



# IMA Methodology - P2 Series

IMA (ANBIMA Market Index) - P2 Series

IRF-M P2 and IMA-B 5 P2

December Version – 2023

## Versions:

---

**Previous version: November-2016**

**Current version: December-2023**

**Changes:** Inclusion of items 9 and 10, on page 10.

Inclusion of Appendix – Mathematical Formulas, on page 11 and Versions History, on page 13.

On page 14, executive board updated. No changes in calculation methodology.

## Contents

---

<b>Versions:</b> .....	<b>2</b>
<b>1. What is IMA – P2 Series?</b> .....	<b>4</b>
<b>2. Theoretical portfolios</b> .....	<b>4</b>
<b>3. Index Calculation</b> .....	<b>7</b>
<b>4. Database</b> .....	<b>8</b>
<b>5. Events that cause interference in the index daily calculation</b> .....	<b>8</b>
<b>6. Termination and Interruption Policy</b> .....	<b>9</b>
<b>7. Disclosure</b> .....	<b>9</b>
<b>8. Disclaimer / Liability Exemption</b> .....	<b>9</b>
<b>9. Periodic Review</b> .....	<b>10</b>
<b>10. Final considerations</b> .....	<b>10</b>
<b>Appendix : Mathematical Formulas</b> .....	<b>11</b>
<b>Version History:</b> .....	<b>11</b>

## 1. What is IMA – P2 Series?

---

IMA – P2 Series are indexes belonging to the broad IMA family of indexes. They represent the evolution, at market prices, of government bond portfolios and serve as benchmarks for the segment. Such references vary from other IMA-family indexes as they have a minimum average term (PMR) control device<sup>1</sup>.

The P2 series indexes are:

**IRF-M P2** – Market Fixed Income Index P2 Series

**IMA-B 5 P2** – ANBIMA Market Index B 5 P2 Series

## 2. Theoretical portfolios

---

The composition of theoretical portfolios is reviewed monthly, reflecting changes in the quantity of outstanding bonds on the market, in order to preserve the indicator's representativeness and ensure its PMR does not fall below the 720-day threshold throughout the portfolio cycle.

### a) Bond Eligibility Criteria

- Of the government bonds priced by the ANBIMA, only the following are not eligible:
- bonds maturing in less than one month – the redemption of which would take place over the theoretical portfolio cycle;
- bonds placed through non-competitive issuances;
- bonds with one unique public offer placement<sup>2</sup>;
- new maturities placed on the market in the last two business days prior to the rebalancing date of the theoretical portfolios.

The following are eligible for the P2 series sub-indexes portfolios:

---

<sup>1</sup> According to Brazilian tax law on fixed-income ETFs, it was decided to create benchmarks that maintain the PMR of the index portfolio equal to or greater than 720 calendar days, the minimum established to ensure the lowest income tax rate provided for in the regulation. The PMR of the portfolio is the weighted average PMR of its components. The PMR of each component is calculated as follows:  $PMR_i = \frac{\sum_i^n F_i T_i}{\sum_i^n F_i}$ , where  $F_i$  represents the asset's nominal payment flows, and  $T_i$  is the term, in calendar days, to the  $n$  events in the asset's payment flow.

<sup>2</sup> New maturities placed on the market after May 2010 are immediately included in the index. However, if there is no new placement within the following three months, they are removed from the index until the National Treasury Department makes the second placement, via a public offer.

- IRF-M P2: fixed rate bonds (LTN and NTN-F);
- IMA-B 5 P2: IPCA-indexed bonds (NTN-B) maturing within 63 months. It is important to highlight that assets with maturities of 61, 62 and 63 months participate with up to 75%, 50% and 25% (respectively) of their outstanding quantity on the rebalancing date. For the other eligible assets, 100% of the outstanding quantity on the market is considered.

## b) Quantities used

The process of defining and disclosing the components, and their respective quantities, is carried out two business days prior to the indexes' rebalancing date (theoretical portfolio preview disclosure date), based on market quantities of the previous business day (d-3).

Such quantities are changed only by the STN's definitive buy, sell, or exchange operations. Although bonds solely placed on the market through direct operations are not eligible to be part of IMA's theoretical portfolio, such amounts are added to the bonds outstanding used for calculation. Moreover, amounts of eligible maturities issued through STN's "Tesouro Direto" program are also included the calculation.

