

## METHODOLOGY FOR VALUING INSTRUMENTS ISSUED BY TESOFE, IPAB AND BANCO DE MÉXICO

### 1. INTRODUCTION

This note describes the methodology Banco de México uses to value, at market prices, securities issued by TESOFE, IPAB and Banco de México, which are part of the institution's proprietary position or which the central bank accepts as guarantees either for market maker securities-lending purposes or intraday loans granted to payment system financial intermediaries.

Under this methodology, the clean and dirty prices of each instrument are calculated as a weighted average of valuation prices the following price suppliers provide Banco de México with: Algorithmics-Valmer, Grupo Proveedor de Precios Bursátiles (GBS), and Provedora Integral de Precios S.A. de C.V. (PIP). The weights used are random and are normalized in order to guarantee that the central bank's valuation prices are between the highest and the lowest of suppliers' valuations.

Before describing the methodology, the following notes and definitions should be made:

$PL_{x,t}$ : Clean valuation price of instrument "x" calculated by Banco de México on date  $t$ .

$PL_{x,t}^m$ : Clean valuation price of instrument "x" calculated by the same price supplier on date  $t$ .

$PS_{x,t}$ : Dirty valuation price of instrument "x" calculated by Banco de México on date  $t$ .

$PS_{x,t}^m$ : Dirty valuation price of instrument "x" calculated by the same price supplier on date  $t$ .

### 2. CALCULATION OF VALUATION PRICES

The universe of securities to be valued using this methodology is indicated in the catalog of instruments INDEVAL sends Banco de México on a daily basis. The name of the issuer, maturity date and nominal value of each security is obtained from the same source.

In order to calculate the valuation price of an individual issuance, the information suppliers provide Banco de México with is the only one that is considered for both the clean and dirty price, and takes the form of one of the following cases:

#### Case 1:

If for instrument "x" we have  $k$  ( $k \leq 2$ ) price supplier valuations, Banco de México will calculate the clean valuation price of this instrument using the following formula:

$$PL_{x,t} = \sum_{i=1}^k w_i^* \cdot PL_{x,t}^i \quad (1)$$

where

$$w_i^* \equiv \frac{w_i}{\sum_{i=1}^k w_i} \quad (2)$$

and where  $w_i$ 's are  $k$  random weights with values of between 0 and 1 generated with an even distribution.

In this case, the clean valuation price that Banco de México will calculate for instrument "x" will be the average weighted price of the clean prices of the  $k$  suppliers, where the weights will be calculated generating  $k$  values, independently of an even distribution with support at interval  $[0,1]$ , and these values are subsequently normalized. For each instrument, at each valuation date, a series of  $k$  weights shall be determined.

In this case, dirty prices will be calculated by replacing in equation (1) values  $PS_{x,t}^i$  for values  $PL_{x,t}^i$ ; the weights  $w_i$ 's will be the same as for the clean prices. The dirty valuation price is therefore calculated as follows:

$$PS_{x,t} = \sum_{i=1}^k w_i^* \cdot PS_{x,t}^i \quad (1')$$

## Case 2:

If on the valuation date there is no price supplier information for instrument "x", Banco de México will calculate the clean and dirty valuation prices of this instrument by repeating the previous day's value; in other words:

$$PL_{x,t} = PL_{x,t-1} \quad (3)$$

where

$$PS_{x,t} = PS_{x,t-1} \quad (3')$$

### **3. PUBLICATION OF VALUATION PRICES ON BANCO DE MÉXICO'S WEB PAGE**

Banco de México will publish on its Web Page the valuation prices of the most recent on-the-run instruments from a pool of securities issued by TESOFE, IPAB and the central bank itself.