6.2. Pre-publication Validations

Prior to publication, calculated rates for all benchmarks must pass a validation check. The validation check is performed by the Calculation Agent immediately after calculation of the benchmarks and prior to their dissemination.

Validation checks aim to identify unusual input data volumes (missing or duplicated data) comparing volumes for the day to historical parameters.

The Administrator periodically reviews the validation parameters, according to market conditions, and informs the Calculation Agent of any changes.

The Calculation Agent will have in place procedures to:

- investigate and correct the anomaly
- promptly escalate to the Administrator in the event of persisting anomalies
- report monthly to the Administrator the results of the pre-publication validation checks

The Administrator provides a full report of Validation Checks to the Oversight Committee.
6.3. Publication

The Calculation Agent performs calculations and post-calculation checks immediately after input data have been received; benchmarks are published shortly after calculation and validation checks, according to the following approximate schedule:

<table>
<thead>
<tr>
<th>Times GMT/BST unless specified</th>
<th>SFTP</th>
<th>Bloomberg</th>
<th>Administrator Website</th>
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<tr>
<td>RFR EUR</td>
<td>4:15pm</td>
<td>4:30pm</td>
<td>5:00pm (T+1)</td>
</tr>
<tr>
<td>RFR Sterling</td>
<td>4:15pm</td>
<td>4:30pm (T+1)</td>
<td>5:00pm (T+1)</td>
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<tr>
<td>RFR JBOND</td>
<td>6:30pm JST</td>
<td>6:30pm JST</td>
<td>6:30pm JST</td>
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Each publication includes the following:

- Date & Time of publication
- Index Value
- Index Volume
- Initial Volume

The RFR Euro publication follows the BrokerTec EU Repo Holiday Calendar.

The RFR Sterling publication follows the BrokerTec UK Gilt Repo Holiday Calendar.

The RFR JBOND publication follows the Japanese settlement calendar

In addition, CBA may, with advance notice, choose not to publish the RFR benchmarks on any given business day.

6.4. Error Policy

If the Administrator - within 24 hours from publication - finds that there is an incorrect publication resulting from miscalculation or inaccurate data inputs, the benchmark will be republished if the error is greater than 1bp (0.01%). In the event one of the ten individual RFR Euro country benchmarks is republished, the RFR Euro will also be republished. Alternatively, if the difference is smaller than 1bp, there will be no re-publication.
7. Governance

The Administrator operates under a comprehensive Risk and Control Framework, providing clear policies on Governance, Oversight, Benchmark Design and Calculation, Outsourcing, Operations, Reporting of Infringements and Business Continuity.

CBA has in place a "Three Lines of Defence" model, enabling close cross-monitoring of the governance process - this being business, compliance and audit who all have a key role in ensuring that CBA meets its regulatory requirements.

7.1. Oversight Committee

An Oversight Committee is appointed by the Administrator to review the integrity of the benchmark, in accordance with the CBA Terms of Reference for Oversight Committees.

The Oversight Committee will provide independent oversight of, and challenge to the Administrator on all aspects of the Benchmark determination process. The minutes of the Oversight Committee are made available on the Administrator’s website.

The Oversight Committees can escalate to the CBA Board if required.

7.2. Review of the Methodology

The Administrator constantly monitors the Benchmark Methodology and its consistency with the stated objectives. The Benchmark Methodology is reviewed annually by the Administrator and the Oversight Committee.

The Oversight Committee approves proposed changes to the Benchmark Methodology including, but not limited to, the structure of the Benchmark, input data used and all aspects of the Calculation Methodology.

The Oversight Committee may direct the Administrator to consult on any changes to the methodology with Stakeholders and the wider market.

7.3. Consultation Process

The Administrator will engage relevant Stakeholders and end-users on material changes to the Benchmark Methodology, if required by Regulation or where the Oversight Committee requests such consultation.

Changes to the Methodology are deemed material on the basis of an assessment conducted by the Administrator and submitted to the Oversight Committee for advice and feedback.

