



GLOBAL RATE SET SYSTEMS

A EURONEXT COMPANY

GRSS-MTS EGB Fix Calculation Methodology

Version: Version 1.0

Date: July 2026

Contents

1	Introduction	3
2	Index Timings	3
3	Confidence Framework	4
4	Calculation of the GRSS-MTS EGB Fix	5
4.1	Level 1: Transactions	5
4.1.1	Effective Volume	5
4.1.2	Level 1 Calculation	5
4.1.3	Role of Level 1 in the Methodology	7
4.2	Level 2: Executable Quotes	8
4.2.1	Level 2 Calculation	8
4.2.2	Role of Level 2 in the Methodology	10
4.3	Level 3: BondVision Composite PRices	10
4.3.1	Level 3 Calculation	10
4.4	The Scope of Published Data	11

1 Introduction

This methodology defines the framework for the calculation of the GRSS-MTS European Government Bond (EGB) Fix. The objective is to produce robust, transparent, and market-representative pricing of European government bonds at the individual bond level (individual ISIN).

The calculation is based on a hierarchical waterfall approach that incorporates three distinct data sources, reflecting the representative quality of the data:

- Level 1 (L1): Transactions – executed trades on MTS Cash Domestic Bond Markets sourced within a defined time window prior to the calculation time.
- Level 2 (L2): Executable Quotes – active bid and ask quotes derived from market depth on MTS Cash Domestic Bond Markets
- Level 3 (L3): BV Composite Prices – indicative composite prices from the BondVision platform.

The methodology is governed by a **confidence-based framework**, where each data input contributes to an aggregate measure of confidence, primarily driven by traded and quoted volumes, supplemented by BV composite prices. A minimum confidence threshold must be achieved for the index to be considered representative and eligible for publication. The calculation follows a sequential logic, where data from lower-priority levels are added to the data from higher-priority levels until a pre-defined minimal confidence threshold is reached.

At no stage is higher-quality data discarded; instead, lower-level data are introduced only to complement existing information. The final index price is computed as a confidence-weighted average of all used inputs.

2 Index Timings

GRSS-MTS EGB Fix index is calculated twice a day – at 11:00 CET/CEST and at 17:15 CET/CEST reflecting the highest market liquidity and market close respectively.

The index is calculated from data collected in an allocated time window before the calculation. The index is then published within 15 minutes of the calculation time.

If no data can be collected during the allocated data collection windows, the index is calculated from backup data collected 1 hour prior to the calculation time.

TIMINGS FOR 11:00 GRSS-MTS EGB FIX CALCULATION:

Test table		
Backup Data Collection Window	Backup data collected from MTS Domestic Cash Markets and BondVision platform	9:58 – 10:00 CET/CEST
Data Collection Window	Data collected from MTS Domestic Cash Markets and BondVision platform	10:58 – 11:00 CET/CEST
Calculation Time	Collected data is processed and calculated	11:00 CET/CEST

Publication Time	Calculated index data is published via information vendors	11:00 – 11:15 CET/CEST
------------------	--	------------------------

TIMINGS FOR 17:15 GRSS-MTS EGB FIX CALCULATION:

Test table		
Backup Data Collection Window	Backup data collected from MTS Domestic Cash Markets and BondVision platform	16:13 – 16:15 CET/CEST
Data Collection Window	Data collected from MTS Domestic Cash Markets and BondVision platform	17:13 – 17:15 CET/CEST
Calculation Time	Collected data is processed and calculated	17:15 CET/CEST
Publication Time	Calculated index data is published via information vendors	17:15 – 17:30 CET/CEST

3 Confidence Framework

The methodology relies on a **minimum confidence threshold** to ensure that the calculated index price is sufficiently supported by observable market activity. This threshold defines the minimum level of aggregated confidence — derived from transactions and executable quotes volumes — required for the index to be considered representative.

The minimum confidence is **defined as a static parameter at the section (i.e. country) level**, to allow for reflecting structural differences in liquidity across sovereign bond markets.

