

### Contacts

**Roberto Ballinez**

Public Finances and Infrastructure Sr.  
Executive Director  
roberto.ballinez@hrratings.com

**Roberto Soto**

Public Finances and Infrastructure  
Director  
roberto.soto@hrratings.com

**Luisa Adame**

Public Finances Manager  
luisa.adame@hrratings.com

**Alfonso Sales**

Methodological Criteria Associate  
Director  
alfonso.sales@hrratings.com

**Mauricio Prieto**

Methodological Criteria Sr. Analyst  
mauricio.prieto@hrratings.com

**Pedro Latapí**

Chief Credit Officer  
pedro.latapi@hrratings.com

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exclusive property of HR Ratings.

**This document describes the methodology used by HR Ratings to evaluate the credit quality of the Structured Debt of Mexican States.**

This document is focused on both banking and securities market Structured Debt (SD) of the states of the United Mexican States, which is acquired through irrevocable trusts with Federal funds from *Ramo 28* (Federal Participations), *Ramo 33* (Federal Contributions) as a payment source or any other Federal transfers that may be pledged as a payment source.

### Description of the Methodology

The HR Ratings' model is based mainly on a quantitative exercise that measures, in a specific period, the maximum reduction in the pledged revenues resisted by the SD under the condition of meeting all its debt obligations. This reduction determines the credit rating, although under specific circumstances, the rating may vary in terms of *notches* due to Qualitative Adjustments.

With the projection of the pledged revenues and the debt service in each period, the model identifies the minimum hedging and based on this applies an additional stress to the revenue over a period of thirteen months. The Target Stress Rate (TOE) measures the maximum reduction that the structure will withstand in said period. It also considers the use of all the resources available in funds and guarantees, but establishes the condition that the resources used be replenished with the remaining amounts of the operation in the future.

For the projection of the pledged transfers and the debt service, this methodology uses macroeconomic scenarios constructed by HR Ratings' Economic Analysis Department and that consider different variables such as economic growth, inflation and interest rates. The scenarios incorporate stress factors as a cyclical impact for variables such as Federal Assignable Collections (RFP) or national *Ramo 28* national and the variable applicable to each state.

The methodology allows other factors to be incorporated into the quantitative analysis, which include the monetization of GPOs or financial derivatives, as well as cases in which a third party pays the respective amortizations of the period either partially or totally, and the inclusion of secondary and substitute payment sources.

The Credit Rating can be assigned to the SD after the TOE is determined. Qualitative Adjustments can then be incorporated based on the state's unsecured rating or the contractual affirmative or negative covenants, which may trigger early maturity events.

HR Ratings' rating process for the SD of states of the United Mexican States must have a legal opinion that evaluates the capacity of the trust contract to perform its functions, obligations and responsibilities entrusted to it and that allows it to operate as such. The methodology describes the items identified through a legal opinion provided by an external legal firm and the process will be conducted in the event that there is any update of said opinion.

# Structured Debt of Mexican States:

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### Introduction

This methodology describes the analysis process to determine the credit quality of the Structured Debt (SD) of the states of the United Mexican States, which is acquired through irrevocable trusts with Federal funds from *Ramo 28* (Federal Participations), *Ramo 33* (Federal Contributions) as a payment source or any other Federal transfers that may be allocated as a payment source. Debt may be constituted through bank loans or securities issued on the stock market through debt instruments.

This methodology assumes as Structured Debt (DE) in which the payment of interest and periodic and obligatory amortizations are required (referred to jointly as debt service). To do so, HR Ratings bases its analysis mainly on the projections of the payment source through a flow analysis, considering the reserves constituted and any additional recourse available (credit improvement) that may be quantified and that serves to cover the payment of the debt service. This evaluation considers the performance of the debt, the payment source and/or additional flows throughout the legal term of the loan or the issue.

An important characteristic in this methodology is the fact that it only considers the unsecured rating of the state, the Federal funds of which are allocated as a payment source of the debt, when below "HR BBB-", or the equivalent in the market. In these cases, HR Ratings may include a qualitative adjustment on the rating of a SD.

Finally, the analysis process described in this methodology may also be applied in SDs whose payment source comes from the collection rights of a portfolio, the underlying assets of which are bank loans or even the remainder of another SD. In both cases, the requirement that the payment source must be come from Federal transfers and that the credit quality of the underlying assets or the preferential SD is met.

HR Ratings' quantitative analysis described in this methodology is based on measuring the capacity of the structure of the debt to resist a sudden contraction of the funds available for the debt service. In this vein, the model identifies the minimum value of the coverage of the debt service and applies an extraordinary stress of thirteen months around said coverage. This period considers the weakest month from the financial point of view and the stress will be applied to the transfers allocated through the Target Stress Rate (TOE). The reduction of revenue is conditioned to there being sufficient funds to meet the debt obligations and to that the structure being capable to replenishing the reserves used with remaining amounts.

HR Ratings recognizes that not all the factors that affect the credit quality of the SD are quantifiable; therefore, the analysis process also allows for a series of Qualitative Adjustments. These are specific and their impact on the rating is limited to the description provided in this methodology. HR Ratings' rating report will outline and justify the adjustments incorporated into the credit rating of the SD.

The methodology has two addenda: *Structured Debt of Mexican Municipalities: Addendum to the Federal-Transfers Backed Debt Methodology* and *Structured Debt of Subnational Entities and OPDs. Addendum to the Own-Revenue Backed Debt Methodology*. The first refers to the debts of municipalities with Federal transfers as a payment source, whereas the second refers to the debts of the states, municipalities and their decentralized bodies with non-Federal revenue as a payment source (such as taxes, duties and levies collected by the entity itself).

### Legal Strength of Evaluated Structured Debt

There are two fundamental legal elements that must be evaluated in each case in which the rating process described in this methodology is used. These elements refer to the concept of the trust within the SD and the validation of their legal strength by an external legal firm through a Legal Opinion.

The credit analysis of an SD begins from the fact that there is a legal and operative separation between the financial structure and the entity's payment capacity and/or intention. Therefore, the methodology allows the credit quality of the SD to be captured without considering the credit quality of the entity. However, it must be clarified that, although this separation allows HR Ratings to prepare a quantitative analysis that does not incorporate the credit rating of the entity. This may have an impact through Qualitative Adjustments.

This section describes the treatment of the legal opinion and the HR Ratings' interpretation to assess the legal strength of the structure. The section focuses first on the concept of the trust and then the legal opinion, followed by the treatment and the potential impact of the update of the legal documentation.

#### The Concept of the Trust.

A trust contract is the legal means, vehicle or instrument that stipulates all the terms, conditions, rights and obligations that give form to the organizational and operative structure of a bank loan or stock market issue during its entire term. The existence of this contract, which must be unconditional and irrevocable, is what allows the loan or issue to be considered as an SD.

The concept of the trust must meet the following characteristics: 1) be irrevocable and transparent until it performs its purpose, 2) be a management trust, which implies the existence of a third party (trustee) who manages the assets and/or funds used as a payment source between the debtor (trustor) and the creditor (beneficiary, the institution that grants the loan or the investors holder of the issue instruments); 3) be a trust in which the parties indicate the manner in which the SD should operate and therefore, service their payment obligations; 4) be a payment vehicle, through which the debtor is obliged to maintain the funds available at all times to meet the payment obligations, and 5) determine the priority of payments. All this is conducted by allocating said funds to the trust.

#### Legal Opinion<sup>1</sup>

The rating process for the SD must have a legal opinion that evaluates the capacity of the trust contract to perform its functions, obligations and responsibilities entrusted to it and that allows it to operate as such. The rating process must also confirm that the trust contract and the rest of the legal documents of the transaction meet the legal obligations and provisions applicable to the contracting of financing or the issuing of debt, including the allocation mechanism of the payment source, guarantee contracts and financial derivatives. If all the above is complied with in accordance with the law firms' internal criteria, then the Legal Opinion would consider that the trust is valid, enforceable, opposable against third parties

<sup>1</sup> In its General Methodological Criteria (CGM), HR Ratings explains the concept of the Legal Opinion, the characteristics that must be met and its importance for the SD. The CGM may be consulted at the following link: <https://www.hrratings.com/methodology/>.

and if its implementation is adequate, which would enable HR Ratings to continue with its rating process.

Otherwise, when the Legal Opinion determines that these points are not adequately addressed in the legal documentation, one of the following two situations may arise. The first is when the loan contract explicitly stipulates that the entity must contribute resources for the payment of the debt service. In these cases, HR Ratings may assign the SD the unsecured credit rating assigned to the entity. The second situation is the one in which the structure does not admit resources from the entity; therefore, in these cases, HR Ratings will suspend its rating process.

### Update of the Legal Opinion

During the review process of a credit rating of and SD, there is the possibility that the parties involved in the financial transaction make modifications or additions to the legal documents reviewed initially by HR Ratings and the law firm. Under these circumstances, HR Ratings may request an update of the current Legal Opinion in accordance with certain criteria.

Faced with any modification and/or addition to the legal documents, HR Ratings may proceed to request the trustor for all the new documents in order to determine whether or not an update to the Legal Opinion is required<sup>2</sup>. As a consequence, the possible situations are:

1. If the modifications to the legal documents do not have any effect on the terms of the allocation of the funds offered as payment guarantee, HR Ratings will not request the update of the Legal Opinion. Despite this, it may be possible that the modifications have an impact on the current rating level of the SD or its attribute<sup>3</sup>.
2. If the modifications require the update of the Legal Opinion, it must be updated preferably with the law firm that issued the original opinion; otherwise, another law firm authorized by HR Ratings will have to be engaged. Here the following scenarios may arise:
  - If the update of the Legal Opinion considers that the documentation referring to the trust guarantees that it is valid, enforceable, opposable against third parties and its implementation is adequate, HR Ratings shall incorporate the modifications into the quantitative analysis and perform the respective rating action.
  - If the update of the Legal Opinion does not guarantee that the trust is valid, enforceable, opposable against third parties and its implementation is adequate, HR Ratings may incorporate said modifications into its analysis and propose a Qualitative Adjustment as part of the review process. The impact on the number of *notches* would be reflected in that the credit rating of the SD being equal to the rating of the trustor in cases identified as having the obligation to contribute funds to the trust.
  - If the law firm does not conclude the update process of the Legal Opinion by the date of the annual rating review, HR Ratings shall report the status of the operation, including the possible changes in the current rating or its attribute

<sup>2</sup> The update of the Legal Opinion may be requested at any time during the term of the operation, but not necessarily during the annual review process performed by HR Ratings.

<sup>3</sup> Attribute shall be understood as: Outlook, Observations or Special Review, as defined in HR Ratings' CGM.

based on the information it holds. The review process will continue its course once the lawyers send the updated Legal Opinion.

Finally, if HR Ratings identifies any change on the legal documentation, depending on the magnitude or relevance of the changes, it may place the rating in "Review in Process". In this period, the changes will be evaluated to confirm if they have an impact on the financial characters and if an update of the Legal Opinion is required. In general, during the monitoring of the rating or the follow-up process, an update of the Legal Opinion may be request should any changes in the relevant documents be identified.

### General Structure of Analysis Model

The first step of HR Ratings' quantitative model consists of developing a projection of the payment source and the debt service of the SD. To do this, several different macroeconomic scenarios generated by HR Ratings' SD Economic Analysis Department are used. The first of these scenarios replicates the economic and financial conditions prevailing in the Mexican market (Base Scenario). The rest incorporate stress conditions, first a Low Growth with Low Inflation Scenario and then a Scenario of Stagflation. The rating process considers the historical information available at the time and uses current projections in order to assign the rating. In each analysis report, HR Ratings will outline the main risks derived from movements in the macroeconomic variables to the rating assigned.

Once the revenue and debt service projections are prepared for each Macroeconomic Scenario, the Debt Service Coverage Ratio (DSCR) will be calculated at each payment date and for the remaining term of the SD<sup>4</sup>. Based on this, the scenario in which the smallest DSCR arises will be identified and an additional stress on the payment source will be applied around it for a period of six months before and six months after. The application of this exercise will determine the Target Stress Rate (TOE), which fulfills the purpose of calculating the maximum level of stress that a structure may tolerate on its payment source without falling into default in a specific time. The level of stress may be greater if there is any other liquid resource and available within the SD for the payment of the debt service. Examples of this are the reserve funds, coverage contracts and payment guarantees.

If the SD has a reserve fund and/or a payment guarantee, the TOE must meet the additional condition that the remainders of the future flows of the payment sources must be replenishable to the target amount of the reserve, in accordance with the stipulations of the legal documentation and/or pay the funds used from the guarantee<sup>5</sup>. In technical terms, if the SD has additional funds, the maximum level of stress will be that in which the minimum DSCR is equal to 1.0x (times). Otherwise, if there is a reserve fund and/or payment guarantee, obtaining a DSCR below 1.0x is feasible. However, the level of this coverage must be such that, once this additional stress period ends, there are sufficient funds to replenish the reserves and/or pay the guarantee in a specific time<sup>6</sup>.

The credit rating is determined based on the value of the TOE, which in turn may be adjusted in terms of *notches*, either positively or negatively, if there are Qualitative Adjustments. The types of factors evaluated in these adjustments typically refer to the analysis of the terms and conditions of the financial transaction and if its existence represents an improvement

<sup>4</sup> In this methodology, the Primary DSCR is the relevant coverage metric. The concept of "Primary" refers to that the coverage only considers the resources allocated to the payment of the debt service of the SD.

<sup>5</sup> The analysis process of an SD with a Partial Guarantee or Prompt Payment Guarantee is presented in the methodology: "Partial Guarantees for Issues of Structured and Unsecured Debt" document, published in March 2019 by HR Ratings on [www.hrratings.com](http://www.hrratings.com).

<sup>6</sup> This lapse is defined as the Post-Critical Stress Period and its duration, in the case of the reserve funds, will depend on the amount of funds available to service the debt in terms of periods.

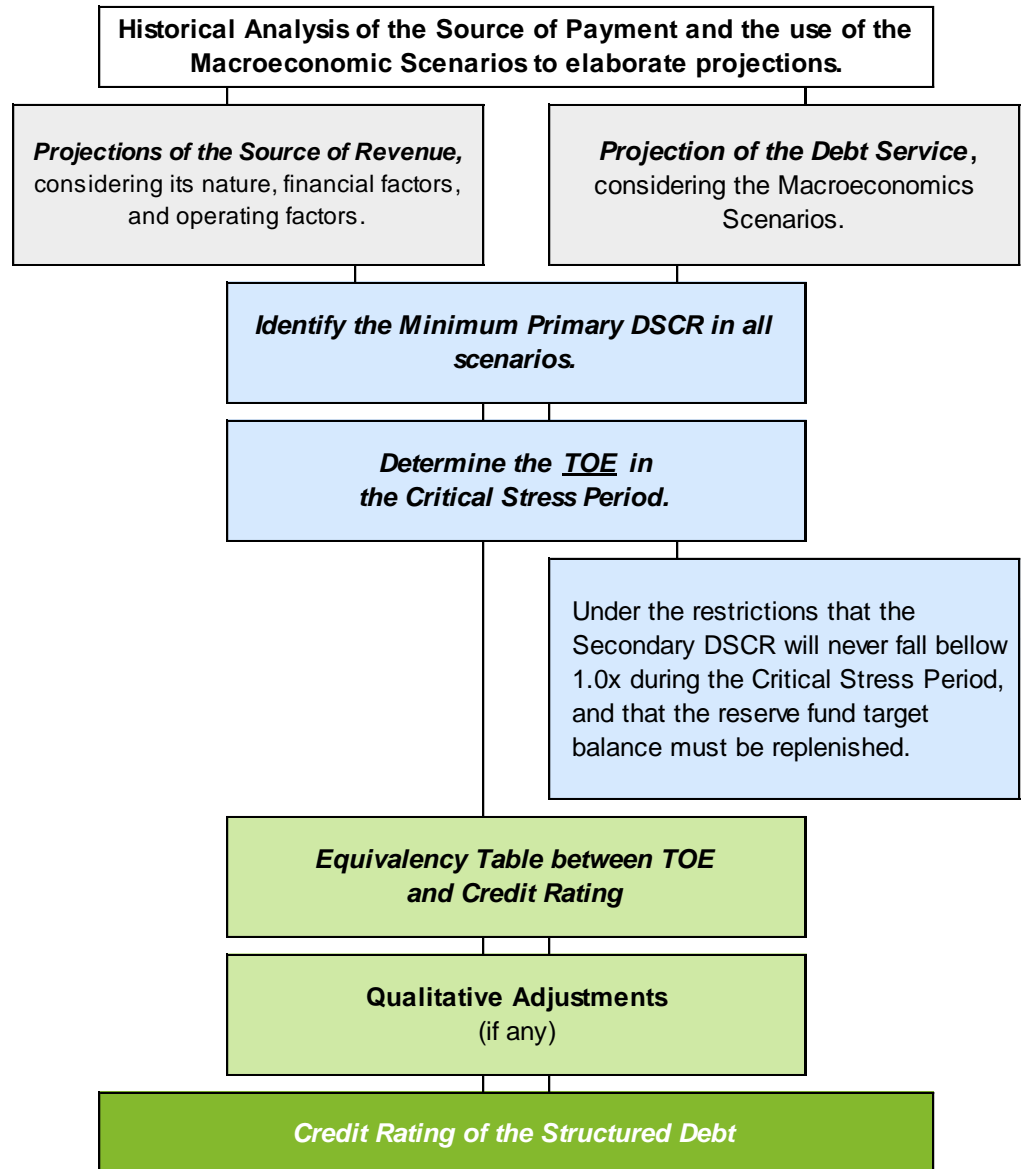
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or an additional credit risk. These adjustments will be explained later. For the time being, Table 1 shows the structure of the model described in this section:

**Table 1: HR Ratings' Evaluation Process**



Source: HR Ratings.