In the P2 series indexes, in order to ensure the preservation of the minimum PMR, the process of defining the quantities is as follows:

1. Price estimate and PMR calculation of eligible assets: given the last known indicative rate (from three business days prior to the rebalancing date), cash flow is adjusted forward to the recalculation date, and full-month VNA (Adjusted Nominal Value) is utilized for NTN-Bs.
2. Calculation of the eligible portfolio's PMR (with estimated prices) and PMR for the rebalancing date:

$$PMR_c = \sum_{j=1}^n \frac{PMR_r^j \times Q_{ma}^j \times P_e^j}{\sum_i^n Q_{ma}^i \times P_e^i}$$

Where:

$PMR_c$  = Portfolio's PMR

$PMR_r^j$  = asset's PMR  $j$  at the rebalancing date

$Q_{ma}^j$  = Number of the bonds on the market,  $j$  adjusted according to maturity

$P_e^j$  = estimated price of the asset  $j$  at the rebalancing date

$n$  = number of index components

3. if  $PMR_c$  is equal to or greater than 780 calendar days<sup>3</sup>, the used quantities  $Q_u^j$  will be equal to  $Q_{ma}^j$ . Otherwise,  $Q_u^j$  will be obtained by the consecutive reduction of  $Q_{ma}^j$  from the assets that have the lowest  $PMR_r^j$  until  $PMR_c$  reaches 780 calendar days. For fixed-rate bonds, whenever LTN and NTN-F with equal  $PMR_r^j$  coexist, the LTN's  $Q_{ma}^j$  will be reduced first.

### c) Theoretical amounts

In rebalancing, the quantities set in the theoretical portfolio preview process ( $Q_u^j$ ) are used, and the closing prices of the bonds on the rebalancing date, using the following procedure:

1. From the quantities of eligible bonds used ( $Q_u^j$ ) and the closing price at the rebalancing date, an auxiliary index  $I_t^a$  is found:

$$I_t^a = \sum_{j=1}^k Q_u^j \times P_t^j$$

2. Next, the new valid theoretical quantities of each eligible bond ( $Q_{nv}^j$ )<sup>4</sup> are adjusted, as follows:

$$Q_{nv}^j = Q_u^j \times \left( \frac{I_t}{I_t^a} \right)$$

Where:

$P_t^j$  = ex-coupon price of the bond  $j$  at date  $t$

$I_t$  = index number at date  $t$

### d) Theoretical portfolio validity and rebalancing

IMA index theoretical portfolio composition remains constant across the portfolio cycle. Regarding IRF-M P2, the portfolio validity ranges from the second business day of the month through the first business day of the following month. As for the IMA-B 5 P2, its theoretical portfolio is valid from the 16th of one month until the 15th of the subsequent month. Whenever such dates are non-business days, the following business day is considered instead.

The disclosure of new theoretical portfolios, in turn, occurs after index calculation on the theoretical portfolio last validity day.

<sup>3</sup>ANBIMA may change the 780-calendar-day parameter upon approval by ANBIMA's Benchmarks Subcommittee, aimed at preserving the index.

<sup>4</sup>Therefore, we have:  $\sum_{j=1}^k Q_{nv}^j \times (P_t^j + C_t^j) = I_t$ , which preserves the index continuity vis-à-vis the change in the theoretical portfolio and the relative values of each bond against the market portfolio (total value of eligible bonds).

Index	Validity Period	Rebalancing
<b>IRF-M P2</b>	From the second business day of one month until first business day of the next month	After calculation of first business day of the month
<b>IMA-B 5 P2</b>	From first business day after the 15th until day 15 of the next month	After calculation of the 15th day of the month

### 3. Index Calculation

IMA indexes are chain-linked by the Laspeyres method (the prices of their components are weighted by their theoretical quantities, on the base period). Thus, changes in the composition of the theoretical portfolio do not impact the index's profitability.

In order to obtain the result of each IMA sub-index, the theoretical amount of each bond (on the base period) is multiplied by its respective price (on the reference date), thus producing each bond's number of points within the index. The sum of the number of points across all index components returns the index number. It should be noted that both coupon payments and eventual redemptions occurring on the reference date will be taken in account for calculating the index.