The minimum confidence threshold is determined through a combination of historical data analysis on market activity and market expertise and is subject to a periodic review by the [PLACEHOLDER] oversight committee¹.

The minimum confidence threshold governs the progression of the calculation:

- If the confidence derived from Level 1 (transactions) exceeds the threshold, the index is computed using Level 1 data only.
- If not, Level 2 (executable quotes) is incorporated to increase the total confidence up to the threshold.
- If the combined confidence from Level 1 and Level 2 remains insufficient, Level 3 (BondVision composite prices) is used to supplement the remaining confidence required to reach the threshold.

¹ For current minimal confidence threshold levels, see Appendix I to the Methodology.

4 Calculation of the GRSS-MTS EGB Fix

This section describes how each level of the index calculation is performed and how the levels are combined into the final index price. This entire calculation is performed for each individual bond (ISIN).

4.1 LEVEL 1: TRANSACTIONS

Level 1 (L1) represents the market trading activity source of information in the methodology and is based exclusively on **executed trades**, reflecting the highest level of price certainty.

Eligible transactions are defined as all trades executed on MTS Cash Domestic Bond Markets within a predefined 2-minute time window preceding the calculation time.

The L1 price is calculated as an **effective volume-weighted average price** of all eligible transactions.

4.1.1 Effective Volume

Each transaction contributes to the calculation through an **effective volume**, which is derived from its nominal traded volume adjusted by a time-based weighting factor. This approach assigns greater importance to trades executed closer to the calculation time.

4.1.2 Level 1 Calculation

The time-weighting mechanism is defined as follows:

- The observation window is divided into **20 equal time segments**.
- Segment 1 corresponds to the earliest part of the window, and segment 20 to the interval immediately preceding the calculation time.
- Each segment $n \in \{1, \dots, 20\}$ is assigned a weight:

$$w_n = 0.1 \times n$$

- The **effective volume** of a transaction is then computed as:

$$V_{\text{eff}} = V \times w_n$$

where:

- V is the nominal traded volume,
- w_n is the weight associated with the segment in which the transaction occurs.

This construction ensures that:

- Transactions executed immediately before the calculation time receive the **highest weight** (up to $2.0 \times$ nominal volume).
- Earlier transactions contribute less significantly (down to $0.1 \times$ nominal volume).

4.1.2.1 L1 PRICE

Eligible transactions can be from both **Buy side** (=ask price) and **Sell side** (=bid price)². Each trade has an indication to which side it belongs. For the purposes of the index calculation, Level 1 needs to provide bid, ask and mid-price in all circumstances.

Calculation differs based on what trades are available in the L1 eligible pool:

A) There are both buy trades and sell trades:

- VWA bid-price is calculated from all sell trades in the pool:

$$Price_{bid} = \frac{\sum(Bid_i * V_{eff,i})}{\sum V_{eff,i}}$$

Where:

- Bid_i is the bid-price of transaction i ,
- $V_{eff,i}$ is the effective volume of transaction i .

•

- VWA ask price is calculated from all buy trades in the pool:

$$Price_{ask} = \frac{\sum(Ask * V_{eff,i})}{\sum V_{eff,i}}$$

Where:

- Bid_i is the price of transaction i ,
- $V_{eff,i}$ is its effective volume of transaction i .

- Level 1 price is then calculated as follows:

$$Rate_{L1} = \frac{Price_{bid} + Price_{ask}}{2}$$

Where:

- $Price_{bid}$ is the VWA price of all sell trades in the pool
- $Price_{ask}$ is the VWA price of all buy trades in the pool

B) There are only a *sell* trades or only a *buy* trades in the eligible transaction pool.

- Mid-price is then calculated using the spread derived from executable quotes if available, or indicative quotes. If no quotes are available, then the transactions are not eligible for calculation.

1. Spread from executable quotes:

The spread is calculated as best spread (meaning the spread of the best bid-ask pair)

² Indication of buy/sell side if from the point of view of the aggressor. Aggressor buys at ask price and sells at bid price.

$$Spread = Ask_{best} - Bid_{best}$$

Where:

- Ask_{best} is the best (lowest price) executable ask quote.
- Bid_{best} is the best (highest price) executable bid quote.