The emphasis on the calculation of the TOE value reflects the assumption that the payment capacity of the SD is as strong (in financial terms) as its performance at its weakest point, which is represented by the minimum DSCR projected throughout the term of the legal maturity.



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Lastly, pursuant to the number of bank loans and securities issues rated by HR Ratings, the payment source of most of these SDs comes from Federal transfers received from Federal Participations (*Ramo 28*)<sup>7</sup>.

### Macroeconomic Scenarios.

HR Ratings prepares various Macroeconomic Scenarios to evaluate the financial strength of a loan or the issue of securities market debt under stress situations: 1) the Base Scenario, 2) the Stagflation Scenario and 3) the Low Growth with Low Inflation Scenario. Macroeconomic Scenarios also allow the projection of financial expenses, such as the cost of debt, because they provide a series for different interest rates (Equilibrium Interbank Interest Rates), exchange rate, inflation and the value of the Investment Unit (UDI).

The Federal Assignable Collection (RFP) is the most important variable projected, as well as the Federal funds of *Ramo 28* and *Ramo 33*, which may be allocated. HR Ratings considers the estimates of the Gross Domestic Product (GDP) in each scenario as a point of reference<sup>8</sup>. In general terms, the projection of a specific Federal fund may consider, within its calculation, the historical percentage in terms of the GDP.

With the GDP projections, under the different Macroeconomic Scenarios, HR Ratings makes estimates for the RFP and for the different Federal Revenues funds that may be allocated by the states. The main relationships calculated in this process are: 1) RFP to national GDP, 2) FGP by state to national FGP, 3) FAIS by state to national FAIS and 4) FAFEF by state to national FAFEF.

The historical information will be used to project these series and the constant proportions will be maintained for the Base Scenario. For the case of stress scenarios, multiple levels of stress will be incorporated, which will be explained later.

### Federal Assignable Collection (RFP)

The RFP is constituted from a set of funds collected by the Federation through Federal taxes and a large portion of these are assignable by the states and municipalities<sup>9</sup>. This suggests that the national economic activity determines, to a great extent, the amount that year-on-year is approved of this item in the Federal Revenues Law (LIF)<sup>10</sup>.

Based on the foregoing, the RFP projections are based on the historical percentage that has been shown as part of the rated GDP. In the Base Scenario, this percentage is projected using the weighted average of the last five years observed and the current year:  $\{t_{-5}, \dots, t_0\}$ <sup>11</sup>; the current calendar year is considered as year zero ( $t_0$ )<sup>12</sup>.

<sup>7</sup> Although this methodology refers to transfers from Federal funds that may be allocated according to the Fiscal Coordination Law (LCF, 2018), any future change in the law on the origin, the criteria and the calculation of the transfers that the sub-national entities (the states) may receive must be analyzed under this same methodology. In the nature of the Federal transfers changes, HR Ratings may conduct a separate analysis process.

<sup>8</sup> These two include the main funds used for the payment of states' and municipalities' debt obligations. Nowadays, approximately 94% of the sub-national debt rated by HR Ratings has the General Participations Fund (FGP) and the Municipal Development Fund (FFM) as payment sources.

<sup>9</sup> In addition to Federal taxes, the RFP include mining duties and 80.29% of the Federal Government's oil revenues, as well as surplus income. The foregoing is according to the current Fiscal Coordination Law (LCF).

<sup>10</sup> Other elements that may influence the performance of the RFP are certain international financial variables (such as fuel prices) and tax reforms that may be approved by the Legislative Branch.

<sup>11</sup> HR Ratings review and/or re-evaluate the RFP projection and as a consequence, the rest of the relevant funds, at least once a year. This review will preferably be conducted at the beginning of the year in order to include all the new data observed.

<sup>12</sup> The projection process conducted by HR Ratings may consider the amount budgeted in the RFP in the LIF as a reference for  $t_0$  (base year or current year).

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In the Macroeconomic Stress Scenarios, the calculation of the historical proportion of the RFP to the PIB will consider additional adjustments. The first refers to a stress to be applied to the period projected between years  $t_1$  and  $t_5$ , the second adjustment refers to another stress of a different magnitude to be applied to years  $t_6$  and  $t_{10}$ , and the last stress fixed from  $t_{11}$ . A Cyclical Stress will also be applied, which refers to the reduction on years  $t_2$  and  $t_3$ . This cycle will be repeated every six years; therefore, the second cycle will occur in years  $t_8$  and  $t_9$ , and the third cycle will be applied to  $t_{14}$  and  $t_{15}$  and then successively. It is important to mention that the value of this reduction may change in accordance with the prevailing economic conditions.

Table 2 illustrates how HR Ratings applies its stress to the relationship between the RFP and the Rated GDP. The series relating to the Rated GDP are prepared by HR Ratings' Economic Analysis Department, provided that the RFP for each scenario relates to the method described herein.

**Table 2: Applying Stress to the Projections of the RFP.**

Year	Base Scenario			Stress Scenario				
	Nominal GDP	RFP		Nominal GDP	RFP		Stress Factors	
	Amount	Amount	% of GDP	Amount	Amount	% of GDP	Regular	Cyclical
$t_{-6}$	\$450,152	\$167,457	37.20%	\$450,152	\$167,457	37.20%	n/a	
$t_{-5}$	\$473,110	\$174,436	36.87%	\$473,110	\$174,436	36.87%	n/a	
$t_{-4}$	\$492,980	\$184,769	37.48%	\$492,980	\$184,769	37.48%	n/a	
$t_{-3}$	\$526,503	\$190,173	36.12%	\$526,503	\$190,173	36.12%	n/a	
$t_{-2}$	\$547,037	\$201,966	36.92%	\$547,037	\$201,966	36.92%	n/a	
$t_{-1}$	\$569,465	\$211,215	37.09%	\$569,465	\$211,215	37.09%	n/a	
$t_0$	<b>\$597,938</b>	<b>\$217,850</b>	<b>36.43%</b>	<b>\$538,145</b>	<b>\$217,850</b>	<b>40.48%</b>	<b>n/a</b>	
$t_1$	\$627,835	\$230,933	36.78%	\$502,268	\$183,792	36.59%	0.00095	
$t_2$	\$659,227	\$242,479	36.78%	\$494,420	\$179,931	36.39%	0.00095	-0.20%
$t_3$	\$692,188	\$254,603	36.78%	\$519,141	\$188,954	36.40%	0.00095	-0.10%
$t_4$	\$726,798	\$267,334	36.78%	\$545,098	\$198,429	36.40%	0.00095	
$t_5$	\$763,138	\$280,700	36.78%	\$572,353	\$207,806	36.31%	0.00095	
$t_6$	\$801,295	\$294,735	36.78%	\$600,971	\$217,746	36.23%	0.00075	
$t_7$	\$841,359	\$309,472	36.78%	\$631,020	\$228,160	36.16%	0.00075	
$t_8$	\$883,427	\$324,946	36.78%	\$662,571	\$237,746	35.88%	0.00075	-0.20%
$t_9$	\$927,599	\$341,193	36.78%	\$695,699	\$249,807	35.91%	0.00075	-0.10%
$t_{10}$	\$973,979	\$358,253	36.78%	\$730,484	\$262,480	35.93%	0.00075	
$t_{11}$	\$1,022,678	\$376,165	36.78%	\$767,008	\$275,182	35.88%	0.00055	
$t_{12}$	\$1,073,811	\$394,973	36.78%	\$805,359	\$288,499	35.82%	0.00055	
$t_{13}$	\$1,127,502	\$414,722	36.78%	\$845,627	\$302,458	35.77%	0.00055	
$t_{14}$	\$1,183,877	\$435,458	36.78%	\$887,908	\$315,317	35.51%	0.00055	-0.20%
$t_{15}$	\$1,243,071	\$457,231	36.78%	\$932,303	\$331,503	35.56%	0.00055	-0.10%
$t_{16}$	\$1,305,225	\$480,093	36.78%	\$978,918	\$348,518	35.60%	0.00055	
$t_{17}$	\$1,370,486	\$504,097	36.78%	\$1,027,864	\$365,379	35.55%	0.00055	
$t_{18}$	\$1,439,010	\$529,302	36.78%	\$1,079,258	\$383,054	35.49%	0.00055	
$t_{19}$	\$1,510,961	\$555,767	36.78%	\$1,133,220	\$401,584	35.44%	0.00055	
$t_{20}$	\$1,586,509	\$583,556	36.78%	\$1,189,881	\$418,629	35.18%	0.00055	-0.20%

Source: HR Ratings' example.

Throughout the projections in the Base Scenario, the relationship for the RFP to the Rated GDP remains fixed with a base in a weighted average of the percentages observed between



{t-5, ..., t<sub>0</sub>}. This percentage is taken for the Stress Scenario, but the reductions observed in the two right-hand columns, regular stress and cyclical stress, are applied to it.

### National General Participations Fund

The current LCF establishes the transfer mechanisms of the RFP funds to the states and municipalities. The Law stipulates that the FGP will be calculated year-on-year in the Federal Expenditure Budget (PEF) considering a proportion equivalent to 20.0% of the RFP. In such a manner that, beginning with the RFP series under the Base Scenario and the Stress Scenarios, this proportion may be applied to obtain the projection of the national FGP<sup>13</sup>.

### State General Participations Fund

HR Ratings will also weight the historical proportion of the last five years and the current year between the FGP of each state and the national FGP to project the proportion of the national FGP applicable to each state. The PEF will be taken as a reference for the current year. This process relates to the projection of the Base Scenario<sup>14</sup>.

An additional adjustment will be made for the Macroeconomic Stress Scenarios. This process is equivalent to the one described for the proportion of the RFP on the GDP, excluding the application of the Cyclical Stress. The magnitude of each of these adjustments will be the same for all the states and will be applied in the same years.

Finally, a monthly series projected for each state will be constructed on the series of state FGP. These will consider the historical seasonality factor inherent to each state, which will be obtained from the weighted average of prior years<sup>15</sup>.

### Social Infrastructure Contributions Fund (FAIS) and the Contributions Fund for the Strengthening of Federal States (FAFEF)

The transfer mechanism to the states established in the LCF will be applied for the projections of the FAIS and FAFEF, which are funds from *Ramo* 33. The national FAIS will be determined annually in the PEF with Federal funds in an amount equivalent to 2.5294% of the RFP<sup>16</sup>. The FAFEF fund will be determined annually in the PEF in an amount equivalent to 1.4% of the RFP.

Considering the different series of the RFP that have been projected for each scenario, these percentages will be applied and the series will be obtained (base and stress) for both national funds. The state series will be constructed based on this:

The process to obtain these series will be same as used for the state FGP. In other words, the historical proportion of the last five years plus the current year between the FAIS of each state and the national FAIS will be calculated. The weighted average of these years will be taken to prepare the projection for each state in each scenario. The process to apply the

<sup>13</sup> Although there is a legal reference of 20.0%, HR Ratings recognizes that there may be small historical deviations. Therefore, HR Ratings will review the proportions observed to confirm said relationship and in the event that of a deviation, it may propose to the Analysis Committee a calculation process of the proportion similar to the PIB / RFP proportion. In other words, the proportion used in the projection of the national FGP would be the result of the weighted average of the last five years observed (RFP / national FGP) and the current year.

<sup>14</sup> In general terms, the same weightings will be used for the five years and the current year observed in each state. In extraordinary cases, the Analysis Committee may adjust the weightings applied to particular state(s).

<sup>15</sup> If there is any extraordinary event in the amount or distribution of FGP of a specific state, the six-year period may be extended.

<sup>16</sup> Of the total of the RFP, 0.3066% will apply to the States' Social Infrastructure Contributions Fund (FISE) and 2.2228% to the Municipal Social Infrastructure Fund of the Territorial Demarcations of the Federal District (FISM). For the purposes of this methodology, the FAIS and FISE concept are synonymous in the cases of the states. The FAISM and FISM applies to the municipalities.

stress in the respective scenarios is equivalent to the rest of the variables described in this document.

Lastly, in terms of the seasonality of the series, the LCF stipulates a specific monthly transfer mechanism for these funds. The FAIS (FISE and FISM) will be paid monthly in the first ten months of the year in equal parts to the states by the Ministry of Finance and Public Credit (SHCP) and then by the states to the municipalities<sup>17</sup>. The FAFEF funds will be paid to the states monthly in twelve equal installments<sup>18</sup>.

### Federal Participations (*Ramo 28*)

Federal Participations (national *Ramo 28*) will be projected based on their historical percentage compared to the national GDP. In the Base Scenario, the proportion expected through the series would once more be the weighted average of the last five plus the current year<sup>19</sup>.

The process to apply the reductions in the Stress Scenarios is equivalent to the process described in the preparation of the RFP quotient to GDP, as shown in Table 2. This includes the second adjustment mentioned in said section, which applies the Cyclical Stress Scenario in the projections of national *Ramo 28* as a percentage of the national GDP.

### Federal Participations per State

The transfers levels at state level will be determined using the projections of Federal Participations at national level for the different macroeconomic scenarios. The percentage of *Ramo 28* to be received by each state is projected through the historical relationship between their own *Ramo 28* and the national *Ramo 28*<sup>20</sup>. The proportion applied to all the years of the SD will be the result of the weighted average of the last five years plus the current year: This proportion will not incur any change in the Base Scenario.

The process described in Table 2 will also be used for the stress scenarios and the calculation of the Federal Participations per State, without applying the Cyclical Stress.

Finally, a monthly series will be projected for each state on the annual series of *Ramo 28*. These will consider the historical monthly seasonality factor inherent to each state, which will be obtained from the weighted average of the six prior years<sup>21</sup>.

### Transfers to Municipalities

Although the current LCF establishes the percentage that each state must transfer to its municipalities from the funds that compose *Ramo 28*, no proportion is established on the total of the Federal Participations to the states.

In this vein, the Federal Participations received by the municipalities from the entire state FGP may not be less than 20% of the amount applicable to the state, which must distribute

<sup>17</sup> The states shall pay their respective municipalities and in the case of Mexico City, the territorial demarcations, the fund applicable to them in accordance with the calendar pursuant to which the Federation pays the states. Said calendar must be published by the states by the latest January 31 of each fiscal year in their respective gazettes.

<sup>18</sup> If the Federal payment source has characteristics other than those analyzed in this methodology, the Analysis Team, together with the General Analysis Department, may determine a process for its projection.

<sup>19</sup> The projection process for the national and state *Ramo 28* amount may take the amounts budgeted year-on-year in the LIF as a reference. HR Ratings may also make adjustments that reflect the particular performance of each state for the period  $t_0$ .

<sup>20</sup> The LCF stipulates the distribution criteria of national *Ramo 28* among the 23 states. It must be mentioned that from the 2015 reform to said Law, additional funds were constituted in *Ramo 28*.

<sup>21</sup> If there were any extraordinary event in the amount or distribution of *Ramo 28* of a specific state, the six-year period may be extended.

them in accordance with the applicable legislation. The local legislatures will establish their distribution among the municipalities based mainly on the collection incentives and replenishment principles in the municipal part<sup>22</sup>.

As already mentioned, the FAIS is set annually in the PEF in an amount equivalent to 2.5294% of the RFP, based on the estimates made based on the LIF for each fiscal year. Of the total of the RFP, 0.3066% will apply to the States' Social Infrastructure Fund (FISE) and 2.2228% to the Municipal Social Infrastructure Fund of the Territorial Demarcations of the Federal District (FISM). This fund will be paid monthly in the first ten months of the year in equal parts to the states by the Federation and then by the states to the municipalities and territorial demarcations.

### Interest Rates and Surcharges

Up to now, this methodology has explained the procedure used to project future Federal transfers that may be allocated to the payment source of the SD and that is credited to the state. In terms of the financial cost expected from the SD, HR Ratings also uses different macroeconomic scenarios generated by its Economic Analysis Department for cases in which the cost of the debt is referenced to a variable interest rate or to the Investment Unit (UDI).

Moreover, the financial cost of the debt may consider a surcharge (additional base points), which is generally linked to the credit rating obtained and maintained by the SD. In this case, the base financial scenario would consider the surcharge associated to the lowest credit rating (or with the greatest risk) prevailing the market. For the case of stress scenarios, the surcharge considered would be the one at the credit rating level lower than the level of the Base Scenario<sup>23</sup>.

If the SD has financial hedging instruments such as CAPs or SWAPs, the quantitative model will incorporate their effects (positive or negative). The duration and magnitude of these effects will be different according to the macroeconomic scenario analyzed.

### Calculation Model of the Target Stress Rate (TOE)

HR Ratings' quantitative model is based on the calculation of the Target Stress Rate (TOE), which captures the maximum reduction of the revenue that an SD may withstand in the specified lapse, without defaulting on its payment obligations. This first section defines the main variables, concepts and metrics used to calculate the TOE; it continues with the description of the model and offers a formal definition of this rate and the problem of optimization it causes. Lastly, this section provides an example of how a credit rating is calculated and interpreted.

### Variables, Concepts and Metrics

To describe the quantitative model, it is first necessary to define the main variables used :

#### **Definition: *Revenue Allocated*.**

For the terms of this methodology, Revenue Allocated refers to the future cash flow available to serve the debt and cover certain expenses. This flow is assigned by the state during the

<sup>22</sup> Currently, there are states that transfer more than 20% to their municipalities.

<sup>23</sup> In some cases, the legal documents of the SD stipulate that the surcharge is based on the credit rating with the greatest risk and on its remaining term. In these cases, the surcharge is fixed throughout the term of the SD.