The Administrator will publish notice of the consultation on its website, inviting feedback from stakeholders and the wider market. Notice of a consultation will be posted at least 1 (one) month prior to the deadline for responses. The notice will include the details of the proposed material change, the timeline and the rationale for the change.

Findings of the consultation process and proposed changes to the Benchmark Methodology, recommended as a result of the consultation, will be presented by the Administrator to the Oversight Committee for its consideration.

Feedback to a consultation is considered confidential, however the Administrator will publish an anonymized summary with its conclusions, as soon as is practical, but before implementation of any changes.
7.4. Cessation

The Administrator constantly monitors the representativeness of the Benchmark. If the Benchmark is deemed to be unrepresentative of the underlying economic reality due to paucity of input data or systemic changes in the related markets, the Administrator will engage the Oversight Committee at the earliest opportunity. These cessation arrangements are designed to mitigate cessation and transition risks.

The Oversight Committee may direct the Administrator to consult with Stakeholders as described in the Consultation Process section of this document.

As a last resort, if no alternative arrangements are feasible, the Oversight Committee may advise the Administrator to discontinue the Benchmark, providing Stakeholders at least 6 (six) months’ notice and assistance to explore alternative reference instruments.

The Administrator will endeavour to identify alternative benchmarks; however, this might not always be possible due to Regulations, market conditions or suitable alternatives.

Users of the benchmark are recommended to ensure that they have adequate fallback policies and procedures in the event of the Benchmark becoming unrepresentative of its economic interest.

7.5. Records Retention

The Administrator has in place policies for the retention of any relevant evidence and documentation related to the determination and dissemination of the Benchmark, either in paper or in electronic format, for at least the mandatory term of 5 (five) years.

7.6. Auditing

An internal audit process is undertaken regularly, to ensure adherence to the stated Methodology, the IOSCO principles and regulatory requirements.

External audits can be requested at any time by the Administrator’s Board, the Oversight Committee or the internal audit function.

7.7. Data Licensing and Distribution

The Benchmark is made available subject to execution of an Information License Agreement (ILA) together with the appropriate Schedules. Market participants that intend to subscribe to the benchmark should contact the Administrator at the following email address: CMEDataSales@cmegroup.com

7.8. Complaints Procedures

CME Group has publicly available Complaints Procedures, applicable to the Administrator, which sets out the procedure according to which a complaint will be dealt with by a senior member of staff not directly involved with the benchmark calculation and dissemination. Information related to complaints will be stored in a restricted access area and kept for a period of at least 5 (five) years following the date when the complaint was first lodged. Complaints can be submitted at internationalcompliance@cmegroup.com.
## 8. Appendix I – Key Terms & Definitions

<table>
<thead>
<tr>
<th>TERM</th>
<th>DESCRIPTION</th>
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<tr>
<td>Administrator</td>
<td>CME Group Benchmark Administration Limited</td>
</tr>
<tr>
<td>BMR</td>
<td>UK Benchmark Regulation (Regulation (EU) 2016/2011, as retained in UK law under the European Union (Withdrawal) Act 2018, as amended from time to time)</td>
</tr>
<tr>
<td>bp</td>
<td>Basis Point (1 basis point = 0.01%)</td>
</tr>
<tr>
<td>CBA</td>
<td>CME Group Benchmark Administration Limited</td>
</tr>
<tr>
<td>GC</td>
<td>General Collateral</td>
</tr>
<tr>
<td>SC</td>
<td>Special Collateral</td>
</tr>
<tr>
<td>OC</td>
<td>Oversight Committee</td>
</tr>
<tr>
<td>RFR</td>
<td>RepoFunds Rate</td>
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<tr>
<td>VWAR</td>
<td>Volume Weighted Average Rate</td>
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9. Appendix II – ESG Disclosures

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<tr>
<th>Item</th>
<th>Description</th>
<th>Response</th>
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<td>Sovereign Debt</td>
</tr>
<tr>
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<td>Name of the benchmark or family of benchmarks.</td>
<td>CME Overnight Repo-Backed Benchmark</td>
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<td>Item 4</td>
<td>Does the benchmark methodology for the benchmark or family of benchmarks take into account ESG factors?</td>
<td>No</td>
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