

# FEDERAL GOVERNMENT BOND PRICING METHODOLOGY



## INTRODUCTION

In this technical note is presented the methodology to calculate and price federal government bonds. The formulas used the file ASEL007 available in the Brazilian Central Bank portal as a source of interest rate coupon and the Nominal Value (VNA)<sup>1</sup>. ANBIMA portal is the source of the yield to maturity.

### 1 Financial Treasury Bills (LFT) and National Treasury Bills (LTN)

The pricing of treasury bills (LFT and LTN) uses the formula below

$$PU_i = \left[ \frac{VNA_i}{\left( \left( \frac{Taxa_i}{100} \right) + 1 \right)^{\frac{DU_i}{252}}} \right]$$

where

$PU_i$ : Unitary price of bond i

$VNA_i$ : Nominal value for bond i, from column “Valor Nominal Atualizado” at Central Bank file ASEL007

$Taxa_i$ : Yield to maturity of bond i from ANBIMA

$DU_i$ : Business days from settlement day and the maturity day of bond i.

### 2 National Treasury Notes series B, C e F (NTN-B, NTN-C, NTN-F)

The formula below is used to price national treasury notes with semi-annually payments or not (zero-coupon)

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<sup>1</sup><https://www.bcb.gov.br/acesoinformacao/legado?url=https:%2F%2Fwww.bcb.gov.br%2Fhtms%2Fselic%2Fselicpesqarq.asp>

$$PU_i = \sum_{t=1}^n \frac{\left[ \left( 1 + \frac{CupomTx_i}{100} \right)^{\frac{1}{2}} - 1 \right] * VNA_i}{\left( 1 + \frac{Taxa_i}{100} \right)^{\frac{DU_t}{252}}} + \frac{VNA_i}{\left( 1 + \frac{Taxa_i}{100} \right)^{\frac{DU_t}{252}}}$$

where

$PU_i$ : Unitary price of bond i

$VNA_i$ : Nominal value for bond i, from column “Valor Nominal Atualizado” at Central Bank file ASEL007

$Taxa_i$ : Yield to maturity of bond i from ANBIMA

$CupomTx_i$ : coupon paid semi-annually for bond i, from column “Taxa de Juros” at Central Bank file ASEL017

$DU_{t,i}$ : Business days from settlement date to maturity day of bond i .

### 3 Exchange Rate Linked Government Bonds

Exchange rate linked government bonds follows the formula below to be priced

$$PU_i = \sum_{t=1}^n \frac{\left[ \left( 1 + \frac{CupomTx_i}{100} \right)^{\frac{1}{2}} - 1 \right] * VNA_i}{\left( 1 + \frac{Curva_{i,t}}{100} \right)^{\frac{DC_t}{360}}} + \frac{VNA_i}{\left( 1 + \frac{Curva_{i,t}}{100} \right)^{\frac{DC_t}{360}}}$$

where

$PU_i$ : Unitary price of bond i

$VNA_i$ : Nominal value for bond i, from column “Valor Nominal Atualizado” at Central Bank file ASEL007

$CupomTx_i$ : coupon paid semi-annually for bond i, from column “Taxa de Juros” at Central Bank file ASEL017

$Curva_{t,i}$ : Discount rate, in 360 calendar days, that represents the expected Exchange rate o bond  $i$ , at vertex  $t$

$DC_t$ : Calendar days from settlement date to date  $t$ .

*This Technical note is available on [www.b3.com.br](http://www.b3.com.br), Market data and Indices, Data services, Market data, Reports, Derivatives Market, Methodology, Federal Government Bond Pricing Methodology.*