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term of the SD the Federal transfers it receives mainly from the Participations (*Ramo* 28) and certain Contributions (*Ramo* 33). Said transfers must be in turn transferred directly to a trust (FISO) the purpose of which is to serve the debt.

**\*Note:** It must be clarified that the *Revenue Allocated* used by the HR Ratings in its model incorporates the different levels of stress described in the preceding section.

### Definition: *Debt Service*.

For the terms of this methodology, debt service refers to the periodic payment of interest and amortization through the FISO with the *Revenue Allocated*. If the SD has an active financial hedging instrument, the effects (positive or negative) shall be incorporated into the amount of interest payable in in each period.

### Definition: *FISO Expenses*.

For the terms of this methodology, *FISO Expenses* refer to disbursements to be made by the FISO for commission, fees, considerations for guarantees, annual fees for certain services, contractual premiums for certain financial derivatives, among others.

### Definition: *Available Reserves*.

For the terms of this methodology, *Available Reserves* refer to the funds available at all times to assists in the *Debt Service* if it cannot be covered in full by the *Revenue Allocated*. These reserves can take forms such as funds determined by fixed target balance or by a number of months of *Debt Service*, partial guarantees, letters of credit, etc.

### Definition: *Primary Coverage*.

Expressed in terms of times (x), *Primary Coverage* reflects the capacity of the future cash flow available to service the debt obligations and is calculated for the entire term of the SD using the following formula:

$$DSCR_t^{Primaria} = \frac{\text{Ingreso Afectado}_t - \text{Gasto del FISO}_t}{\text{Servicio de Deuda}_t}$$

### Definition: *Critical Stress Period*.

This refers to a lapse of thirteen months around the minimum  $DSCR_t^{Primaria}$ , in which an additional stress will be applied to the *Revenue Allocated* and is defined as follows:

$$\{t_{-6}, \dots, t_{-1}, t_0 \Leftrightarrow \min \{DSCR_{t_0}^{Primaria}\}, t_1, \dots, t_6\}$$

### Definition: *Secondary Coverage*.

Expressed in terms of times (x), *Secondary Coverage* reflects the capacity of the future cash flow and the reserves available to service the debt obligations and is calculated using the following formula:

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$$DSCR_t^{Secundaria} = \frac{\text{Ingreso Afectado}_t - \text{Gastos del FISO}_t + \text{Reservas Disponibles}_t}{\text{Servicio de Deuda}_t}$$

### Definition: *Post-Critical Stress Period*.

Refers to the lapse, following the Critical Stress Period, in which the SD, with the use of remainders existing in the FISO, must replenish the funds of the reserves used to comply with the *Debt Service* payment. In cases of reserve funds, this implies replenishing the target balance and in the case of partial guarantees, it refers to repaying the funds used considering the respective interest. The replenishment shall always be based on the applicable legal documentation that describes the conditions of any reserve fund, guarantee or any other instrument.

The length of this period is defined in terms of the funds available; for example, in the case of a reserve fund, it will depend on the number of months represented by the funds in the reserve in terms of *Debt Service*<sup>24</sup>.

### Conditions for the Critical Stress Period and Post-Critical Stress Period.

The first step of the quantitative model consists of identifying the minimum *Primary Coverage* during the term of the structure. On identifying this minimum value, the Critical Stress Period is constructed in which an additional stress will be applied to the Revenue Allocated, which must meet the multiple conditions. It is important to clarify that the HR Ratings model will be applied in one of the two stress scenarios, which implies that it will incorporate the projections of the respective macroeconomic variables. The stress scenario will be selected based on the one that shows the smallest minimum *Primary Coverage*.

In the absence of reserves, the stress that will be applied to the Revenue Allocated in this period would consider the restriction of the  $DSCR_t^{Primaria} \geq 1.0x$ . However, it is most common that the SD evaluated with this methodology has access to reserves; therefore, its use would permit lower  $DSCR_t^{Primaria}$  in the *Critical Stress Period*. Notwithstanding this, under these circumstances, it must meet the condition of replenishing the reserves used in the *Post-Critical Stress Period*.

This implies that the stress to be applied in the *Critical Stress Period* must always consider the capacity of the remainders to replenish, in the *Post-Critical Stress Period*, the reserves used.

The following section defines the rate that determines the magnitude of the stress to be applied in the *Critical Stress Scenario*.

### Calculating the TOE

#### Definition: *Target Stress Rate (TOE)*

The TOE refers to the maximum stress that the Revenue Allocated can withstand toward the SD during the *Critical Stress Period*, complying with the *Debt Service*, but will the condition of replenishing the reserves used during the *Post-Critical Stress Period*. The equilibrium value of this ( $TOE^E$ ) rate that meets these conditions is determined by applying the following problem of optimization.

<sup>24</sup> In the case of Partial Guarantees, the criterion use is contained in the *Partial Guarantees for Issues of Structured and Unsecured Debt: Debt Methodology*, published by HR Ratings in March 2019.

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**Calculate:** the  $TOE^E$

**Subject to:**

- i)  $(1 - TOE^E) \sum_{t=1}^{C=13} Pledged\ Revenue_t - FISO\ Expenses_t + Available\ Reserves_1 \geq \sum_{t=1}^{C=13} Debt\ Service_t$
- ii)  $Available\ Reserves_{C+n} = Target\ Amount\ of\ the\ Reserve\ Fund_{C+n}$

**Where:**

$TOE^E$ : Represents the Target Stress Rate that solves the problem of optimization.

$C$ : Refers to the extension of the Critical Stress Period.

$n$ : Refers to the extension of the Post-Critical Stress Period.

**Definition: Critical Revenue.**

During the *Critical Stress Period*, the revenue that results after applying the  $TOE^E$  to the *Revenue Allocated* is defined as *Critical Revenue*, the calculation of which is shown in the following expression:

$$Critical\ Revenue_{t_i} = Pledged\ Revenue_{t_i} (1 - TOE)$$

**Where:**  $i = \{-6, \dots, 0, \dots, 6\}$  and  $i \in \{-6, \dots, 0, \dots, 6\}$  represents the of months of the *Post-Critical Stress Period*.

### Equivalence between the TOE and the Credit Rating of the SD

The rating of the SD is related to the value of the TOE through an equivalence. The relationship between the TOE calculated in the financial flows model and the rating level is determined based on Table 3.



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**Table 3: Ratings to TOE**

Credit Ratings	TOE Ranges
HR AAA (E)	[ 77.5% , 100% ]
HR AA+ (E)	[ 71.5% , 77.5% )
HR AA (E)	[ 65.5% , 71.5% )
HR AA- (E)	[ 59.5% , 65.5% )
HR A+ (E)	[ 52.5% , 59.5% )
HR A (E)	[ 45.5% , 52.5% )
HR A- (E)	[ 38.5% , 45.5% )
HR BBB+ (E)	[ 31.5% , 38.5% )
HR BBB (E)	[ 24.5% , 31.5% )
HR BBB- (E)	[ 17.5% , 24.5% )
HR BB+ (E)	[ 16.0% , 17.5% )
HR BB (E)	[ 14.0% , 16.0% )
HR BB- (E)	[ 12.0% , 14.0% )
HR B+ (E)	[ 10.0% , 12.0% )
HR B (E)	[ 8.0% , 10.0% )
HR B- (E)	[ 6.0% , 8.0% )
HR C+ (E)	[ 4.0% , 6.0% )
HR C (E)	[ 2.0% , 4.0% )
HR C- (E)	[ 0.0% , 2.0% )

Source: HR Ratings.

This table shows the intervals or ranges within the curve on a scale of 0% to 100%, with which HR Ratings will determine the credit rating based on the value of the TOE.

However, if in an annual review or during the follow-up process, it is identified that the TSR has changed to another rating range as a result of the analysis conducted, HR Ratings may maintain the rating or modify its attribute by considering the evolution expected of the TSR.

### Example of the TOE Calculation

In this section, HR Ratings offers an example of how the TOE is calculated, considering the variables, concepts, metrics and the process defined in the preceding section. Table 4 shows a structure in which in  $t_0$  the minimum *Primary Coverage* is 2.43x; and the Critical Stress Period is constructed around this period.

In this particular example, the *Post-Critical Stress Period* is composed of five periods and the target balance of the reserve fund is P\$25 million (m). As can be observed, the  $TOE^E$  is 80.62% and enables that the  $DSCR_{t_6}^{Primaria} = 0.49$  and the  $DSCR_{t_6}^{Secundaria} = 1.0x$ . In this case, the entire reserve fund is used during the *Critical Stress Period* and the remainders during the *Post-Critical Stress Period* are such that they allow the said fund to be replenished in full.

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Table 4: Model to determine the Target Stress Rate (TOE).

Cyclical Pledged Revenues	Debt Service	Primary DSCR	Min. DSCR	Critical Revenue (TOE)	Primary DSCR	Balance without Reserve Fund	Available Reserve Fund		Secondary DSCR	Funds remaining by the end of the period
			2.43x	80.62%			Beginning	End		
\$9,126,966	\$3,285,468	2.78x		\$9,126,966	2.78x	\$5,841,498	\$25,000,000	\$25,000,000	10.39x	\$5,841,498
\$9,128,335	\$3,334,750	2.74x		\$9,128,335	2.74x	\$5,793,585	\$25,000,000	\$25,000,000	10.23x	\$5,793,585
\$9,129,704	\$3,384,771	2.70x		\$9,129,704	2.70x	\$5,744,933	\$25,000,000	\$25,000,000	10.08x	\$5,744,933
\$9,131,074	\$3,435,543	2.66x		\$9,131,074	2.66x	\$5,695,531	\$25,000,000	\$25,000,000	9.93x	\$5,695,531
<b>\$9,132,443</b>	<b>\$3,487,076</b>	<b>2.62x</b>	<b>t-6</b>	<b>\$1,769,754</b>	<b>0.51x</b>	<b>-\$1,717,322</b>	<b>\$25,000,000</b>	<b>\$23,282,678</b>	<b>7.68x</b>	<b>\$0</b>
\$9,133,813	\$3,539,382	2.58x	t-5	\$1,770,019	0.50x	-\$1,769,363	\$23,282,678	\$21,513,315	7.08x	\$0
\$9,156,648	\$3,592,473	2.55x	t-4	\$1,774,444	0.49x	-\$1,818,028	\$21,513,315	\$19,695,287	6.48x	\$0
\$9,179,539	\$3,646,360	2.52x	t-3	\$1,778,881	0.49x	-\$1,867,479	\$19,695,287	\$17,827,808	5.89x	\$0
\$9,202,488	\$3,701,055	2.49x	t-2	\$1,783,328	0.48x	-\$1,917,728	\$17,827,808	\$15,910,080	5.30x	\$0
\$9,225,495	\$3,756,571	2.46x	t-1	\$1,787,786	0.48x	-\$1,968,785	\$15,910,080	\$13,941,295	4.71x	\$0
<b>\$9,248,558</b>	<b>\$3,812,920</b>	<b>2.43x</b>	<b>t0</b>	<b>\$1,792,256</b>	<b>0.47x</b>	<b>-\$2,020,664</b>	<b>\$13,941,295</b>	<b>\$11,920,631</b>	<b>4.13x</b>	<b>\$0</b>
\$9,271,680	\$3,812,939	2.43x	t1	\$1,796,736	0.47x	-\$2,016,203	\$11,920,631	\$9,904,428	3.60x	\$0
\$9,294,859	\$3,812,958	2.44x	t2	\$1,801,228	0.47x	-\$2,011,730	\$9,904,428	\$7,892,699	3.07x	\$0
\$9,373,865	\$3,812,977	2.46x	t3	\$1,816,539	0.48x	-\$1,996,438	\$7,892,699	\$5,896,260	2.55x	\$0
\$9,453,543	\$3,812,996	2.48x	t4	\$1,831,979	0.48x	-\$1,981,017	\$5,896,260	\$3,915,243	2.03x	\$0
\$9,533,898	\$3,813,015	2.50x	t5	\$1,847,551	0.48x	-\$1,965,464	\$3,915,243	\$1,949,779	1.51x	\$0
<b>\$9,614,936</b>	<b>\$3,813,034</b>	<b>2.52x</b>	<b>t6</b>	<b>\$1,863,255</b>	<b>0.49x</b>	<b>-\$1,949,779</b>	<b>\$1,949,779</b>	<b>\$0</b>	<b>1.00x</b>	<b>\$0</b>
\$9,696,663	\$3,813,053	2.54x		\$9,696,663	2.54x	\$5,883,610	\$0	\$5,883,610	2.54x	\$0
\$9,779,085	\$3,813,072	2.56x		\$9,779,085	2.56x	\$5,966,013	\$5,883,610	\$11,849,623	4.11x	\$0
\$9,925,771	\$3,813,091	2.60x		\$9,925,771	2.60x	\$6,112,680	\$11,849,623	\$17,962,302	5.71x	\$0
\$10,074,658	\$3,813,110	2.64x		\$10,074,658	2.64x	\$6,261,547	\$17,962,302	\$24,223,850	7.35x	\$0
<b>\$10,225,778</b>	<b>\$3,813,129</b>	<b>2.68x</b>	<b>t11</b>	<b>\$10,225,778</b>	<b>2.68x</b>	<b>\$6,412,648</b>	<b>\$24,223,850</b>	<b>\$25,000,000</b>	<b>9.03x</b>	<b>\$5,636,498</b>
\$10,379,164	\$3,813,149	2.72x		\$10,379,164	2.72x	\$6,566,016	\$25,000,000	\$25,000,000	9.28x	\$6,566,016
\$10,379,745	\$3,813,168	2.72x		\$10,379,745	2.72x	\$6,566,578	\$25,000,000	\$25,000,000	9.28x	\$6,566,578
\$10,380,327	\$3,813,187	2.72x		\$10,380,327	2.72x	\$6,567,140	\$25,000,000	\$25,000,000	9.28x	\$6,567,140

Source: HR Ratings.

With these characteristics and with a  $TOE^E = 80.62\%$ , the credit rating in this example is "HR AAA (E)". Notwithstanding, and as shown in the Table 5, the value of the  $TOE^E$  is sensitive to the extension of the *Post-Critical Stress Period*. In the case, this lapse is reduced to three period for the SD.

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**Table 5: Restriction to the Model and the Restitution of the Reserve Fund in three periods.**

Cyclical Pledged Revenues	Debt Service	Primary DSCR	Min. DSCR	Critical Revenue (TOE)	Primary DSCR	Balance without Reserve Fund	Available Reserve Fund		Secondary DSCR	Funds remaining by the end of the period
			2.43x	74.80%			Beginning	End		
\$9,126,966	\$3,285,468	2.78x		\$9,126,966	2.78x	\$5,841,498	\$25,000,000	\$25,000,000	10.39x	\$5,841,498
\$9,128,335	\$3,334,750	2.74x		\$9,128,335	2.74x	\$5,793,585	\$25,000,000	\$25,000,000	10.23x	\$5,793,585
\$9,129,704	\$3,384,771	2.70x		\$9,129,704	2.70x	\$5,744,933	\$25,000,000	\$25,000,000	10.08x	\$5,744,933
\$9,131,074	\$3,435,543	2.66x		\$9,131,074	2.66x	\$5,695,531	\$25,000,000	\$25,000,000	9.93x	\$5,695,531
<b>\$9,132,443</b>	<b>\$3,487,076</b>	<b>2.62x</b>	<b>t-6</b>	<b>\$2,301,706</b>	<b>0.66x</b>	<b>-\$1,185,370</b>	<b>\$25,000,000</b>	<b>\$23,814,630</b>	<b>7.83x</b>	<b>\$0</b>
\$9,133,813	\$3,539,382	2.58x	t-5	\$2,302,051	0.65x	-\$1,237,331	\$23,814,630	\$22,577,299	7.38x	\$0
\$9,156,648	\$3,592,473	2.55x	t-4	\$2,307,806	0.64x	-\$1,284,667	\$22,577,299	\$21,292,633	6.93x	\$0
\$9,179,539	\$3,646,360	2.52x	t-3	\$2,313,576	0.63x	-\$1,332,784	\$21,292,633	\$19,959,849	6.47x	\$0
\$9,202,488	\$3,701,055	2.49x	t-2	\$2,319,360	0.63x	-\$1,381,696	\$19,959,849	\$18,578,153	6.02x	\$0
\$9,225,495	\$3,756,571	2.46x	t-1	\$2,325,158	0.62x	-\$1,431,413	\$18,578,153	\$17,146,740	5.56x	\$0
<b>\$9,248,558</b>	<b>\$3,812,920</b>	<b>2.43x</b>	<b>t0</b>	<b>\$2,330,971</b>	<b>0.61x</b>	<b>-\$1,481,949</b>	<b>\$17,146,740</b>	<b>\$15,664,791</b>	<b>5.11x</b>	<b>\$0</b>
\$9,271,680	\$3,812,939	2.43x	t1	\$2,336,799	0.61x	-\$1,476,140	\$15,664,791	\$14,188,651	4.72x	\$0
\$9,294,859	\$3,812,958	2.44x	t2	\$2,342,641	0.61x	-\$1,470,317	\$14,188,651	\$12,718,334	4.34x	\$0
\$9,373,865	\$3,812,977	2.46x	t3	\$2,362,553	0.62x	-\$1,450,424	\$12,718,334	\$11,267,910	3.96x	\$0
\$9,453,543	\$3,812,996	2.48x	t4	\$2,382,635	0.62x	-\$1,430,361	\$11,267,910	\$9,837,548	3.58x	\$0
\$9,533,898	\$3,813,015	2.50x	t5	\$2,402,887	0.63x	-\$1,410,128	\$9,837,548	\$8,427,420	3.21x	\$0
<b>\$9,614,936</b>	<b>\$3,813,034</b>	<b>2.52x</b>	<b>t6</b>	<b>\$2,423,312</b>	<b>0.64x</b>	<b>-\$1,389,723</b>	<b>\$8,427,420</b>	<b>\$7,037,698</b>	<b>2.85x</b>	<b>\$0</b>
\$9,696,663	\$3,813,053	2.54x		\$9,696,663	2.54x	\$5,883,610	\$7,037,698	\$12,921,308	4.39x	\$0
\$9,779,085	\$3,813,072	2.56x		\$9,779,085	2.56x	\$5,966,013	\$12,921,308	\$18,887,320	5.95x	\$0
\$9,925,771	\$3,813,091	2.60x	<b>t0</b>	\$9,925,771	2.60x	\$6,112,680	\$18,887,320	<b>\$25,000,000</b>	7.56x	\$0
\$10,074,658	\$3,813,110	2.64x		\$10,074,658	2.64x	\$6,261,547	\$25,000,000	\$25,000,000	9.20x	\$6,261,547
\$10,225,778	\$3,813,129	2.68x		\$10,225,778	2.68x	\$6,412,648	\$25,000,000	\$25,000,000	9.24x	\$6,412,648
\$10,379,164	\$3,813,149	2.72x		\$10,379,164	2.72x	\$6,566,016	\$25,000,000	\$25,000,000	9.28x	\$6,566,016
\$10,379,745	\$3,813,168	2.72x		\$10,379,745	2.72x	\$6,566,578	\$25,000,000	\$25,000,000	9.28x	\$6,566,578
\$10,380,327	\$3,813,187	2.72x		\$10,380,327	2.72x	\$6,567,140	\$25,000,000	\$25,000,000	9.28x	\$6,567,140

Source: HR Ratings.