If there are no executable quotes available to calculate Spread, then it is calculated from indicative quotes (BV Composite).

2. Spread from indicative quotes:

The spread is calculated as spread between bid and ask of the BV composite price

$$Spread = Ask_{bvc} - Bid_{bvc}$$

Where:

- Ask_{bvc} is BV composite ask price.
 - Bid_{bvc} is BV composite bid price.
- Level 1 price is then calculated from the bid-price or the ask-price (depending on what type of trades are in the pool) by adding or subtracting the spread
 - a) let's suppose we only have **buy trades** (for only sell trades a vice versa calculation will be applicable), then:
 - Step1: Calculate VWA ask-price from Buy trades:

$$Price_{ask} = \frac{\sum (Ask_i * V_{eff,i})}{\sum V_{eff,i}}$$

Where:

- Ask_i is the ask-price of transaction i .
- $V_{eff,i}$ is the effective volume of transaction i .
- Step 2: Calculate bid-price as:

$$Price_{bid} = Price_{ask} - Spread$$

- Step 3: Calculate mid-price as:

$$Price_{mid} = Price_{ask} - \frac{Spread}{2}$$

4.1.2.2 LEVEL 1 CONFIDENCE

The L1 confidence is defined as the sum of effective volumes of all eligible transactions:

$$C_{L1} = \sum V_{eff,i}$$

4.1.3 Role of Level 1 in the Methodology

Level 1 is evaluated first in the calculation hierarchy:

If C_{L1} exceeds the minimum confidence threshold defined for the relevant market, the index price is determined solely from Level 1.

- If the threshold is not met, the calculation proceeds to **Level 2**, where executable quotes are incorporated to supplement the available information.

4.2 LEVEL 2: EXECUTABLE QUOTES

Level 2 (L2) incorporates executable market quotes to supplement transaction data when Level 1 alone does not provide sufficient confidence. It is based on snapshots of the order book, capturing available liquidity from MTS Cash Domestic Bond Markets.

4.2.1 Level 2 Calculation

Level 2 (L2) calculation is calculated as volume weighted price from top 5 levels of the order book, sampled in 6-seconds intervals during a 2 minute window directly preceding the calculation time.

The L2 calculation proceeds through the following steps:

4.2.1.1 Snapshot Collection

A fixed number *Nof* **order book snapshots** is collected within a predefined time window prior to the calculation time.

Each snapshot represents a **full depth capture** of both markets at a given timestamp.

4.2.1.2 Depth Selection and Validation

For each snapshot:

- The **top 5 levels** on both bid and ask sides are retained.
- A consistency check is performed to ensure that, at each level:

$$\text{Ask Price} > \text{Bid Price}$$

4.2.1.3 Spread-Based Filtering

Spread filtering is performed on each individual snapshot as follows:

- The **best bid** and **best ask** prices are identified.
- The **spread** is defined as:

$$\text{Spread} = \text{Ask}_{\text{best}} - \text{Bid}_{\text{best}}$$

Where:

- Ask_{best} is the best (lowest price) executable ask quote.
- Bid_{best} is the best (highest price) executable bid quote.

Bid-ask pairs are retained iff:

$$\text{Price}_{\text{ask}} - \text{Price}_{\text{bid}} \leq 2 * \text{Spread}$$

Any bid-ask pair that fail this check are removed from further calculation.

This filtering removes quotes that are excessively distant from the top of the book, ensuring that only **relevant and actionable liquidity** is considered.

4.2.1.4 Position-Based Price Weighting

Within each snapshot, quotes are weighed based on their position in the order book to reflect priority of execution.

For a quote at position $n \in \{1, \dots, 5\}$, a weight is applied to its price:

$$w_n = \frac{2}{n}$$

This implies:

- Top-of-book quotes (position 1) receive the highest weight.
- Lower levels contribute progressively less.

The weighting is applied **to prices only**, while **volumes remain unchanged**.

