

## Determining the Overnight Interbank Funding Rate Secured with Bank Debt Instruments (Overnight Bank Funding Rate or Bank Funding Rate)<sup>1</sup>

In order to obtain a daily interbank funding rate representative of the wholesale market secured with securities issued by banks, Banco de México has decided to calculate and provide to the general public the Interbank Funding Rate Secured with Bank Paper (Overnight Bank Funding Rate). This rate is based on Mexican peso denominated wholesale funding operations for one-day repo and one-day outright transactions collateralized with bank promissory notes, certificates of deposit, and banker's acceptances settled through S.D. Indeval (*Institución para el Depósito de Valores, S.A. de C.V. (INDEVAL)*).

The Overnight Bank 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 Bank 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. In case that two or more transactions from the base sample have exactly the same 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 this *base sample*. The Overnight Bank 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 Bank 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 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  $i$ th 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:

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

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In case two or more transactions from the *base sample* have exactly 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 *i*th transaction. The *cumulative volume* for the *i* 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 *j*th operation, for  $j = 1, \dots, i$ .

5. The Overnight Bank 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
<b>Sum</b>	<b>\$ 11,350.00</b>

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%
<b>7.74%</b>	\$ 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 Bank 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**.

## Determining the Overnight Interbank Funding Rate Secured with Government Debt Securities (Overnight Government Funding Rate or Government Funding Rate)<sup>2</sup>

In order to obtain a daily interbank funding rate representative of the wholesale market secured with securities issued by the Federal Government in local currency, Banco de México has decided to calculate and provide to the general public the Overnight Interbank Funding Rate Secured with Government Debt Securities (Overnight Government Funding Rate). This rate is based on Mexican peso denominated wholesale funding operations for one-day repo transactions collateralized with government securities<sup>3</sup> settled through S.D. Indeval (*Institución para el Depósito de Valores, S.A. de C.V. (INDEVAL)*).

The Overnight Government 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 Government 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. In case that two or more transactions from the base sample have exactly the same 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 this *base sample*. The Overnight Government 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 Government 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 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  $i$ th 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:

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

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<sup>3</sup> The government securities are: Certificados de la Tesorería de la Federación (CETES), Bono de Desarrollo de Desarrollo del Gobierno Federal con Tasa de Interés Fija (Bonos M), Bonos de Desarrollo del Gobierno Federal (Bonos D) and Bonos de Desarrollo del Gobierno Federal denominados en Unidades de Inversión (UDIBONOS).

In case two or more transactions from the *base sample* have exactly 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 *i*th transaction. The *cumulative volume* for the *i*th 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 *j*th operation, for  $j = 1, \dots, i$ .

5. The Overnight Government 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*

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