In this case, the  $DSCR_{t_6}^{Primary} = 0.64x$  and the  $DSCR_{t_6}^{Secondary} = 2.85x$ , both greater than in the case that the *Post-Critical Stress Period* were five periods. Because the example now only considers three periods to replenish the target balance of the reserve fund, the structure cannot make use of the entire fund during the *Critical Stress* and the  $TOE^E$  fell to 74.80%, which relates to a credit rating of "HR AA+ (E)".

## Particular Characteristics in the Application of the Model

### Timeline for the TOE Calculation

The analysis process is conducted throughout the period in which there is an outstanding balance of the debt acquired pending payment<sup>25</sup>. However, in order to incorporate the sensitivity of creditor faced with the weakness of a structure in coming periods, the time line in which the payment period will sought with the minimum Primary DSCR will reduce. This time line is extended over the next two macroeconomic cycles according to the Cyclical Stress generated by HR Ratings and described in the two preceding sections.

<sup>25</sup> In terms of the determination of the outstanding balance of the SD, HR Ratings shall confirm with the borrower if the amount contracted was the same as that actually drawn-down. If this information is not available, for the purposes of model, a draw-down of 100.0% of the amount contracted will be assumed. If the amount drawn-down is confirmed as being less than the amount contracted, future draw-downs must be monitored in case that the draw-down period is still valid.

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Notwithstanding this, HR Ratings considers that the structure of the amortizations may imply a credit risk that, on applying the timeline criterion, it will not be captured in the analysis, above all of the curve of these amortizations is ascending.

In order for the credit rating of the SD capture this risk and at the same time the timeline criterion be applied, the TOE analysis will be replicated considering the full term of the SD. Unfavorable qualitative adjustments may be assigned if the value of the SD that considers the full term of the SD is equivalent to one rating level below, by at least one *notch*, the rating that relates to the TOE calculated considering the timeline, which is limited to the next two economic cycles.

### Determination of the Target Stress Rate (TOE) of *Ramo 33*

This section explains the calculation process of the TOE for state debt backed by specific revenue flows from *Ramo 33*: FAFEF and FAIS. Unlike the funds of *Ramo 28*, the FAFEF and FAIS have certain rules the govern how the funds available for the payment of the state's debt obligations are calculated.

Mexican Federal legislation allows a state to allocate up to 25% of the revenue to which it is entitled annually to a SD (applicable both to the FAFEF and to the FAIS). This rule also stipulates that, for future years, the state may allocate a minimum amount equal to 25% of the revenue allocated to it in the contracting year. There, if the total amount of the funds received by the state through the FAFEF program in a future year (for example,  $t_1$ ) is lower than the total amount received in the contracting year ( $t_0$ ), the structure will receive an amount of funds at least equal to 25% of the contracting year.

In the example, if the FAFEF in a future year ( $t_1$ ) decreases by 30% in comparison with the contracting year  $t_0$  (i.e., that the funds in the reserve in  $t_1$  represent 70% of the amount of  $t_0$ ) and if the state initially allocated 25% of this fund, then 25% of the 70% will be the amount of funds equivalent for the use of the SD in  $t_1$ . Based on the foregoing, in  $t_1$  the structure would receive the amount of funds equivalent to at least 35.7% of the FAFEF of the current year.

For the calculation of the TOE, if there is a surplus amount over the minimum absolute amount guaranteed by the FAFEF or FAIM program (25%), it will be considered as a resource available within the analysis of the SD. The cause of the possible existence of a surplus amount would be the result of the projected growth, both of the FAFEF and the FAIS, in the long term.

For the calculation of the TOE, in the first place, it must be considered if the funds allocated from the payment source in the contracting year are sufficient to service the debt of the SD around the period of the minimum DSCR. Once the foregoing has been reviewed, the TOE will be calculated based on the funds available from the payment source of the reserve fund year and the other liquid resources that form part of the SD (reserve funds).

### Monetization of the Prompt Payment Guarantee (GPO)

As already mentioned, the analysis of the TOE may be extended beyond the Critical Stress Period to ensure that the future flows projected of the structure are able to meet the state's financial obligations, such as the replenishment of the reserve fund balance and/or, in the case of the GPO, any payment required by a third-party guarantee.

As long as the legal documentation permits the flows provided by a GPO to be monetized within the financial model, from a technical point of view, their existence will be considered as additional funds to service the payment of the debt. Under these circumstances, the

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analysis would be similar to a typical reserve fund and as a consequence, the periods in addition to the Post-Critical Stress Period, considered to meet the financial obligation would have an effect on the value of the TOE.

The analysis process of a GPO must always consider all its operating characteristics and conditions. Some of the characteristics that can be mentioned are: the freezing of the guarantee or the revolving nature of same once used, the mechanism to calculate the exposed amount, the level of consideration, etc. The credit rating of the guarantee must also be an important element given that it determines the effectiveness and capacity of the GOP to meet the state's obligations in conditions of stress<sup>26</sup>.

### Monetization of Derivative Financial Instruments

If the legal documentation of the SD stipulates the contracting of a Hedging Contract, specifically a CAP or a SWAP, as an obligation, HR Ratings shall include all the expenses (premiums or any other expense associated to its contracting) and, if applicable, the earnings or losses generated by these instruments within the financial projection model.

In general, Hedging Contracts are those that set the value of a financial variable (CAP) or exchange its value for another (SWAP). The hedge applies in the specific time and may involve the payment of a premium. The variables subject to hedging are, among, others, interest rates, investment units (UDI) or the exchange rate.

The terms and conditions of the contracts shall be provided by the trustor so that the modeling may adhere to the financial conditions stipulated in the legal documents. Otherwise, HR Ratings may make its projections in accordance with the prevailing market conditions.

In the same manner as occurs with the technical treatment of a GPO, the credit rating of a financial institution offered and backed by the derivative is important and must be considered by HR Ratings. In general terms, if the financial institution's credit rating (Relevant Rating) is greater than the SD's rating, the effect of the hedging will be considered in the analysis. Otherwise, if the institution's credit rating is less than or equal to the rating issued to the SD, HR Ratings will not incorporate its credit improvement within its analysis.<sup>27</sup>

### Structured Debt with Amortizations Backed by a Financial Instrument

When a state contracts an SD with a banking institution, generally with Development Banking Institutions, and the payment of the capital is backed by a Zero Coupon Bond or any other instrument (generally issued by the Federal Government), HR Ratings considers that the state only acquires the obligation to pay interest.

In these cases, both the calculation of the TOE and the determination of the Critical Stress Period will not change. However, only the amount of interest accrued throughout the term of the SD will be considered in the calculation of the debt service in each period.

If the Zero Coupon Bond associated to this financial transaction or any other instrument that performs the function of covering the entire amortization were issued by a public or private entity other than the Federal Government, HR Ratings must contemplate the issuer's credit

<sup>26</sup> For further information about the monetization process of the GPO, refers to the "Partial Guarantees for Issues of Structured and Unsecured Debt" document, published in March 2019 by HR Ratings on [www.hrratings.com](http://www.hrratings.com)

<sup>27</sup> The consideration of Relevant Ratings may be extended to insurance and bonding contracts, if any. Once more, the financial institution's rating must be granted preferably by HR Ratings; if not, HR Ratings may consider the lowest rating available in the market.

quality<sup>28</sup>. If a risk is identified, a qualitative adjustment to the rating of the SD may be proposed.

### Secondary and Substitute Payment Sources

The primary payment source is defined the funds (Federal transfers) that, having been allocated by the state, are used by the trustee to service the debt, the payment of the FISO expenses and to replenishment of the reserve funds before any other resource existing and available in the trust.

In order to improve the credit quality of an SD, it is common that the entity also offers an additional source of funds as a payment guarantee. These are known as secondary and substitute payment sources. HR Ratings has a special technical treatment for each one of them.

The secondary payment source represents a flow of funds that are fully available to the trustee for the payment of the debt service and the replenishment of the reserve fund of the SD<sup>29</sup>. In this vein, the payment source is used at all times to overcome a partial or total lack of liquidity of the primary payment source.

HR Ratings projects the flows of the secondary payment source on a par with the primary payment source, and given its characteristics, it will be used to calculate the series of Primary DSCR and as a consequence, the  $TOE^E$ . It is important to comment that during the Critical Stress Period, both sources will be subject to the reduction percentage.

There is a type of payment source, which is not secondary, but that, under certain conditions, may be used by the trustee to replenish the structure's reserve funds or if an Acceleration Event or Advanced Maturity is triggered.

In the case, HR Ratings' technical treatment of these funds is similar to that of an additional reserve. The funds would be considered available for the payment of debt capital and interest (by funding the reserve); however, neither would they be contemplated for the calculation of the Primary DSCR nor would the reduction percentage used to determine the  $TOE^E$  be applied to them. Also, unlike a traditional reserve fund, replenishing the funds used during the Post-Critical Stress Period would not be a condition within the optimization model of the  $TOE^E$ .

Lastly, in the case of substitute payment sources, their main characteristic is the fact that they are only available to comply with the payment of the debt service if the primary payment source is eliminated or substantially modified. In these cases, the elimination or change, from a legal standpoint, is a sufficient reason for the annulment of the original allocation made by the state to the SD<sup>30</sup>.

Another of the characteristics of this type of funds is that they do not always circulate within the trust accounts. In certain cases, if the substitution of the primary payment source is required, the trustee or other authorized entity must issue an instruction to release the funds to the SD.

In the preceding examples, it is assumed that the origin of both the primary and the additional payment sources is Federal. However, there are cases in which a state offers a

<sup>28</sup> If HR Ratings has not rated the issuer of the Zero Coupon Bond, the lowest rating in the market shall be used.

<sup>29</sup> HR Ratings considers that the fact that the flow circulating through the FISO ensures greater credit strength; otherwise, the trustee's access (operatively and administratively) to this resource will be analyzed. If limitations are identified, a qualitative adjustment may be assigned.

<sup>30</sup> There are clauses in this regard in certain trust contracts, which stipulate the mechanisms or steps to be taken if the primary payment source ceases to be allocated.



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Federal fund as a primary payment source and an own fund as an additional payment source (secondary or substitute) or vice-versa<sup>31</sup>.

If the primary source is of Federal origin and the state offers a secondary payment source of own origin as a guarantee, three possible cases will arise.

- Federal primary source and own secondary source: In this case, Federal funds will be projected in accordance with this methodology, whereas own revenues will be projected based on the addendum that explains the projection method<sup>32</sup>. The minimum Primary DSCR will be determined once both series of future flows have been constructed. The sum of both funds would also be subject to the percentage reduction process to determine the  $TOE^E$ .
- The primary Federal source and own revenues that will only be used to replenish the reserve fund in an Acceleration or Advanced Maturity Event: Under these circumstances, the projection of own revenues would not be considered for the calculation of the Primary DSCR nor would the reduction percentage used to determine the  $TOE^E$  be applied to them. However, they will have an impact on being funds available in the calculation of secondary hedging, without the need for the obligation of replenishment at the end of the Post-Critical Stress Period.
- Federal primary source and own substitute source: Once again, Federal funds will be projected in accordance with this methodology and own revenues will be projected based on the respective addendum. Under these circumstances, although the own revenues flows are projected, they will not be considered for the calculation of the minimum Primary DSCR or the calculation of the  $TOE^E$ . This process enables HR Ratings to establish the strength of the substitute source.

For the first and second cases, HR Ratings may conduct an additional analysis process in order to evaluate the probable credit improvement of the SD due to having a Federal payment source and own revenues (funds diversification factor). In these cases, a qualitative adjustment on credit rating of the SD may be incorporated.

## Credit Rating and Qualitative Adjustments

The credit rating of the SD is based on the value of the TOE, and if any factors that can be incorporated into the quantitative model are identified, they will be incorporated through Qualitative Adjustments. These factors are atypical and this section describes which may be considered and which possible impacts each may have on the credit rating.

### Adjustments Related to the Entity's Unsecured Rating

This factor can be analyzed in three different ways. The first refers to the fact that the unsecured rating of a contracting entity is below "HR BBB-"<sup>33</sup>. The second refers to the possibility that the SD contemplates, either implicitly or explicitly, the funds of a second sub-national entity. The third refers to that the entity's rating shows a high credit quality, thus

<sup>31</sup> For the purposes of this methodology and its addenda, "own revenues" is defined as all funds collected and generated by the state's own economic activity.

<sup>32</sup> The technical treatment of own revenues as a payment source (in particular the projection process of future flows) is explained in the document: *Structured Debt of Subnational Entities and OPDs: Addendum to the Own-Revenue Backed Debt Methodology*, available at: [www.hrratings.com](http://www.hrratings.com).

<sup>33</sup> The rating level established in this section refers to an SD the debt of which is backed by Federal transfers.

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offering certainty regarding the timely payment of its debt obligations in the specific cases in which there is the possibility that a state contributes funds in stress situations of the SD.

### Unsecured Rating of the State below “HR BBB-”

In relation to the first possibility, there are three scenarios based on the unsecured rating of a contracting state and on the existence or not of an implicit or explicit guarantee on its part<sup>34</sup>. This guarantee or recourse is relevant on considering situations or high financial stress that increase the liquidity risk of the SD.

- The unsecured rating of the state is equal to or greater than “HR BBB-” and the SD does not have funds provided by the state, which would be established in the legal documentation. In said case, the unsecured rating is not a relevant factor for the rating of the DE; therefore, a structure may be granted a lower rating than the state. In this case, there would be no qualitative adjustment.
- The unsecured rating of the state is equal to or greater than “HR BBB-” and the structure has funds provided by the state. In this case, an unsecured rating represents a floor for the credit rating of the SD.
- The unsecured rating of the state is below “HR BBB-” In this case, the fund provided by the state is irrelevant because it is assumed that the state with this rating would have difficulties to respond to its debt in situations of high economic stress. Additionally, it may be assumed that the state would seek to restructure its debt or amend the legal documentation to make use of the cash allocated by the trust, which would weaken the credit quality of the SD. Therefore, if the rating of the SD is higher than the state’s rating, HR Ratings will propose an unfavorable adjustment, of one *notch*, the rating of the SD.

### Funds Provided by a Second State.

In terms of the second possibility, which considers that the SD has Federal revenues as a payment source and their funds toward the contracting state, and in addition, there is another guarantee of a second sub-national entity, HR Ratings shall proceed as follows.

- In the funds are liquid and circulate through the payment trust’s accounts (i.e., there is an allocation), HR Ratings shall monetize these funds within the calculation of the TOE<sup>35</sup>.
- If the fund are not liquid, but they do guarantee the payment of all the financial obligations of the SD contracted by the state, an adjustment will only be proposed if the Federal Government is the guarantor. In this case, the SD will be matched to the Federal Government’s credit rating.

### Unsecured rating with a high credit quality

Finally, the third possibility establishes a criterion that relates the rating of the SD with the unsecured rating of the state when both reflect credit strength and the legal documentation admits funds from the state. The criterion establishes a positive adjustment on the credit rating of the SD if it is equal to or below the rating of the state if and only if, the SD, as well as contemplating the existence of funds to the state, it complies with certain financial conditions.

- If the rating of the SD is below the unsecured rating, then the structured rating will be the same as the rating of the state.

<sup>34</sup> Unlike bank loans, in most cases securities issues do not have a guarantee or recourse in terms of additional funds provided by the issuer.

<sup>35</sup> In this situation, it must be borne in mind that the guarantee does meet any of the assumptions of the section “Secondary or Substitute Payment Sources”. The fact that the unsecured rating of the second entity is below “HR BBB-” will also be considered.

- If the rating of the SD is equal to the state's rating, the minimum financial conditions necessary to make a favorable adjustment are as follows:
  - The SD must have a legal opinion that considers that the trust is valid, enforceable, opposable against third parties and its implementation is adequate.
  - Throughout its term, the SD must have an annual minimum Primary DSCR of 2.0x<sup>36</sup>.
  - Throughout its term, the SD must have a minimum annual reserve fund equivalent to 1.0x of the debt service.
  - The SD must not have contractual clauses that significantly increase its credit risk.