The index number ( $I_t$ ) is calculated according to the following formula:

$$I_t = \sum_{j=1}^k Q_{nv}^j \times (P_t^j + C_t^j)$$

Where:

k: number of components of the index

$Q_{nv}^j$ : is the maturity j valid theoretical amount

$P_t^j$ : the maturity j ex-coupon price at reference date t

$C_t^j$ : the maturity j interest payment at reference date t

## 4. Database

---

### a) Quantities

Through an agreement settled with ANBIMA, the STN is in charge of sending, daily, the market quantities the Association, for all maturities participating in the different portfolios.

In the event of data unavailability, ANBIMA will be responsible for updating market quantities, making use of issuance information (public offers) and redemption, disclosed in due time by SELIC (Sistema Especial de Liquidação e de Custódia) and STN.

### b) Prices

Prices used for valuing the theoretical portfolios components, of the IMA indexes, are calculated daily by ANBIMA, based on a survey with a representative sample composed of banks, asset administrators and financial intermediaries active on the government bonds' secondary market. The survey aims at capturing the fair price of each bond, i.e., the value at which a given institution would do business with that specific maturity, regardless of whether or not any trade actually took place during the day.

In order to eliminate spurious prices and outliers, several statistical criteria and filters are applied. For a thorough description of the statistical filtering process, refer to ANBIMA's Code of Regulation and Best Practices on the Trading of Financial Instruments, available at the [ANBIMA website](#).

At the end of this process, for each maturity, an indicative average rate is determined. In cases where it is not possible to calculate such rates for a maturity that is part of the index theoretical portfolios, the last available rate will be used and a new unitary price for the reference date will be calculated.

## 5. Events that cause interference in the index daily calculation

---

After disclosure, the numbers of the published indexes will not be recalculated.

Any events concerning data compilation, calculation and disclosure of the indexes will be disseminated throughout ANBIMA's websites.



## 6. Termination and Interruption Policy

---

Index cessation or interruption will be evaluated by the ANBIMA's Benchmarks Subcommittee and approved by its Pricing Committee.

ANBIMA will disclose index cessation decisions through its communication channels.

## 7. Disclosure

---

### a) Preview and monthly theoretical portfolio

The list of components and quantities that will be taken into account for each theoretical portfolio, during the respective validity period, is disclosed two business days in advance to the rebalancing date, in the morning. Theoretical portfolios are published, in the evening, immediately following the calculation of the closing values of the last day of validity of the theoretical portfolios (which normally occurs no later than 7 pm).

### b) Daily market quantities

A list containing statistics regarding outstanding government bonds and their changes is disclosed daily, during the morning (one business day lag).

### c) Daily results

Results of the indexes and their statistics are disclosed daily, after the determination of their components' secondary market prices, which occurs, normally, no later than 7 pm.

## 8. Disclaimer / Liability Exemption

---

Disclosure of the IMA is for information purposes only; its usage by economic agents is optional. ANBIMA shall be held harmless for eventual damages or losses that might arise to users who utilize this index with any purpose and, in this case, the latter assumes entire and exclusive liability.

## 9. Periodic Review

---

The composition of the theoretical portfolios is reviewed monthly, capturing on such occasions the changes that occurred in stocks of securities on the market, in order to preserve the representativeness of the indicator. In addition, ANBIMA relies on the Benchmark Subcommittee to carry out extraordinary revisions, in case market movements that directly affect the indices are allowed, or changes in the methodology are suggested. Any changes made to the indices and methodologies are published on ANBIMA's institutional website and announced at least 120 days in advance, as provided for in the methodology.

## 10. Final considerations

---

Unforeseen cases in the methodology will be evaluated by the responsible bodies.

On occasions when changes to preserve the index require immediate action, the procedures to be adopted can be evaluated and approved by restricted groups of members of the responsible bodies. In such cases, the assessment must be made by at least five representatives of the Benchmarks Subcommittee and approved by at least three representatives of the Pricing Committee (preferably including the president and vice president of the forum).

All decisions are disclosed through the Association's communication channels.

