RepoFundsRate

RFR Benchmark Methodology

RepoFundsRate “RFR”

14th February 2018

Contents

1. Introduction

RepoFundsRate ("RFR") is a series of daily euro repo indices that have been created in response to market demand and consists of 7 index levels:

1. RepoFundsRate Euro ("RFR Euro")
2. RepoFundsRate Germany ("RFR Germany")
3. RepoFundsRate France ("RFR France")
4. RepoFundsRate Italy ("RFR Italy")
5. RepoFundsRate Spain ("RFR Spain")
6. RepoFundsRate Belgium ("RFR Belgium")
7. RepoFundsRate Netherlands ("RFR Netherlands")

RepoFundsRate represents the effective cost of funding for the majority of one-day repo trades in each of the relevant sovereign bond markets, and includes both general collateral and specific collateral trades. Equivalently, RFR can be viewed as a secured, trade-backed one-day interest rate index. RFR is reported on an Act/360-day count convention and its publication follows the ECB TARGET Calendar.[1]

NEX Data Services Limited, the benchmark administrator for RepoFundsRate has developed this methodology to help users understand how the benchmark is determined in relation to it's objectives as a one-day trade backed risk free rate as per the 'RepoFundsRate Benchmark Statement'.

2. EU Benchmark Regulation

As of the 2nd February 2018 NEX Data Services Limited is registered with the FCA pursuant to the EU Benchmarks Regulation (Regulation (EU) 2016/1011[2])

[1] Long-term calendar for TARGET closing days (https://www.ecb.europa.eu/press/pr/date/2000/html/pr001214_4.en.html)

[2] 'Regulation (EU) 2016/1011 of the European Parliament and of the Council of 8 June 2016' (OJ L171, 29.06.16), p.1, data.europa.eu/eli/reg/2016/1011/oj

3. RFR Methodology

Algorithm

The methodology has been designed to accurately represent the overnight cost of funding for the given collateral. This includes considering the size and liquidity of the market, market dynamics and has been fully back tested to ensure it represents the reality.

Each daily RFR index is the volume-weighted average rate of a defined set of eligible repo trades and is calculated as:

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

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 RFR index. Fixed repo rates only are used in the calculation. Where a repo trade uses a floating rate, the corresponding fixed rate is derived on the settlement date before being included in the RFR calculation.

Each RFR index is published as a percentage (i.e. 0.523% is published as "0.523") and to 3 decimal places. The corresponding total size of all trades used in the index calculation is also published.

Eligible Repo Transactions

Eligible repo transactions for each daily RFR index calculation must meet the following criteria:

- Executed on either the BrokerTec or the MTS electronic markets
- Prices available to all dealers on the relevant market prior to being executed (no bilaterally negotiated or otherwise off-platform trades)
- Centrally cleared following execution
- Repo term (from settlement date to maturity date) of one business day
- Trade settlement period (from trade date to settlement date) of zero (0) business days ("Overnight") or one business day ("Tom-Next") or two business days ("Spot-Next")

- Settle on the day for which the RFR index 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 any Eurozone country
- Repo trade to be either general collateral or specific collateral
- Repo trades to be fixed rates, with the exception of French specific collateral trades that are floating rates only
- Specific collateral trades to be in the remaining 75% of trades after applying the Specific Collateral trade filtering algorithm to remove 25% of outlying trades.

Specific Collateral Trade Filtering Algorithm

Specific collateral trades specify precisely the bond to be used as collateral in the repo transaction prior to being executed. Most Specific Collateral trades are priced at or around a typical market level which usually tend to be close to General Collateral rates. If there is a higher than normal demand for the specific bond being used as collateral, the repo rate will be below typical market levels, often significantly ("special trades"). A distribution of specific collateral repo trades is characteristically skewed towards lower repo rates.