It is important to emphasize that the favorable adjustment described in this section requires that the legal documentation of the structure admits that the state contribute funds in financial stress situations.

### Adjustments Related to Contractual Affirmative and Negative Covenants

If for any reason the legal documentation of the SD links the credit risk of the structure with any risk not related to its operation, HR Ratings shall evaluate the potential impact on the credit quality of the SD. This type of risks, typically, are described in the section of the loan contract or issue instrument related to the Affirmative and Negative Covenants Clause ("Covenants") and that, on being signed by the parties involved, have been committed to be performed.

For HR Ratings, the potential risks represented by these obligations are not associated to their mere existence, but to the possible triggering of an "Advance Maturity" event if the state defaults on any clause<sup>37</sup>.

For the purposes of this methodology, an "Advance Maturity" event means that the creditor (banking institution or the investing public) has the authority to request immediate payment of the entire amount of principal pending and the interest accrued of the debt, as well as any other obligation agreed by the state. In HR Ratings' opinion, if the creditor decides to trigger this type of event, the rating of SD may be affected because it would be possible that the state would not have the liquidity required to meet said obligation at that time.

The Affirmative and Negative Covenants that HR Ratings has identified in the legal documentation of the different SD include: 1) maintaining a minimum level of primary DSCR ; 2) maintaining the target balance of the reserve fund; 3) compliance by the state with certain public finance metrics; 4) maintaining a minimum rating of the states and/or the SD; 5) contracting financial derivatives; 6) the obligation to send information on public financial to a third party involved in the transaction, and 7) the cross-maturity with other financial obligations maintained by the states triggered by default<sup>38</sup>.

The credit risk of default on the aforementioned clauses may not be quantified. Although the analysis may be focused on the probability of the occurrence of the event. Typically, the

<sup>36</sup> The value of the Primary DSCR projected may be rounded to the unit to the same as the value of the reserve fund.

<sup>37</sup> The default on one of these obligations not only may trigger an "Advance Maturity" event, but there may also be Preventive Events or Acceleration Events (partial or total). In these latter two cases, the effect on the credit quality of the SD is quantifiable and is typically reflected in the value of the TOE.

<sup>38</sup> This type of clauses refer to that the default on the payment of another valid financial obligation and recognized by the state may give rise to the declaration of default on payment of the SD rated by HR Ratings. the definition of financial obligation may include direct or contingent debt, short-term debt, structured debt or any other type of liability, obligations within same or different payment trusts, or with itself or other creditors.

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contracts or issue instruments stipulate that default on one or several of these obligations by the states does not automatically trigger an Advanced Maturity event, but that the decision is taken by the creditor bank or by the meeting of holders based on the circumstances.

The qualitative adjustment will be based on HR Ratings' perception and experience of the probability that the bank or holders' meeting trigger an Advanced Maturity. Different rating actions may be taken in these cases, from the change of attribute to an unfavorable adjustment in terms of *notches*. The foregoing is due to that the triggering of an Advanced Maturity event typically considers a cure period or, if it were to materialize, would lead to the state being declared as incapable of paying the obligation demanded from it in full. As a consequence, failing to pay the obligation would lead to the SD rating being at time the equivalent to HR D (E).

Table 6 explains how the adjustments will be applied if there are cross-maturity clauses related to events of default or even with the affirmative and negative covenants, which at the discretion of HR Ratings substantially increase the ratings of the triggering of a maturity:

**Table 6: Advance Maturity**

Affirmative and Negative Covenants	
	<b>Maturity not related to an event of non-payment</b>
	A notch may be deducted in cases in which covenants that substantially enhance the risk of triggering Advance Maturity exist.
	<b>Cross-Default related to an event of nonpayment</b>
	A notch may be deducted in cases in which covenants that are related to short-term debt (with any financial institution) exist.*
	A notch may be deducted in cases in which covenants that can be trigger if any liability is registered in the Credit Bureau.*

Source: HR Ratings.

\*The adjustment is only applicable in the cases in which the entity's credit rating is below HR AA- (E).

It is important to clarify that the credit rating of an SD may accumulate a downgrade of at least three *notches* in cases that present the risks proposed in Table 6 simultaneously and those in which the rating of the state is equal to or less than "HR A+", or its market equivalent. In the event that the rating is greater than or equal to "HR AA-", or its market equivalent, the SD may only be downgraded and by only one *notch*, when there are clauses that are not connected with events not related to default but do increase the risk of triggering an Advanced Maturity.

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Guillermo González Camarena No. 1200, Piso 10, Colonia Centro de Ciudad Santa Fe, Delegación Álvaro Obregón, C.P. 01210, Ciudad de México. Tel 52 (55) 1500 3130.  
United States: One World Trade Center, Suite 8500, New York, New York, ZIP Code 10007, Tel +1 (212) 220 5735.

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The ratings and/or opinions issued by HR Ratings consider an analysis of the relative credit quality of an entity, issuer and/or issue; therefore, they do not necessarily reflect a statistical probability of default on payment, this being understood as the impossibility or the lack of will of an entity or issuer to perform its contractual payment obligations. Creditors and/or holders may then be forced to take measures to recover their investments, which may even include restructuring the debt due to the stress situation faced by the debtor. Notwithstanding the foregoing, to grant greater validity to our credit quality opinions, our methodology considers stress scenarios as a complement to the analysis prepared on a base scenario. The fees paid to HR Ratings by issuers generally vary from US\$1,000 to US\$1,000,000 (or the equivalent in local currency) per issue. In some cases, HR Ratings will rate all or some of the issues of a particular issuer for an annual fee. The annual fees are expected to vary between US\$5,000 and US\$2,000,000 (or the equivalent in local currency).

### Contacts

#### Roberto Ballinez

Public Finances and Infrastructure Sr.  
Executive Director  
roberto.ballinez@hrratings.com

#### Roberto Soto

Public Finances and Infrastructure  
Director  
roberto.soto@hrratings.com

#### Luisa Adame

Public Finances Manager  
luisa.adame@hrratings.com

#### Alfonso Sales

Methodological Criteria Associate  
Director  
alfonso.sales@hrratings.com

#### Mauricio Prieto

Methodological Criteria Sr. Analyst  
mauricio.prieto@hrratings.com

#### Pedro Latapí

Chief Credit Officer  
pedro.latapi@hrratings.com

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**This addendum describes the process followed by HR Ratings to evaluate the credit quality of the Structured Debt of the Mexican states, municipalities and decentralized public bodies (OPDs) backed by their own revenues.**

This methodology addendum outlines the process used in the evaluation of the credit quality of the debt of the states, municipalities and decentralized bodies of the United Mexican States acquired through irrevocable trusts (as Structured Debt, SD) and that are paid by own revenues. The credit risks evaluation model maintains the main assumptions put forward in the Master Methodology: *Structured Debt of Mexican States: Federal-Transfers Backed Debt Methodology*.

### Description of the Master Methodology

The model that describes the Master Methodology is based mainly on a quantitative exercise that measures, in a specific period, the maximum reduction resisted by the revenue pledged to the SD under the condition of meeting all its payment obligations. This reduction determines the credit rating, although under specific circumstances, the rating may vary in terms of notches due to Qualitative Adjustments.

With the projection of the pledged revenues, considering HR Ratings' Macroeconomic Scenarios and the debt service in each period; the model identifies the minimum debt coverage, and based on this, applies an additional stress to the projected revenues over a period of thirteen months. The Target Stress Rate (TOE) measures the maximum reduction that the structure will withstand in said period. The model also considers the use of all the funds available in the trust, but establishes the condition that the funds used shall be replenished with the funds remaining from the later operation.

The methodology describes the use of the Prompt Payment Guarantee, financial hedging instruments and secondary and/or substitute sources of payment. The methodology also describes the items identified through a legal opinion provided by an external legal firm and the process will be conducted if there is any update of said opinion.

### Description of this Methodology Addendum

In this addendum, the own revenues of the state will be used as a payment source of the debt service. These revenues are projected based on economic factors that refer to the sensitivity of the payment source to changes in the income of the target population subject to the tax or duty, or changes to consumption patterns due to fluctuations in the prices of different goods and services. Regarding financial factors, the historical trends of the sources of payment are analyzed, as well as a volatility and seasonality analysis. The operating capacities of decentralized bodies to provide service and their collection capacities are analyzed. Several operating or administrative factors that may have an impact on the credit rating of the SD are also included in the analysis. These factors include failures in the coordination mechanisms that enable the state or a third party to collect the revenue pledged and transfer it to the payment trust that serves the debt. Factors such as the periodic compatibility of the deposits into the trust and the dates stipulated for the debt service are also considered.

As part of the quantitative analysis, a specific treatment is offered for the SD of municipalities that use any type of funds generated by the state entity as a secondary payment source. This process would also be applicable to any SD with a payment source from any own revenue generated by another state and in the cases in which the origination of said funds is not clearly defined.

Lastly, Qualitative Adjustments may be included based on the unsecured rating of the state, municipality or any third party capable of contributing funds to the trust or may have any effect on the isolation of the payment source.



# Structured Debt of Subnational Entities and OPDs

## Addendum to the Own-Revenue Backed Debt Methodology

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### Introduction

This addendum is based on the Master Methodology: *Structured Debt of Mexican States: Federal Transfers-Backed Debt Methodology*, which describes the process used by HR Ratings to evaluate the debt structures acquired through irrevocable trusts with Federal funds as a payment source<sup>1</sup>.

This addendum describes the evaluation process of Structured Debt (SD), also based on irrevocable trusts, but those in which the flow pledged by the debt service comes from the own revenues of the states, municipalities, decentralized public bodies and semi-state companies.

HR Ratings' rating process for these SD is like the process described in the Master Methodology. The minimum Primary Hedging is identified with the revenue pledged and the debt service projected, and the Critical Stress Scenario is constructed in said period. In this period, revenue will be reduced through Target Balance Stress Rate ( $TOE^E$ ) with which the structure reaches the limit point at which it may comply with its payment obligations. The  $TOE^E$ , which solves the problem of optimization, guarantees that the reserve fund will be replenished after use in a specific time that the methodology identifies as the Post-Critical Stress Period.

In conceptual terms, the difference from the Master Methodology refers to the process through which HR Ratings projects pledged revenue for the debt service. In this case, the revenue does not come from Federal Participations or Contributions, but from all the funds that the state can tax or collect, such as taxes or duties, considerations for the operation of any decentralized body and even from the distribution to state funds to the municipalities. The most common sources of revenue that may be evaluated with this addendum are listed as follows:

- Payroll taxes;
- Vehicle taxes;
- Income from the operation of Federal or state concessions;
- The State Municipal Strengthening Fund (FEFOM) of the State of Mexico.

HR Ratings will project the source of Revenue, as well as the debt service, the reserve funds involved, sundry expenses and any other component included in the SD under different scenarios. The macroeconomic variables included in them are developed by HR Ratings' Economic Analysis Department and typically use: the Gross Domestic Product (GDP); the National Consumer Prices Index (INPC), its growth and the value of the Investment Unit (UDI) and several interest rates such as the TIIE<sub>28</sub> and the TIIE<sub>91</sub> Interbank Equilibrium Interest Rates.

The scenarios can also incorporate assumptions on the growth of the payment source pledged. Due to the diversity of the sources of payment available, HR Ratings does not offer a mechanism in this document to project every possible source. Instead it describes the analysis of the characteristics and the process to establish the assumptions to be made to develop its projections.

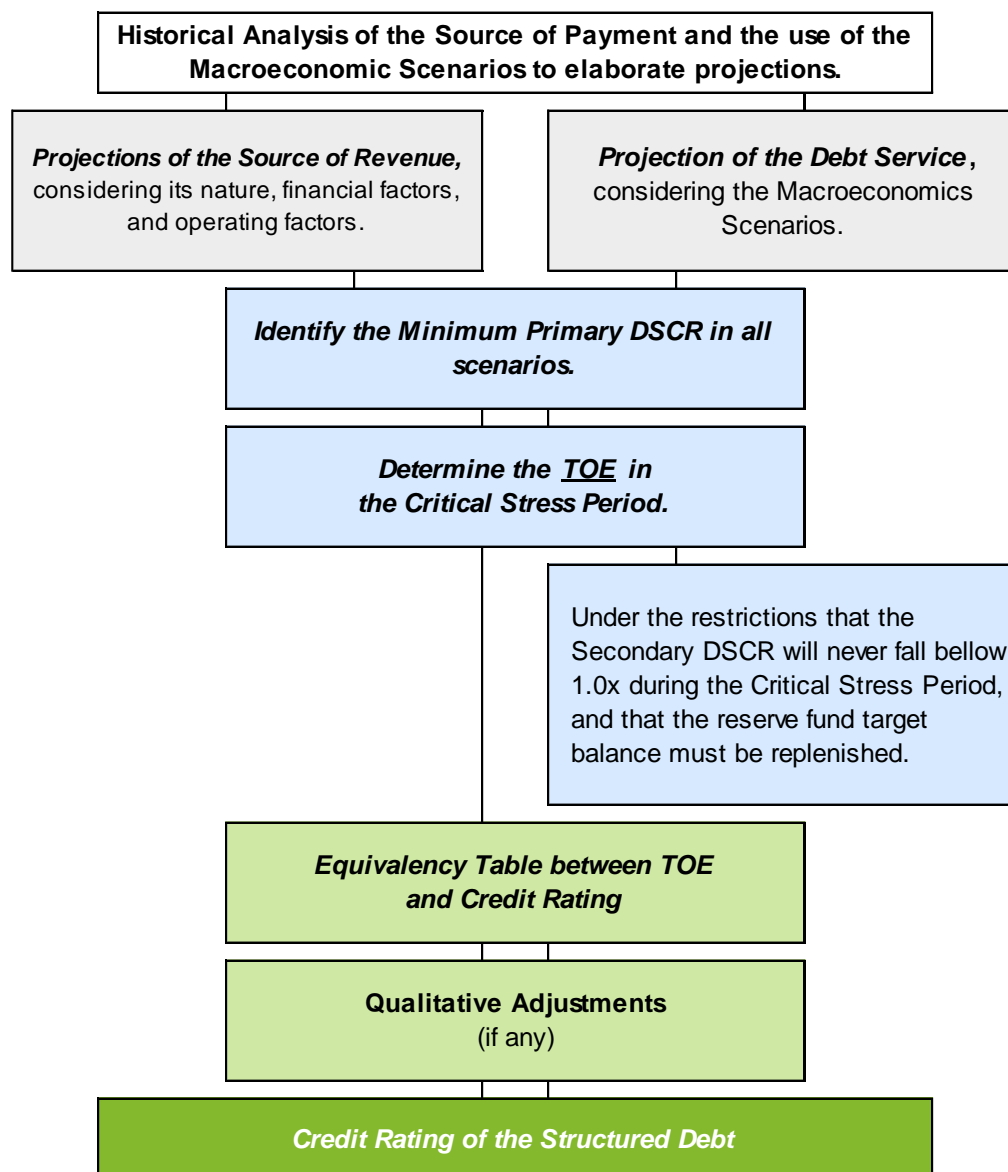
Typically HR Ratings starts from a historical analysis of the payment source, focusing on trends, volatility and seasonality. The evaluation must also include an analysis of the nature of the tax or duty, the revenue, and the demographic mobility of the population subject to

<sup>1</sup> The Master Methodology: *Structured Debt of Mexican States: Federal-Transfers Backed Debt Methodology*, as well as the addendum applicable to the structured debt of Mexican municipalities, can be found at the following link: <https://www.hrratings.com/methodology/>.

collection, the tax rate, the object taxes, the mechanisms and the revenue flow movement, the frequency of payment, among other factors.

Table 1 shows the general structure of this methodology addendum, which begins with the analysis of the macroeconomic, financial and operative factors that may influence the projection of a payment source:

**Table 1: HR Ratings' Evaluation Process**



Source: HR Ratings.

All these factors are considered in the development of the projections under the conditions of diverse Macroeconomic Scenarios, such as the Low Growth and Low Inflation Scenario or the Scenario of Stagflation, prepared by the Economic Analysis Department, and the

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projection that, given the conditions of the payment source, offers the best stress possible in terms of hedging, will be used.

With projection of the pledged revenue, the debt service projection and the  $TOE^E$  that results from the problem of optimization; HR Ratings determines the credit rating of the SD evaluated. But, in the same way as the Master Methodology, this addendum allows qualitative adjustments, in terms of notches, based on specific factors that cannot be quantified.

The factors that may merit a qualitative adjustment refer to the specific weaknesses of the payment source; for example, an operative aspect that may affect the transfer capacity of the funds to the payment trust. The unsecured rating of the state, municipality, decentralized body is also considered, as well as the entity responsible for generating the fund pledged as a payment source. These concepts may even be considered simultaneously. This analysis is relevant because in periods of economic or political stress, incentives may be generated to undermine the isolation of the source or payment or eliminate it, such as in the cases of a tax or fee pledged.

Among the items that this addendum includes from the Master Methodology, in addition to the quantitative revenue reduction process, there is the need for an external legal opinion that evaluates if the trust is valid, enforceable, opposable against third parties and if its implementation is adequate. This would enable HR Ratings to continue with its rating process.

### Quantitative Analysis Process

This first section outlines the macroeconomic concepts that will be common in the construction of scenarios to project the payment source, the debt service and other items such as the reserve fund and relevant expenses. The aspects specific to the operation of the SD and that may have a negative effect on the flow of funds to the fund to service the debt will be described. Lastly, the quantitative process to determine the  $TOE^E$  and the credit rating of SD is described, as explained in the Master Methodology. Additionally, the addendum describes the specific treatment of the SD used as part of its payment source to the State Municipal Strengthening Fund (FEFOM) of the State of Mexico.