## Appendix : Mathematical Formulas

---

$$\text{Duration Bond} = \frac{\sum_{j=1}^k du^j * PU^j}{\sum_{j=1}^k PU^j}$$

Onde: {  
k is the cash flow numbers  
du is the number of workdays of the flow  
PU is the bond price

$$\text{Duration Basket} = \sum_{j=1}^k D^j * W^j$$

Onde: {  
k is the number of bonds  
D is the duration of each bond  
W is the weight of each bond in the index

$$\text{Yield} = \sum_{j=1}^k TIR^j * W^j$$

Onde: {  
k is the number of bonds  
TIR is the internal rate of return (indicative rate) of each bond  
W is the weight of each bond in the index

$$\text{Redemption Yield} = \frac{\sum_{j=1}^k TIR^j * D^j * W^j}{\sum_{j=1}^k D^j * W^j}$$

Onde: {

- k** is the number of bonds
- TIR** is the internal rate of return (indicative rate) of each bond
- D** is the duration of each bond
- W** is the weight of each bond in the index

$$\text{Convexity bond} = \frac{1}{(1+i)^2} * \left[ \sum_{t=1}^n \frac{Ft}{(1+i)^t} * (t^2 + t) \right]$$

Onde: {

- t** = flow period per year (252 workdays)
- i** = TIR
- F** = nominal flow
- V** = present value (sum of discounted flows)

$$\text{Convexity Basket} = \frac{PMR_r^j * Q_{ma}^j * P_e^j}{\sum_i^n Q_{ma}^j * P_e^j}$$

Onde: {

- PMR<sub>c</sub>** = average renegotiation period of basket
- PMR<sub>r</sub><sup>j</sup>** = average renegotiation period of bond *j* for the rebalanced date
- Q<sub>ma</sub><sup>j</sup>** = Market quantity of bond *j* adjusted according to the maturity date
- P<sub>e</sub><sup>j</sup>** = Price of bond *j* estimated for the rebalancing date
- n** = number of index components

$$\text{PMR Bond} = \frac{\sum_{j=1}^k F^j * T^j}{\sum_{j=1}^k F^j}$$

Onde: {  
k is the number of bond's payment flow  
F are the nominal payment flows  
T period in days of k events in the bond's payment flow

$$\text{PMR Basket} = \sum_{j=1}^n \frac{PMR_r^j * Q_{ma}^j * P_e^j}{\sum_i^n Q_{ma}^i * P_e^i}$$

Onde: {  
 $PMR_c$  = average renegotiation period of basket  
 $PMR_r^j$  = average renegotiation period of bond  $j$  for the rebalanced date  
 $Q_{ma}^j$  = Market quantity of bond  $j$  adjusted according to the maturity date  
 $P_e^j$  = Price of bond  $j$  estimated for the rebalancing date  
 $n$  = number of index components

## Version History:

---

**Version: November-2016**

**Changes:** Only textual and layout changes. No changes in calculation methodology.

## IMA Methodology - P2 Series

IMA (ANBIMA Market Index) - P2 Series

IRF-M P2 and IMA-B 5 P2

**President** • Carlos André

**Vice-Presidents** • Aroldo Medeiros, Carlos Takahashi, Eric Altafim, José Eduardo Laloni, Luiz Sorge, Pedro Rudge, Roberto Paris e Sergio Cutolo

**Directors** • Adriano Koelle, Eduardo Azevedo, Fernanda Camargo, Fernando Rabello, Fernando Miranda, Fernando Vallada, Giuliano De Marchi, Gustavo Pires, Julya Wellisch, Rafael Morais, Roberto Paolino, Rodrigo Azevedo e Teodoro Lima

**Executive committee** • Zeca Doherty, Francisco Vidinha, Guilherme Benaderet, Lina Yajima, Marcelo Billi, Tatiana Itikawa, Amanda Brum, Eliana Marino, Soraya Alves e Thiago Baptista

### Rio de Janeiro

Praia de Botafogo, 501 - 704, Bloco II, Botafogo,

Rio de Janeiro, RJ - CEP: 22250-911

Tel.: (21) 2104-9300

### São Paulo

Av. Doutora Ruth Cardoso, 8501, 21<sup>º</sup> andar, Pinheiros

São Paulo, SP - CEP: 05425-070

Tel.: (11) 3471 4200

[www.anbima.com.br](http://www.anbima.com.br)