Determining the Overnight TIIE Funding Rate[1]

In order to obtain a near risk-free reference rate (RFR) aligned to international standards[2] and representative of the Mexican overnight secured interbank funding market for Mexican pesos, Banco de México has decided to calculate and provide to the general public the Overnight TIIE Funding Rate. One of the main RFRs' features is that these rates must be determined solely from transaction data. Hence, the Overnight TIIE Funding Rate is calculated with wholesale overnight repurchase agreement (repo) transactions denominated in Mexican pesos, settled by banks and brokerage firms. These repo transactions are secured by debt instruments issued by the Federal Government, the Mexican Bank Savings Protection Institute (IPAB) and the Central Bank.[3] The database considered by Banco de México consists in all the repo transactions with the characteristics described above, and that are settled through S.D. Indeval (*Institución para el Depósito de Valores, S.A. de C.V. (INDEVAL))*.

The Overnight TIIE Funding Rate is determined as a volume-weighted median of interest rates paid on Mexican peso denominated repo transactions mentioned in the previous paragraph. For the calculation of the Overnight TIIE Funding Rate, the INDEVAL database is filtered to remove transactions settled among institutions belonging to the same financial group. The remaining transactions determine the *base sample* used in the rate calculation. The volume-weighted median is calculated by ordering the transactions of the *base sample* from the lowest to the highest rate, thus, the first transaction is the one with the lowest interest rate of the *base sample* and the last operation is the one with the highest interest rate. If there are two or more transactions with the same interest rate, the transaction with the lowest amount is sorted first. Then, for each transaction of the ordered *base sample* the cumulative volume is calculated and expressed as a percentage of the total volume of said *base sample*. The Overnight TIIE Funding Rate is then determined as the interest rate associated with the first transaction which cumulative volume represents 50% or more. At publication, the volume-weighted median is expressed in annual terms and rounded to two decimal places.

The detailed calculation procedure of the daily Overnight TIIE Funding Rate is as follows:

1. Define n as the total of wholesale overnight repo transactions in Mexican pesos settled by banks and brokerage houses included in the *base sample* the day of the computation of the rate. The

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amount of each transaction included in the *base sample* is expressed in pesos and it is defined as y_i. The rate corresponding to each transaction is defined as r_i. For both cases, the subscript i represents the ith transaction, for $i = 1, \dots, n$.

2. The transactions in the *base sample* are sorted by rate in ascending order from the lowest to highest rate so that $\{r_{(1)}, \dots, r_{(n)}\}$, where:

$$r_{(1)} \leq r_{(2)} \leq \cdots \leq r_{(n)}.$$

   In case two or more transactions from the *base sample* have the same rate, the transaction with the lowest amount is sorted first.

3. The *total aggregated volume* (VTA) is calculated as the sum of the amount, expressed in Mexican pesos, of every transaction included in the *base sample*:

$$VTA = \sum_{i=1}^{n} y_{(i)}.$$

4. For each transaction in the *base sample,* and sorted according to the criterion stated in numeral 2, a *cumulative volume* is computed adding the volume of all the transactions from the first to the ith transaction. The *cumulative volume* for the ith transaction is defined as V_i, and it is expressed as the percentage of the *total aggregated volume* defined in numeral 3, according to the following formula:

$$V_i = \frac{\sum_{j=1}^{i} y_{(j)}}{VTA} * 100,$$

   where $y_{(j)}$ represents the associated amount of the jth operation, for $j = 1, \dots, i$.

5. The Overnight TIIE Funding Rate is determined as the rate associated to the first transaction that has a cumulative volume larger or equal than 50% ($V_i \geq 50$), according to the ascending sorting defined in numeral 2.

   Finally, the rate is expressed in annual terms and rounded to two decimal places.

Numerical example: Consider the following transactions as the *base sample*

Rate	Amount
7.74%	$ 1,500.00
7.81%	$ 1,100.00
7.70%	$ 2,000.00
7.74%	$ 1,200.00
7.76%	$ 1,500.00
7.75%	$ 1,400.00
7.73%	$ 1,350.00
7.78%	$ 1,300.00

According to what is stated in **numeral 2**, the *base sample* is sorted from the lowest to the highest rate. In case two or more transactions from the *base sample* have exactly the same rate, the transaction with the lowest amount is sorted first.

	Rate	Amount
	7.70%	$ 2,000.00
	7.73%	$ 1,350.00
	7.74%	$ 1,200.00
	7.74%	$ 1,500.00
	7.75%	$ 1,400.00
	7.76%	$ 1,500.00
	7.78%	$ 1,300.00
	7.81%	$ 1,100.00
Sum		$ 11,350.00

In this example, the *total aggregated volume* according to **numeral 3** is equal to $11,350 pesos. Then, according to what is stated in **numeral 4**, for each transaction of the sorted *base sample,* the cumulative volume is calculated as follows:

Rate	Amount	Cumulative Volume
7.70%	$ 2,000.00	17.62%
7.73%	$ 1,350.00	29.52%
7.74%	$ 1,200.00	40.09%
7.74%	$ 1,500.00	53.30%
7.75%	$ 1,400.00	65.64%
7.76%	$ 1,500.00	78.85%
7.78%	$ 1,300.00	90.31%
7.81%	$ 1,100.00	100.00%

Thus, the Overnight TIIE Funding Rate in this example is **7.74%** corresponding to the first transaction where the cumulative volume is higher or equal than 50% $(V_i \geq 50)$ as stated in **numeral 5**.