### The Economic and Financial Factors Considered in the Construction of the Base Scenario and the Stress Scenario

The procedures stipulated in the Master Methodology are inherited in the determination of the flow of pledged revenue and the debt service. These relate to the following variables: 1) rate of inflation, 2) Gross Domestic Product (GDP), and 3) interest rates. These variables are projected by HR Ratings' Economic Analysis Department for a Base Scenario, a Low Growth and Low Inflation Scenario or a Scenario of Stagflation. The variables included in these scenarios will be used only in the cases where they are relevant and their use will be justified in the analysis report, as well as the main risks relating to these projections.

The historical trend of each payment source will be analyzed with an emphasis on identifying the behavior of the source in previous periods of stress. An analysis is also conducted of the volatility of the revenue, emphasizing two factors: the annual growth in different periods (monthly, quarterly, half-yearly and annually) and the predictability of seasonality.

There are aspects that may be specific to one payment source. In the case of a tax or fee on a good or service, the sensitivity of a consumption pattern when faced with changes in

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the revenue of the target population must be identified, or changes in the population itself. If changes in the prices of certain goods that may be revealed as substitutes or complements have any effect on taxation must also be identified.

In cases in which the revenue is originated by a decentralized body, its capacity to generate earnings must be evaluated. This includes the efficiency of collection and ensuring coverage to the target population. The analysis report will list each factor included in the projection of the payment source and will detail the impact that each one may have on the respective scenario.

### **The Operative Factors Considered in the Construction of the Base Scenario and the Stress Scenario**

This section outlines some of the factors that apply only to the debt structure and that may have a direct effect on the flow of funds received by the payment trust directly.

For example, the collection mechanisms of the payment source will be evaluated. These are particularly relevant in cases in which any figure not related to the state generates the revenue or if the payment source is originated or collected by more than one state. The operative and administrative coordination mechanisms must be clearly documented, as well as the route the payment source will follow. If HR Ratings considers that the mechanisms are not viable in operative and administrative terms or are not clearly stipulated in the legal documentation, the performance of the source or payment may be projected with an unfavorable bias.

In the same manner, the rules, the legislation or the contracts that allow the funds to be generated will be monitored continuously to determine if any change may have any effect on the volume or the flow of the payment source. This refers to the political risk that may be quantified in HR Ratings' projections.

The compatibility between the collection periods and the debt service periods is also relevant. If the trust receives the funds sufficiently in advance, the operative risks that affect the flow of the source itself may be mitigated. This is particularly relevant in cases in which there is one or more third parties not related to the state, who are responsible for collecting the payment source.

In the case of fees or taxes in which the user may pay through financial institutions or self-service establishments, the feasibility that the source or payment arrives promptly and completely to the trust that services the SD must be evaluated based on the historical performance and operating capacity of these institutions.

As stipulated in the preceding section, the analysis report will list each fact incorporated in the projection of the payment source and will detail the impact that each may have on the projection of the payment source in the scenarios.

### **Determination of the Target Stress Rate (TOE, Spanish acronym)**

The Debt Service Coverage Ratio (DSCR) is obtained once the revenue pledged and the debt service are determined. The analysis of this item is conducted based on the Master Methodology.

The TOE is calculated using the optimization process, which, like the Master Methodology, has the TOE as a variable "target". The full payment of the respective debt service is a restriction, which would be reflected in a Secondary Coverage (those that include the

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reserves) equal to or greater than 1.0x. The second condition is this process is that the reserve fund is replenished to its target balance within a set period after its use. The macroeconomic variables that will be used in this process will be those used in the Stress Scenario that reflects the most adverse financial conditions for the SD.

The TOE represents the maximum-possible stress that the payment source pledged, in favor of the SD, may withstand without falling into default and allowing the replenishment of the reserve in accordance with the conditions stipulated by the Master Methodology. If SDs are identified in which no reserve fund is contemplated, the metrics of the Primary and Secondary Coverages will be matched and would be stressed until the lower of their values reach the unit.

The  $TOE^E$  allows, through an assignment curve, the Credit Rating of the SD to be determined. This curve is shown in the addendum: *Structured Debt of Mexican Municipalities: Addendum to the Federal-Transfers Backed Debt Methodology*. This curve will also apply to the SD that has multiple sources of payment, provided that the primary source is Own Revenue. However, if in an annual review or during the follow-up process, it is identified that the TOE has changed to another rating range as a result of the analysis conducted, HR Ratings may maintain the rating or modify its attribute by considering the evolution expected of the TOE. Said situation will be justified in the analysis report by presenting the financial strengths or weaknesses produced by our projection model.

The analysis process is conducted throughout the period in which there is an outstanding balance of the debt acquired pending payment<sup>2</sup>. However, in order to incorporate the sensitivity of creditor faced with the weakness of a structure in coming periods, the timeline in which the payment period will sought with the minimum Primary DSCR will be reduced. This timeline is extended over the next two macroeconomic cycles according to the scenarios generated by the Economic Analysis Department. Under the criteria set in the Master Methodology, the analysis will be extended to the rest of the term of the SD.

### The State Municipal Strengthening Fund (FEFOM) of the State of Mexico

This section describes the calculation of the TOE for the SD contracted for the municipalities of the State of Mexico when the primary payment source is Federal Participations from Branch 28 (or any of its sub-accounts) and the secondary or subsidiary source are funds from the State Municipal Strengthening Fund (FEFOM), which are generated by the State of Mexico itself.

In contrast with the funds from Branch 28 and/or Branch 33, which are transferred by the Mexican Federal Government (HR AAA, on the local scale) to the 32 States of the Republic, the FEFOM funds are originated, allocated and transferred by the State of Mexico to each of its municipalities. The origin of the funds and the distribution method are determined by the State of Mexico in accordance with internal standards and criteria, which may be modified year to year. Therefore, no municipality has control over the amount of these funds.

Due to that the FEFOM is originated by the State of Mexico, the credit quality of which below that of the Federal Government, HR Ratings' analysis incorporates an additional stress factor through a modification in the TOE calculation method. The resulting problem of optimization is as follows:

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<sup>2</sup> In terms of the determination of the outstanding balance of the SD, HR Ratings shall confirm with the borrower if the amount contracted was the same as that actually drawn-down. If this information is not available, for the purposes of model, a draw-down of 100.0% of the amount contracted will be assumed. If the amount drawn-down is confirmed as being less than the amount contracted, future draw-downs must be monitored in case that the draw-down period is still valid.

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Calculate the  $TOE^E$

Subject to:

- 1)  $(1 - TOE) \sum_{t=1}^{13} FGP_t + (1 - Z) \sum_{t=1}^{13} FEFOM_t + FR_{t=1} \geq \sum_{t=1}^{13} SD_t$
- 2)  $Y = f(TOE)$
- 3)  $Z = TOE + Y$
- 4)  $FR_{T+n} = SO_{T+n}$

Where:

$TOE$ : Percentage of reduction applicable to PPS (Primary Payment Source).

$Y$ : Additional stress factor of FEFOM (Subsidiary Payment Source).

$Z$ : Percentage of reduction applicable to FEFOM (Subsidiary Payment Source).

$FGP_t$ : Pledged Revenue of PPS in month  $t$ .

$FEFOM_t$ : Pledged Revenue of FEFOM in month  $t$ .

$T$ : Number of months of Critical Stress Period (13 months).

$FR_t$ : Reserve fund in month  $t$ .

$SD_t$ : Debt service in month  $t$ .

$SO_T$ : Target Balance of Reserve Fund in month  $T$ .

$n$ : Number of months of Post-Critical Stress Period.

In the same manner as in the rest of the structures, the month with the minimum Primary DSCR expected in the cyclical stress period will be determined. The Critical Stress Period will be established around this month, in which a differentiated reduction will be applied as follows:

a) the reduction for the Primary Payment Source (PPS) will be calculated using the  $TOE$  model. This reduction will determine the additional stress factor to be applied to the Secondary or Subsidiary Payment Source (FEFOM),

b) once the additional stress factor is determined, the reduction on the FEFOM will be defined as the sum of the level of reduction of the PPS, plus the additional stress factor. In such a manner that the reduction of the FEFOM will depend on the reduction of the PPS.

The  $TOE^E$  is the maximum percentage of reduction that solves the problem. It is important to mention that its value must guarantee the replenishment of the target balance of the reserve fund once the Critical Stress Period ends, in accordance with the Master Methodology. Based on the foregoing, the credit rating of the SD will be based on the differentiated reduction applied to the PPS and the FEFOM. The value of " $Y = f(TOE)$ " may vary based on the value of " $TOE^E$ ", as shown as Table 2.



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Table 2: Values of $Y = f(TOE)$			
Ratings	Min. V.	TOE Range	$Y = f(TOE)$
HR AAA (E)	85.0%	[ 0.850 , 1.000 )	0.070
HR AA+ (E)	78.0%	[ 0.780 , 0.850 )	0.070
HR AA (E)	71.0%	[ 0.710 , 0.780 )	0.070
HR AA- (E)	64.0%	[ 0.640 , 0.710 )	0.070
HR A+ (E)	56.4%	[ 0.564 , 0.640 )	0.076
HR A (E)	48.8%	[ 0.488 , 0.564 )	0.076
HR A- (E)	41.2%	[ 0.412 , 0.488 )	0.076
HR BBB+ (E)	33.6%	[ 0.336 , 0.412 )	0.076
HR BBB (E)	26.0%	[ 0.260 , 0.336 )	0.076
HR BBB- (E)	18.4%	[ 0.184 , 0.260 )	0.076
HR BB+ (E)	16.0%	[ 0.160 , 0.184 )	0.024
HR BB (E)	14.0%	[ 0.140 , 0.160 )	0.020
HR BB- (E)	12.0%	[ 0.120 , 0.140 )	0.020
HR B+ (E)	10.0%	[ 0.100 , 0.120 )	0.020
HR B (E)	8.0%	[ 0.080 , 0.100 )	0.020
HR B- (E)	6.0%	[ 0.060 , 0.080 )	0.020
HR C+ (E)	4.0%	[ 0.040 , 0.060 )	0.020
HR C (E)	2.0%	[ 0.020 , 0.040 )	0.020
HR C- (E)	0.0%	[ 0.000 , 0.020 )	0.020

Source: HR Ratings.

The problem of optimization explained in this section shall be applicable to any SD with a secondary payment source generated by the own revenue of another state (for example, through budgetary items). Under these circumstances, it is probable that neither the amount not the distribution method are known or are under the control of the municipality, but instead are defined the second state.

## Credit Rating and Qualitative Adjustments

There are relevant factors that cannot be incorporated quantitatively into the analysis; therefore, they are considered as Qualitative Adjustments within the process. These factors are atypical and there are specific guidelines for them to be considered in the credit rating of the SD.

Typically, the Qualitative Adjustments incorporate the analysis of the unsecured rating of the state and the possibility that the state contributes funds directly to the trust. The existence of funds from the state may be taken into account in the case of the municipalities, and in the case of decentralized bodies, funds from the state or any municipality may be considered, as applicable.

The isolation of the payment source must be considered in the case for debt backed by own revenues; i.e., measuring the capacity to alter the operation of the trust in accordance with the terms of the initial contract. An evaluation is conducted to ensure that the state or municipality maintains the power or intention to channel the funds pledged to any other activity, or if applicable, to change the nature of the revenue used as a payment source.

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The interaction of these three variables (funds, unsecured rating and isolation of the payment source) allows the evaluation of the quality of the revenue pledged and the possible incentives that a state may have to make use of these funds in any stress situation.

In terms of the existence of the funds from the state, its credit rating and the adequate isolation of the payment source, three cases may be considered:

**Case 1:** If the payment source has been determined as adequately isolated, the states involved do not offer any type of fund, the unsecured rating of the state in question is equal to or greater than HR BBB. Then the credit rating will tend to be that determined through the *TOE<sup>E</sup>*.

**Case 2:** If the payment source has been determined as adequately isolated, at least one of the states involved offers some type of mechanism to contribute funds to the trust, if necessary, said state will be granted a rating equal to or greater than BBB. Then the minimum value of the credit rating of the SD will be equivalent to the maximum of the unsecured ratings that offer funds, subject to the state in question being able to cover the respective debt service correctly and promptly.

**Case 3:** If the payment source has been determined as adequately isolated, but the unsecured rating of the state is below HR BBB. Then, considering the state's fund as a non-relevant variable, the pressure that said state perceives to restructure its debt given the pledged revenue must be evaluated. This would be reflected in an unfavorable adjustment of one notch on the credit rating of the SD.

Unlike the Master Methodology, the reference value for the qualitative adjustments due to the unsecured rating of the state is HR BBB, one notch above that stipulated to reflect the additional risk that the payment source does not come from Federal transfers. This will also apply in cases in which there are multiple payment sources, even when some of them come from Federal transfers.

HR Ratings may also assign a favorable qualitative adjustment of one notch to an SD that has a source of revenue composed of own revenues and a Federal transfer. In order to be able to assign this adjustment, two conditions must be met simultaneously: (i) the first refers to the strength or weakness of the source of revenue, which are aspects that cannot be captured through the quantitative model. For example, if the source refers to a tax the collection and isolation of which, that depends on the state itself, shows operative clarity and efficiency. (ii) The second point requires that at least 20.0% of the revenue come from a Federal source.

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Mexico: Guillermo González Camarena No. 1200, Piso 10, Colonia Centro de Ciudad Santa Fe, Delegación Álvaro Obregón, C.P. 01210, Ciudad de México. Tel 52 (55) 1500 3130.  
United States: One World Trade Center, Suite 8500, New York, New York, ZIP Code 10007, Tel +1 (212) 220 5735.

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### Contacts

**Roberto Ballinez**

Public Finances and Infrastructure  
Sr. Executive Director  
roberto.ballinez@hrratings.com

**Roberto Soto**

Public Finances and Infrastructure  
Director  
roberto.soto@hrratings.com

**Luisa Adame**

Public Finances Manager  
luisa.adame@hrratings.com

**Alfonso Sales**

Methodological Criteria Associate  
Director  
alfonso.sales@hrratings.com

**Mauricio Prieto**

Methodological Criteria Sr. Analyst  
mauricio.prieto@hrratings.com

**Pedro Latapí**

Chief Credit Officer  
pedro.latapi@hrratings.com

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**This addendum describes the process followed by HR Ratings to evaluate the credit quality of the Structured Debt of Mexican Municipalities.**

This methodology addendum outlines the process used in the evaluation of the credit quality of the debt of the municipalities of the United Mexican States acquired through irrevocable trusts (as Structured Debt, SD) and that have the respective Federal Participations (*Ramo* 28) and Contributions (*Ramo* 33) as a payment source. The credit risks evaluation model maintains the assumptions put forward in the Master Methodology: *Structured Debt of Mexican States: Federal-Transfer Backed Debt Methodology*

### Description of the Master Methodology

The model described in the Master Methodology is based mainly on a quantitative exercise that measures, in a specific period, the maximum reduction resisted by revenue allocated to the SD under the condition of meeting all its payment obligations. This reduction determines the credit rating, although under specific circumstances, the rating may vary in terms of notches due to Qualitative Adjustments.

With the projection of the pledged revenue, considering HR Ratings' Macroeconomic Scenarios and the debt service in each period, the model identifies the minimum coverage and based on this applies an additional stress to the transfers over a period of thirteen months. The Target Stress Rate (TOE) measures the maximum reduction that the structure will withstand in said period. The model also considers the use of all the funds available in the trust but establishes the condition that the funds used shall be replenished with the funds remaining from the later operation.

The methodology describes the use of the Prompt Payment Guarantee, financial hedging instruments and secondary and/or substitute sources of payment. The methodology also describes the items identified through a legal opinion provided by an external legal firm and the process will be conducted in the event that there is any update of said opinion.

### Description of this Methodology Addendum

This addendum uses the model described in the Master Methodology to calculate the TOE and assign the credit rating. It also incorporates additional Qualitative Adjustments, such as the unsecured rating of another sub-national entity and adjustments in the event that the reserve fund does not cover a minimum of two months' debt service to cope with operative contingencies of the states on transferring Federal funds to the municipalities.

The current Fiscal Coordination Law (LCF) establishes the minimum amount that each state must transfer to its municipalities via certain funds that compose *Ramo* 28 and *Ramo* 33. In its different scenarios, HR Ratings projects the amount applicable to each municipality considering the amount projected for each state in accordance with the process described in the Master Methodology.