As RFR measures general secured interest rates, specific collateral repo trades that are trading away from typical market levels are removed from the defined set of eligible trades. Such trades are identified and removed using the following iterative process:

- All relevant specific collateral repo trades for the same settlement date and the same RFR index are sorted by descending rate;
- The volume-weighted average repo rate of all trades in the sorted list is calculated;
- Either the first or last repo trade in the sorted list is identified as being absolute furthest in rate terms from the volume-weighted average repo rate of the whole sorted list and is deleted from the list (if there are more than one repo trades with the same rate, the smallest trade is deleted);
- The new volume-weighted average repo rate of the remaining trades in the sorted list is calculated and the process is repeated iteratively until a pre-determined percentage of the original number of trades has been deleted;
- This filtering process removes the outlying trades and has the feature that if the trades are symmetrically distributed at the start, trades are deleted evenly from both sides of the distribution. A threshold of 25% has been established as a suitable figure to remove all special trades and leave a symmetric and tightly distributed set of specific collateral repo trades. The threshold may be altered in response to market conditions and any changes will be announced at www.repofundsrate.com;
- The specific collateral repo trades used for the calculation of RFR Euro, which include as collateral sovereign bonds issued by any eurozone country, are grouped as a single set of trades when applying the filtering algorithm;

Note: The Trade Filtering Algorithm only applies to Specific Collateral trades.

4. Source of Input Data

Transactions executed on either the BrokerTec EU or the MTS electronic markets, both of which are multilateral trading facilities ("MTF"). This data is deemed 'regulated-data' by EU BMR as it is provided 'entirely and directly' to the benchmark administrator from the Trading Venue.

5. Prioritisation of Input Data

All transactions on the platforms are considered, there is no prioritization given that the input data uses transactions only.

6. Sufficiency of Input Data

The transactions used are deemed sufficient to represent the economic reality as the European Repo market is circa 300bln EUR / day..

7. Validation of Input Data

The data is validated in that centrally cleared transactions are used in the calculation, furthermore the input data is checked by the administrator for anomalies once received from each Trading Venue.

8. Use of Expert Judgement

No expert judgement is applied to the input data, the input data is transactions only contributed entirely and directly from Trading Venues as per 4 above.

9. Recalculation Policy

The RFR benchmark dissemination goes through 2 pre-checks before the calculation is made available to the public. This is to understand Benchmark values (volume, trade rates) after the majority of trading has concluded but before the end of the trading day. The initial check may evidence any unexpected market activity or any technical issue. The administrator would have time to resolve these issues before the 2nd publication check at the end of the trading day.

10. Periodic Review and Changes to the Benchmark methodology

NEX Data Services Limited operates a governance and control framework and a Benchmark oversight committee. The main role of the committee is to review the benchmark on a quarterly basis and to issue appropriate challenges to ensure the integrity of all aspects of the Benchmark. This includes the control framework and the substitution and removal of individuals from the oversight function.

Where material revisions may be required, the Administrator shall notify and consult with market participants on the proposed changes. The consultation shall consist of the following details:

- Rationale for changes
- Proposed changes
- Potential impact of the changes on the benchmark
- Technical and operational changes required by contributors;

Once the consultation is completed the Administrator shall:

- Present the results to the oversight committee for discussion
- Notify market participants and stakeholders of pending changes with a minimum of 60 days' notice to implement changes
- Update Benchmark methodology and statements on the relevant websites.

11. Benchmark Cessation

Ceasing the determination of the benchmark would be deemed a last resort once all possibilities have been explored by the administrator in consultation with the oversight committee and users of the benchmark family.

This includes considerations on whether the methodology could be adjusted including, but not limited to, sources of input data, and the calculating algorithm of the benchmark. Dependent on circumstance this may not always be possible and the cessation policy would be triggered.

In any circumstances, there would be no less than 6 months' notice given to users and stakeholders in order to help them find alternative benchmarks.

12. Governance and Control Framework

NEX Data Services Ltd operates a benchmark governance and control framework. The framework gives business management and NEX Data Operations clear policies on Governance, Oversight, Benchmark Design, Outsourcing, Reporting of Infringements and Business Continuity.