4.2.1.5 Snapshot Mid Price Construction

For each snapshot:

- A **volume-weighted average bid price** is computed using raw volumes and position-weighted prices.
- A **volume-weighted average ask price** is computed similarly.

The snapshot mid-price is then calculated as:

$$Price_{mid} = \frac{Price_{bid}^{VWAP} + Price_{ask}^{VWAP}}{2}$$

Where:

- $Price_{bid}^{VWAP}$ is the volume-weighted bid-price
- $Price_{ask}^{VWAP}$ is the volume-weighted ask-price

This results in a single representative mid-price per snapshot.

4.2.1.6 Outlier Filtering Across Snapshots

Once N mid prices are obtained:

- The **standard deviation** of the mid prices is computed (provided $N \geq 2$).
- Mid prices lying outside the range:

$$[\mu - 2.5\sigma, \mu + 2.5\sigma]$$

are excluded from further calculations.

If fewer than two mid prices are available, this step is skipped.

4.2.1.7 Randomized Subsampling

If more than 10 mid prices remain after outlier filtering:

- A **random subset** of mid prices is selected.

- The number of retained mid prices is reduced to **10**.

This step acts as a **control mechanism** to further mitigate potential manipulation strategies based on transient quote placement.

4.2.1.8 Final L2 Price

The Level 2 price is computed as the **simple average** of the retained mid prices:

$$L2 \text{ Price} = \frac{1}{K} \sum_{k=1}^K Price_{mid,k}$$

where $K \leq 10$ is the number of retained mid prices.

4.2.1.9 L2 Confidence

The Level 2 confidence is defined as:

$$C_{L2} = \frac{V_{bid} + V_{ask}}{2}$$

where:

- V_{bid} and V_{ask} are the **total bid and total ask volumes**, averaged across all retained snapshots.

4.2.2 Role of Level 2 in the Methodology

Level 2 is incorporated only if Level 1 confidence is insufficient:

- If $C_{L1} + C_{L2}$ meets or exceeds the **minimum confidence threshold**, the index price is computed as a confidence-weighted combination of Level 1 and Level 2.
- Otherwise, the methodology proceeds to **Level 3**, where composite prices are introduced.

4.3 LEVEL 3: BONDVISION COMPOSITE PRICES

Level 3 (L3) is introduced into the calculation in situations where market activity captured through transactions (L1) and executable quotes (L2) is insufficient to meet the minimum confidence threshold.

4.3.1 Level 3 Calculation

If, after applying Level 1 and Level 2, the combined confidence remains below the minimum confidence threshold, the remaining confidence required to reach this threshold is supplemented using the **BondVision composite prices** which are closest to the calculation time within the calculation collection window.

BondVision composite prices are sourced from the MTS BondVision platform. For each bond, the composite provides bid, ask, and mid prices. The **mid-price** from the BondVision composite is used directly.

The contribution of Level 3 is defined purely in terms of the **residual confidence required** to reach the minimum threshold.

4.3.1.1 INTEGRATION INTO THE FINAL INDEX PRICE

When Level 3 is activated, the final index price is computed as a **confidence-weighted average** of all contributing levels:

$$\text{FinalPrice} = \frac{(P_{L1} \cdot C_{L1}) + (P_{L2} \cdot C_{L2}) + (P_{L3} \cdot C_{L3})}{C}$$

where:

- P_{L3} is the BondVision composite mid-price.
- C_{L3} is the residual confidence required to meet the minimal confidence.

$$C_{L3} = C_{\min} - (C_{L1} + C_{L2})$$

- $C_{\min}$ is the **minimal confidence** of the bond.

4.3.1.2 LEVEL 3 CONTROL MECHANISMS

No additional control mechanisms are applied at Level 3. BondVision composite prices incorporate their own internal validation and filtering processes and are used as provided.

4.4 THE SCOPE OF PUBLISHED DATA

This section describes scope of data published as part of GRSS-MTS EGB Fix index and is divided into two parts:

- 1) Scope of bonds included in calculation – see Appendix II to the Methodology for instrument classes and sections included in the calculation
- 2) Information published on each individual bond – see Appendix III to the Methodology for description of all published fields