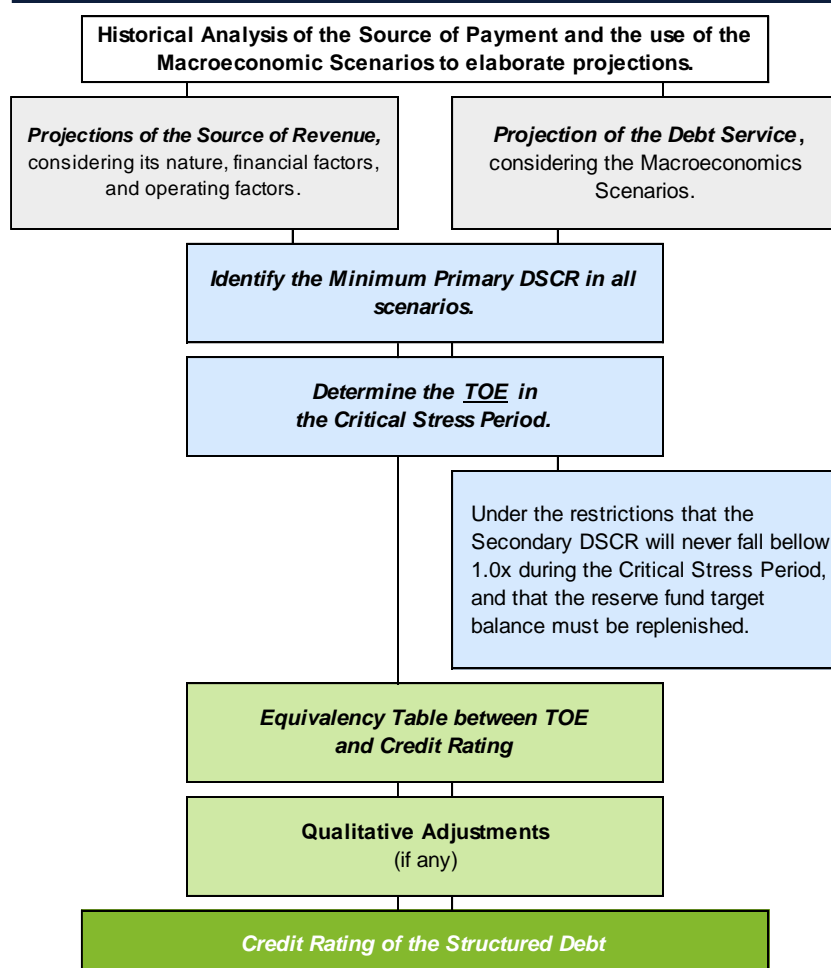
This addendum incorporates the analysis process of Global Credit Lines, which refer to an SD that promotes access to and the contracting of bank loans in competitive financial conditions for a set of municipalities. There are different requirements that may be set by the states or any Federal authority for municipalities seeking to adhere to the line.

### Introduction

This addendum to the *Structured Debt of Mexican States: Federal-Transfers Backed Debt Methodology* (Master Methodology) outlines the process used in the evaluation of the credit quality of the debt of the Mexican Municipalities contracted through irrevocable trusts (as Structured Debt, SD) and that have the respective Participations and certain funds of the Federal Contributions as a payment source.<sup>1</sup> The amount available from these funds is determined to a great extent by the dynamic of the General Participations Fund (FGP), which is distributed through *Ramo* 28, certain funds that compose *Ramo* 33 and any other source of Federal Transfers that may be allocated as a payment source for same .

The addendum describes the elements taken from the Master Methodology and certain aspects that are unique. For example, the addendum maintains the assumption of the requirement for the payment of interest and periodic amortizations. The general structure of the rating model is similar, as can be observed in Table 1 below:

**Table 1: HR Ratings' Evaluation Process**



Source: HR Ratings.

<sup>1</sup> The Master Methodology: *Structured Debt of Mexican States: The Federal Transfers-Backed Debt Methodology*, as well as the addendum applicable to the structured debt with own revenues of the Federal entities (states), can be found at the following link: <https://www.hrratings.com/methodology/>.

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The Master Methodology outlines the need for and the characteristics of a legal opinion. The aspects that will be evaluated in this addendum in terms of the trusts are as detailed in said document. Therefore, the legal opinion will determine if the trust is valid, enforceable, opposable against third parties and if its implementation is adequate. This would enable HR Ratings to continue with its rating process.

The most important differences from the Master Methodology in terms of quantitative modeling refer to: (i) the additional stress levels derived from the transfers made by the state to the municipality in question, and (ii) the rating of the municipal entity whose Federal transfers is allocated.

Moreover, the factors that cannot be incorporated quantitatively into the analysis will be considered through Qualitative Adjustments in terms of *notches*. Some of these are already detailed in the Master Methodology. But others, such as the possible impact on the credit quality of the state to which the municipality or reserve requirement belongs, relate exclusively to this addendum.

### Transfers to Municipalities

The current Fiscal Coordination Law (LCF) establishes the minimum percentage that each state must transfer to its municipalities via certain funds that compose *Ramo* 28. However, there is no proportion established on the total of Federal state participations.

The Federal Participations received by the municipalities from the entire state FGP may not be less than 20.0% of the amount applicable to the state. The state legislatures will establish their distribution among the municipalities based mainly on the collection incentives and replenishment principles. 100% is applicable to the municipalities in the case of the Municipal Development Fund (FFM).

Among the funds that compose *Ramo* 33, the Social Infrastructure Contributions Fund (FAIS) is set annually in the Federal Disbursements Budget (PEF) in an amount equivalent to 2.5294% of the Federal Assignable Collections (RFP), based on the estimates made based on the Federal Revenue Law (LIF) for each fiscal year. Of the total of the RFP, 0.3066% will apply to the States' Social Infrastructure Fund (FISE) and 2.2228% to the Municipal Social Infrastructure Fund of the Territorial Demarcations of the Federal District (FISM). This fund will be paid monthly in the first ten months of the year in equal parts to the states by the Federation and then by the states to the municipalities and territorial demarcations.

### Global Line of Credit

The Global Line of Credit (LGC or program) is a structure that promotes access to and the contracting of bank loans in competitive financial conditions for a set of municipalities within a state<sup>2</sup>. The primary payment source of loans contracted under an LGC will be Federal participations and/or contributions (FGP, FFM, FAIS), which are assigned to a master management and payment source trust by the municipalities that opt to adhere to the program<sup>3</sup>. Municipalities that contract a loan through this mechanism must sign an adhesion contract that constitutes them as Trustors Adhered to the Trust. In certain cases, an LGC may or may not be guaranteed by the respective State government.

<sup>2</sup> LGCs may be established by the Federation through BANOBRAS or through a state itself.

<sup>3</sup> SDs whose payment source comes from own revenue, as detailed in the addendum, may also be considered: "Structured Debt of Subnational Entities and OPDs: Addendum to the Own-Revenue Backed Debt Methodology", at: [www.hrratings.com/methodology/](http://www.hrratings.com/methodology/).



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HR Ratings may rate an LGC or the program, if required, and may also rate each financing independently. The global financial terms and conditions will be considered to analyze the program, including the analysis of future flows of the payment source. Depending on the nature of the payment source, the projection method will follow the stipulations set out in the Master Methodology, in this document or in the respective own-revenue addendum. Additionally, each of the requirements (legal and operatives) to be met by the municipal financing that adhere to the program will be analyzed.

In most cases, the legal documents of the LGC establish the capacity characteristics, maximum contracting amounts, terms, amortization profiles, interest rates, surcharges, target amount of the reserve fund, affirmative and negative covenants, among others, that must be met by all the financing arrangements. Under these circumstances, the financial and credit analysis of the program will consider these general characteristics, will conduct the same analysis process in a cyclical and critical scenario, as specified in the respective methodology and obtain a TOE.

In the event that there is the possibility that the municipalities contract financing adhered the program with different financial characteristics, HR Ratings will analyze all the possible cases and as a consequence, the rating of the program will be based on the case that produces the lowest TOE. It is important to point out that the rating of the program may consider positive or negative qualitative adjustments, as with any SD analyzed.

In terms of the possibility that each municipal financing has different characteristics, HR Ratings may rate both the program and each one individually. In this vein, a restriction may be applied to the amount of credit available to each municipality based on the maximum percentage in relation to the payment source. For example, a municipality may be restricted to maintain the amount to be contracted below 35% of the pledged transfers authorized at the time of requesting the loan.

There are also different requirements or restrictions that may be set by the states or any Federal public entity for municipalities seeking to adhere to the program. In the case of *Ramo* 33, these restrictions are subject to that the funds of the contracting year be sufficient to cover the debt. In the case of *Ramo* 28, the factors to be evaluated refer to how the minimum coverage and other factors such as the existence of a technical committee, solidarity or not among the borrowers, etc., are determined.

## Quantitative Analysis Process

### Preparation of the Assumptions in Base and Stress Scenarios

The procedures stipulated in the Master Methodology are inherited in the determination of the flow of revenue allocated and the debt service. These consider the following variables: 1) the rate of inflation, 2) the Gross Domestic Product (GDP), 3) interest rates, 4) the national FGP as a percentage of the RFP and 5) the percentage of the national FGP received by the state to which the municipality whose SD is evaluated belongs. Implicitly, each scenario assumes nominal levels for the GDP and actual interest rates. Each variable includes its respective stress levels (macroeconomic and cyclical) incorporated in accordance with the terms put forward in the Master Methodology.

The Master Methodology explains how the flow of the RFP is distributed among the different *Ramos* and their funds. The addendum mentions those that are relevant to the case of the municipalities.

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## Addendum to the Federal-Transfers Backed Debt Methodology

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HR Ratings prepares projections of the percentage relating to the State FGP and the National FGP. For the analysis presented in this addendum, projections are prepared in terms of the percentage of the State FGP that apply to the municipalities of each entity and within this distributable percentage, the percentage that applies to each particular municipality.

The Municipal Development Fund (FFM) is also projected through the percentage assigned to each RFP fund<sup>4</sup>. Lastly, the FAIS revenue is projected through the percentage assigned annually in the PEF.

Mexican Federal legislation allows a state to allocate up to 25% of the revenue to which it is entitled annually to a SD (applicable both to the Contributions Fund for the Strengthening of Federal States (FAFEF) and to the FAIS). Taking the foregoing into account, this rule stipulates that, for future years, the municipality may allocate a minimum amount equal to 25% of the revenue allocated to it in the contracting year. Therefore, if the total amount of the funds received by the municipality through the FAIS program in a future year (for example,  $t_1$ ) is lower than the total amount received in the contracting year ( $t_0$ ), the structure will receive an amount of funds at least equal to 25% of the contracting year.

### Stress Scenario

There are two additional assumptions of stress for municipal structures, as well as the stress at state level detailed in the Master Methodology.

The first consists of the assumption that of the participations allocated, that each state distributes to its municipalities is reduced in comparison with the percentage obtained in the Base Scenario. It is generally taken as a preliminary assumption that the state distributes 20% of the participations received among its municipalities. The percentage is subject to conditions of stress in the preparation of the projections of the Federal Transfers distributed among the municipalities.

The second assumption refers to the case in which the percentage allocated to the municipality is reduced in comparison with the percentage allocated in the Base Scenario. This scenario reflects the risk of a situation in which the revenue from state-level participations does not change, but revenue lower than expected is received at municipal level.

If the structure depends on transfers allocated through the FAIS, it shall be stressed based on the percentage allocated in the PEF.

### Determination of the Target Stress Rate (TOE)

The Debt Service Coverage Ratio (DSCR) is obtained once the pledged revenues and the debt service are determined. The analysis of this item is conducted based on the Master Methodology.

The analysis process is conducted throughout the period in which there is an outstanding balance of the debt acquired pending payment<sup>5</sup>. However, in order to incorporate the sensitivity of creditor faced with the weakness of a structure in coming periods, subject to

<sup>4</sup> Currently the PEF, based on the Fiscal Coordination Law in force, establishes the amount 1% of the RFP as transfers allocated to the National FFM.

<sup>5</sup> In terms of the determination of the outstanding balance of the SD, HR Ratings shall confirm with the borrower if the amount contracted was the same as that actually drawn-down. If this information is not available, for the purposes of model, a draw-down of 100.0% of the amount contracted will be assumed. If the amount drawn-down is confirmed as being less than the amount contracted, future draw-downs must be monitored in case that the draw-down period is still valid.

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certain conditions, the time line in which the payment period will sought with the minimum Primary DSCR may be reduced. This time line is extended over the next two macroeconomic cycles according to the scenarios generated by HR Ratings. However, the analysis will extend to the entire term of the SD under the conditions established in the Master Methodology.

The TOE is calculated using the optimization process, which, has the TOE as a variable “target”. The full payment of the respective debt service is a restriction, which would be reflected in a Secondary Coverage (those that include the reserves) equal to or greater than 1.0x. The second condition is this process is that the reserve fund is replenished to its target balance within a set period after its use. The macroeconomic variables that will be use in this process will be those used in the Stress Scenario that reflects the most adverse conditions for the SD.

The TOE represents the maximum-possible stress that the payment source allocated, in favor of the SD, may withstand without falling into default and allowing the replenishment of the reserve. However, there are cases of SDs in certain municipalities that do not contemplate a reserve fund. In these cases, the metrics of the Primary and Secondary Coverages will be matched and stressed until the lower of their values reach the unit in the Critical Stress Period.

The equilibrium  $TOE (TOE^E)$  allows, through an assignment curve, the Credit Rating of the SD to be determined. This curve is shown in Table 2:

**Table 2: Ratings to TOE**

Credit Rating	TOE Ranges
HR AAA (E)	[ 85.0% , 100% )
HR AA+ (E)	[ 78.0% , 85.0% )
HR AA (E)	[ 71.0% , 78.0% )
HR AA- (E)	[ 64.0% , 71.0% )
HR A+ (E)	[ 56.4% , 64.0% )
HR A (E)	[ 48.8% , 56.4% )
HR A- (E)	[ 41.2% , 48.8% )
HR BBB+ (E)	[ 33.6% , 41.2% )
HR BBB (E)	[ 26.0% , 33.6% )
HR BBB- (E)	[ 18.4% , 26.0% )
HR BB+ (E)	[ 16.0% , 18.4% )
HR BB (E)	[ 14.0% , 16.0% )
HR BB- (E)	[ 12.0% , 14.0% )
HR B+ (E)	[ 10.0% , 12.0% )
HR B (E)	[ 8.0% , 10.0% )
HR B- (E)	[ 6.0% , 8.0% )
HR C+ (E)	[ 4.0% , 6.0% )
HR C (E)	[ 2.0% , 4.0% )
HR C- (E)	[ 0.0% , 2.0% )

Source: HR Ratings.

This table shows the intervals or ranges within the curve on a scale of 0% to 100%, with which HR Ratings will determine the credit rating based on the value of the TOE. However,

# Structured Debt of Mexican Municipalities

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if in an annual review or during the follow-up process, it is identified that the TOE has changed to another rating range as a result of the analysis conducted, HR Ratings may maintain the rating or modify its attribute by considering the evolution expected of the TOE.

### Credit Rating and Qualitative Adjustments

There are relevant factors that cannot be incorporated quantitatively into the analysis; therefore, they are considered as Qualitative Adjustments within the process. These factors are atypical and there are specific guidelines for them to be considered in the credit rating of the SD. The analysis of the conditions to be met to consider these factors and the impact that they may have on the rating of as SD is explained in detail in the Master Methodology.

#### Adjustments Related to the Entity's Unsecured Rating

Typically, the Qualitative Adjustments consider the unsecured rating of the state and the possibility that the state contributes funds directly to the trust.

This factor can be analyzed in three different ways. The first refers to the fact that the unsecured rating of a contracting entity is below "HR BBB-"<sup>6</sup>. The second refers to the possibility that the SD contemplates, either implicitly or explicitly, the funds of a second sub-national entity. And the third refers to that the entity's rating shows a high credit quality, thus offering certainty regarding the timely payment of its debt obligations. This point is described in greater detail in the Master Methodology.

Under certain conditions, the credit rating of the state may be relevant. If this entity offers a guarantee to the SD, it must be evaluated to establish if it a secondary or substitute source in order to determine if it may imply an impact on the quantitative model. In these cases, in order not to assign an unfavorable adjustment, the state's rating must be greater than or equal to "HR BBB-" if the guarantee is constituted by Federal transfers and "HR BBB" if the guarantee is constituted by own revenue.

#### Adjustments Related to Affirmative and Negative Covenants

If for any reason the legal documentation of the SD links the credit risk of the structure to any unrelated risk, HR Ratings shall evaluate the potential impact on the credit quality of the SD. This type of risks, typically, are described in the Affirmative and Negative Covenants Clause ("Covenants") and that, on being signed by the parties involved, have been committed to be performed. This point is described in greater detail in the Master Methodology.

#### Adjustment related to the Reserve Fund

Given that the distribution and transfer of the Federal funds depends generally on the state, there is the possibility that the SD will be exposed to operative risks. Therefore, the absence of a reserve equivalent to at least two months' debt service is the cause for an Qualitative Adjustment (one *notch*) on the rating of the SD. This obeys that the use of the resources held in a reserve fund are not exposed to said operative risks.

<sup>6</sup> The rating level established in this section refers to an SD the debt of which is backed by Federal Transfers.

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Guillermo Gonzalez Camarena No. 1200, Piso 10, Colonia Centro de Ciudad Santa Fe, Delegación Álvaro Obregón, C.P. 01210, Ciudad de México. Tel 52 (55) 1500 3130.  
United States: One World Trade Center, Suite 8500, New York, New York, ZIP Code 10007, Tel +1 (212) 220 5735.

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The ratings and/or opinions issued by HR Ratings consider an analysis of the relative credit quality of an entity, issuer and/or issue; therefore, they do not necessarily reflect a statistical probability of default on payment, this being understood as the impossibility or the lack of will of an entity or issuer to perform its contractual payment obligations. Creditors and/or holders may then be forced to take measures to recover their investments, which may even include restructuring the debt due to the stress situation faced by the debtor. Notwithstanding the foregoing, to grant greater validity to our credit quality opinions, our methodology considers stress scenarios as a complement to the analysis prepared on a base scenario. The fees paid to HR Ratings by issuers generally vary from US\$1,000 to US\$1,000,000 (or the equivalent in local currency) per issue. In some cases, HR Ratings will rate all or some of the issues of a particular issuer for an annual fee. The annual fees are expected to vary between US\$5,000 and US\$2,000,000 (or the equivalent in local currency).

## METHODOLOGIES

### Current versions of previously sent methodologies

	Methodology	
1	Methodology for the Evaluation of Charter School Debt ( <i>Long Term and Short Term Global Rating Scales</i> ).	<a href="https://www.hrratings.com/docs/metodologia/New%20Charter%20Schools%20Methodology%20R.pdf">https://www.hrratings.com/docs/metodologia/New%20Charter%20Schools%20Methodology%20R.pdf</a>
2	General Methodological Criteria.	<a href="https://www.hrratings.com/docs/metodologia/GMC%20March%202019.pdf">https://www.hrratings.com/docs/metodologia/GMC%20March%202019.pdf</a>
3	Methodology for Public Finances: Unsecured Debt Ratings for Mexican Municipalities Methodology Addendum ( <i>Long Term and Short Term Local Rating Scales</i> ).	<a href="https://www.hrratings.com/docs/metodologia/Adenda_Deuda_Quirografia_Municipios%20English%20Final.pdf">https://www.hrratings.com/docs/metodologia/Adenda_Deuda_Quirografia_Municipios%20English%20Final.pdf</a>
4	HR Ratings' Corporate Debt Credit Risk Evaluation ( <i>Long Term and Short Term Local Rating Scales</i> ).	<a href="https://www.hrratings.com/docs/metodologia/Corporate%20Debt%20Credit%20Risk%20Evaluation%20Final.pdf">https://www.hrratings.com/docs/metodologia/Corporate%20Debt%20Credit%20Risk%20Evaluation%20Final.pdf</a>
5	Public Finance Methodology Unsecured Rating for Mexican States ( <i>Long Term and Short Term Local Rating Scales</i> ).	<a href="https://www.hrratings.com/docs/metodologia/Unsecured%20Rating%20for%20Mexican%20States.pdf">https://www.hrratings.com/docs/metodologia/Unsecured%20Rating%20for%20Mexican%20States.pdf</a>
6	U.S. State Government General Obligations Methodology Addendum ( <i>Long Term and Short Term Global Rating Scales</i> ).	<a href="https://www.hrratings.com/docs/metodologia/General%20Obligation%20States%20Methodology%20March%202014_final.pdf">https://www.hrratings.com/docs/metodologia/General%20Obligation%20States%20Methodology%20March%202014_final.pdf</a>
7	Sovereign Debt Methodology ( <i>Long Term and Short Term Global Rating Scales</i> ).	<a href="https://www.hrratings.com/docs/metodologia/0Sovereign%20Debt%20Methodology.pdf">https://www.hrratings.com/docs/metodologia/0Sovereign%20Debt%20Methodology.pdf</a>
8	U.S. Local Government General Obligations Methodology ( <i>Long Term and Short Term Global Rating Scales</i> ).	<a href="https://www.hrratings.com/docs/metodologia/General%20Obligation%20Methodology%20Nov2013_final.pdf">https://www.hrratings.com/docs/metodologia/General%20Obligation%20Methodology%20Nov2013_final.pdf</a>
9	Methodology for Infrastructure ( <i>Structured Finance Rating Scale</i> ).	<a href="https://www.hrratings.com/docs/metodologia/0Metodologia%20para%20Infraestructura%20(english)%20limpio1.pdf">https://www.hrratings.com/docs/metodologia/0Metodologia%20para%20Infraestructura%20(english)%20limpio1.pdf</a>
10	Rating Methodology for Banks ( <i>Long Term and Short Term Local Rating Scales</i> ).	<a href="https://www.hrratings.com/docs/metodologia/3.2.1.%20Banks.pdf">https://www.hrratings.com/docs/metodologia/3.2.1.%20Banks.pdf</a>
11	Addendum - Rating Methodology for Subordinated Debt ( <i>Long Term and Short Term Local Rating Scales</i> ).	<a href="https://www.hrratings.com/docs/metodologia/3.2.2.%20Rating%20Methodology%20for%20Subordinated%20Debt.pdf">https://www.hrratings.com/docs/metodologia/3.2.2.%20Rating%20Methodology%20for%20Subordinated%20Debt.pdf</a>
12	Rating Methodology for Non-Bank Financial Institutions ( <i>Long Term and Short Term Local Rating Scales</i> ).	<a href="https://www.hrratings.com/docs/metodologia/3.2.3.%20Non%20Bank.pdf">https://www.hrratings.com/docs/metodologia/3.2.3.%20Non%20Bank.pdf</a>
13	Addendum - Rating Methodology for Credit Unions ( <i>Long Term and Short Term Local Rating Scales</i> ).	<a href="https://www.hrratings.com/docs/metodologia/3.2.4.%20Rating%20Methodology%20for%20Credit%20Unions.pdf">https://www.hrratings.com/docs/metodologia/3.2.4.%20Rating%20Methodology%20for%20Credit%20Unions.pdf</a>
14	Addendum - Rating Methodology for Leasing Agents ( <i>Long Term and Short Term Local Rating Scales</i> ).	<a href="https://www.hrratings.com/docs/metodologia/3.2.5.%20Leasing%20Agents.pdf">https://www.hrratings.com/docs/metodologia/3.2.5.%20Leasing%20Agents.pdf</a>
15	Rating Methodology for Brokerage Firms ( <i>Long Term and Short Term Local Rating Scales</i> ).	<a href="https://www.hrratings.com/docs/metodologia/3.2.6.%20Brokerage%20Firms.pdf">https://www.hrratings.com/docs/metodologia/3.2.6.%20Brokerage%20Firms.pdf</a>



16	Rating Methodology for Investment Funds ( <i>Credit and Market Rating</i> ).	<a href="https://www.hrratings.com/docs/metodologia/Investment%20Funds%20Methodology%202019.pdf">https://www.hrratings.com/docs/metodologia/Investment%20Funds%20Methodology%202019.pdf</a>
17	Addendum – Rating Methodology for Bonded Warehouses ( <i>Long Term and Short Term Local Rating Scales</i> ).	<a href="https://www.hrratings.com/docs/metodologia/HR290816NP%208.%20Adendum%20AGD3%200(eng).pdf">https://www.hrratings.com/docs/metodologia/HR290816NP%208.%20Adendum%20AGD3%200(eng).pdf</a>
18	Partial Guarantees for Structured and Unsecured Debt Issues .	<a href="https://www.hrratings.com/docs/metodologia/Partial%20Guarantees%20Methodology.pdf">https://www.hrratings.com/docs/metodologia/Partial%20Guarantees%20Methodology.pdf</a>
19	Rating Methodology for Water Operating Agencies (Debt Evaluation Methodology for Mexican Entities).	<a href="https://www.hrratings.com/docs/metodologia/Mexican%20Water%20Operating%20Agencies%20Methodology.pdf">https://www.hrratings.com/docs/metodologia/Mexican%20Water%20Operating%20Agencies%20Methodology.pdf</a>
20	Special-Tax Bonds Methodology (Methodology for Municipal Entities of the United States of America).	<a href="https://www.hrratings.com/docs/metodologia/Special-Tax%20Bonds%20Methodology%20(MP).pdf">https://www.hrratings.com/docs/metodologia/Special-Tax%20Bonds%20Methodology%20(MP).pdf</a>

## Update versions of previously sent methodologies

21	Structured Debt of Mexican Municipalities: Addendum to the Federal-Transfers Backed Debt Methodology.	<a href="https://www.hrratings.com/docs/metodologia/Federal%20Transfers%20Backed%20Debt%20Addendum%20(Municipalities).pdf">https://www.hrratings.com/docs/metodologia/Federal%20Transfers%20Backed%20Debt%20Addendum%20(Municipalities).pdf</a>
22	Structured Debt of Mexican States: Federal-Transfers Backed Debt Methodology.	<a href="https://www.hrratings.com/docs/metodologia/Federal%20Transfers%20Backed%20Debt%20Methodology%20(States).pdf">https://www.hrratings.com/docs/metodologia/Federal%20Transfers%20Backed%20Debt%20Methodology%20(States).pdf</a>
23	Structured Debt of Subnational Entities and OPDs Addendum to the Own-Revenue Backed Debt Methodology.	<a href="https://www.hrratings.com/docs/metodologia/Own-Revenues%20Backed%20Debt%20Addendum%20(States%20and%20Municipalities).pdf">https://www.hrratings.com/docs/metodologia/Own-Revenues%20Backed%20Debt%20Addendum%20(States%20and%20Municipalities).pdf</a>

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## MODELS

### Current versions of qualitative and quantitative Models

#### a) Banks / SOFIPOS / SOCAPS Model

- Version: 2
- File Name: *Bancos (Entidad\_Año).Jul.20*
- Approved (Model): July 15, 2020.
- Methodology: Methodology for Rating Banks, May 2009.
- Approved (Methodology): March 14, 2018.
- Developed by: HR

**Description:** The model identifies the principal risk indicators within each category of credit risk affecting the entity evaluated; both those that are inherent to the entity and those arising from external factors. Regarding the ability to pay, the principal sources of risk are identified that could cause delay and even default on the settlement of any liability.

#### b) IFNBs / Credit Unions / Leasing Companies Model

- Version: 2
- File Names: *IFNB\_(Entidad\_Año).Jul.20*
- Approved (Model): July 15, 2020.
- Methodology: Rating Methodology for Non-Bank Financial Institutions, May 2009. Rating Methodology for Financial Leasing Agents and Pure Leasing Agents, January 2010. Rating Methodology for Bonded Warehouses, March 2010. Rating Methodology for Credit Unions, August 2011.
- Approved by HR: March 14, 2018.
- Developed by: HR

**Description:** The model explains the principal risk factors present in these entities. Starting from the business model. Its purpose is to justify and give a different weighting to the qualitative and quantitative risk factors for the assignment of the rating by HR Ratings. Among the most important quantitative factors to consider are the historic and projected financial statements and the analysis of the operating efficiency

#### c) Brokerage Firms Model

- Version: 2
- File Name: *Casa de Bolsa (Entidad\_Año).Jul.20*
- Approved (Model): July 15, 2020.
- Methodology: Rating Methodology for Brokerage Firms, June 2009.
- Approved (Methodology): March 14, 2018.
- Developed by: HR

**Description:** The model identifies the principal risk indicators within each category of credit risk affecting the firm evaluated; both those that are inherent to the entity and those arising from external factors. Regarding the ability to pay, the principal sources of risk are identified that could cause delay and even default on the settlement of any liability.

#### d) Investment Funds Model – SIID.

- Version: 2
- File Name: *Calculadora de Fondos de Inversión (Fondo\_Año).Jul.20*
- Approved (Model): July 15, 2020.
- Methodology: Rating Methodology for Investment Funds, May 2019.
- Approved (Methodology): February 2019.
- Developed by: HR

**Description:** This model has two principal aspects: Credit Risk and Market Risk. Credit Risk is based on the credit quality of the assets that form the portfolio of the mutual fund, while Market Risk measures movements in the valuation of the fund because of changes in market interest rates and other variables, such as the exchange rate, inflation, and market volatility. The methodology incorporates a secondary aspect, the evaluation of the Management Quality of the fund for both ratings.

## e) Pure Leasing Companies Model

- *Version: 2*
- *File Name: Arrendadoras Puras (Entidad\_Año).Jul.20*
- *Approved (Model): July 15, 2020.*
- *Methodology: Rating Methodology for Financial Leasing Agents and Pure Leasing Agents, January 2010.*
- *Approved (Methodology): March 14, 2018.*
- *Developed by: HR*

**Description:** The model is based upon quantitative and qualitative factors that evaluates credit risks such as the possibility that the entity will be unable to collect future rents or leasing contracts and the lessor will not be able to recover the asset in a timely manner. So, it analyses the tools and processes used to collect the financial income earned and recover the leased product.

## f) Models used for Sovereign Debt

- *Version: 2*
- *File Name: Sovereign Debt (Country\_Year).Jul.20*
- *Approved (Model): July 15, 2020.*
- *Methodology: Sovereign Debt Methodology, May 19, 2017.*
- *Approved (Methodology): March 14, 2018.*
- *Developed by: HR*

**Description:** The model is based upon the interaction of four analytic dimensions that represent economic growth, fiscal accounts, monetary policy and external accounts. The model also accounts for metrics that evaluate the institutional quality of the sovereign. The model uses HR Ratings forecasts for both a base and a stress model. It also incorporates data from the IMF, the World Bank and the UN.

## g) Models used for Mexican General Obligation ratings

### 1. States

- *Version: 2*
- *File Name: Estados (Entidad\_Año).Jul.20*
- *Approved (Model): July 15, 2020.*
- *Methodology: Rating Methodology for Unsecured Risk for Mexican States, July 31, 2014.*
- *Approved (Methodology): March 14, 2018.*
- *Developed by: HR*

**Description:** The model accounts for fiscal metrics, debt metrics and debt servicing metrics. Most of them as a percent of unrestricted revenues, that discounts transfers to the municipalities and revenue sharing obligations compromised for structured debt servicing. The methodology also accounts for qualitative factors such as contingent liabilities, credit history, liquidity and former willingness to pay.

### 2. Municipalities

- *Version: 2*
- *File Name: Municipios (Entidad\_Año).Jul.20*

- *Approved (Model): July 15, 2020.*
- *Methodology: Unsecured Risk Evaluation for Municipalities, July 31, 2015.*
- *Approved (Methodology): March 14, 2018.*
- *Developed by: HR*

**Description:** The model accounts for fiscal metrics, debt metrics and debt servicing metrics. Most of them as a percent of unrestricted revenues, that discounts revenue sharing obligations compromised for structured debt servicing. The methodology also accounts for qualitative factors such as contingent liabilities, credit history, liquidity and former willingness to pay.

## h) Models used for U.S. General Obligations Ratings

### 1. Local Governments

- Version: 1
- File Name: *GOLocal\_Blank*
- *Approved (Model): November 27, 2013.*
- *Methodology: U.S. Local Government General Obligations Methodology, November 27, 2013.*
- *Approved (Methodology): March 14, 2018.*
- *Developed by: HR*

**Description:** The model is based upon the General Obligation Quantitative Risk Model which accounts for the financial balance, the primary balance, debt metrics and debt servicing metrics, all as share of total revenues or unrestricted revenues. These metrics are projected for both a base and a stress scenario. The qualitative considerations account for a liquidity analysis, a general fund analysis, pensions liabilities, state regulation and support, among others.

### 2. States

- Version: 1
- File Name: *GOStates\_Blank*
- *Approved (Model): March 28, 2014.*
- *Methodology: U.S. State Government General Obligations Methodology (Addendum to Methodology), March 28, 2014.*
- *Approved (Methodology): March 14, 2018.*
- *Developed by: HR*

**Description:** The model is based upon the General Obligation Quantitative Risk Model which accounts for the financial balance, the primary balance, debt metrics and debt servicing metrics, all as share of total revenues or unrestricted revenues. These metrics are projected for both a base and a stress scenario. The qualitative considerations account for a liquidity analysis, a general fund analysis, pensions liabilities, business type activities, among others.

## i) Models used for Corporate Debt Ratings

- *Version: 2*
- *File Name: Corporativos (Entidad\_Año).July.20*
- *Approved (Model): July 15, 2020.*
- *Methodology: Corporate Debt Credit Risk Evaluation Methodology, May 21, 2014.*
- *Approved by HR: March 14, 2018.*
- *Developed by: HR*

**Description:** The model is based upon four metrics that are derived from the entity's financial statements. First the DSCR derived from the entity's period flows, then the same coefficient but adding the cash reserves to the numerator.

The third measures the years required for the entity to serve its debt. And the last one measures the value of their marketable assets as a percent of the entity's total liabilities. Qualitative considerations are incorporated to account for industry risks.

**j) Models used for Charter Schools ratings**

- Version: 1
- File Name: *Charters\_Blank*
- Approved (Model): February 13, 2015.
- Methodology: *Charter Schools Credit Risk Evaluation Methodology, February 13, 2015.*
- Approved (Methodology): March 14, 2018.
- Developed by: HR

**Description:** The Charter Schools quantitative model is based upon the corporate debt methodology. However, the qualitative analysis accounts for the specific states laws regarding the permissions to operate and the ADA (Average Daily Attendance) and the WADA (Weighted Average Daily Attendance) upon which the state transfers are condition.

**k) Models used for Rating for Debt backed by the operation of highways, toll ways and bridges.**

- Version: 2
- File Name: *Concesion\_Peaje (Proyecto\_Año).Jul.20*
- Approved (Model): July 15, 2020.
- Methodology: Methodology for Infrastructure, November 6, 2015.
- Approved (Methodology): March 14, 2018.
- Developed by: HR

**Description:** The model is based upon the TEA rate which accounts for the stress the revenues from users' fees can withstand without the DSCR dropping below one throughout the debt structure. The methodology also incorporates demand risks derived from economic performance of the region around the project and for diverse risks that can affect maintenance cost.

**l) Models used for Water Operating Agencies for Mexican entities**

- Version: 1
- File Name: *OOA (Entidad\_Año).Jul.20*
- Approved (Model): July 15, 2020
- Methodology: Water Operating Agencies: Debt Evaluation Methodology for Mexican Entities July 2019
- Approved (Methodology): July 2019
- Developed by: HR

**Description:** This model has two principal aspects: The operating metrics of the WOA, that measure efficiency in terms of charging customers and delivering water to residences, industrial complex or local business. The second aspect measures the financial performance of the WOA based on coverage metrics, the years that would take the free cash flow to cover the debt net and the weight of non-debt liabilities.

**m) Models used for Ratings of Partial Guarantees**

**1. Infrastructure**

- Version: 1
- File Name: *Garantías Parciales\_Infraestructura (Entidad\_Año).Jul.20*
- Approved (Model): July 15, 2020.

- Methodology: Partial Guarantees for Structured and Unsecured Debt Issues: Debt Methodology.
- Approved (Methodology): March 2019.
- Developed by: HR

## 2. Unsecured

- Version: 1
- File Name: *Garantías Parciales\_ Quirografarias (Entidad\_Año).Jul.20*
- Approved (Model): March 2019.
- Methodology: Partial Guarantees for Structured and Unsecured Debt Issues: Debt Methodology.
- Approved (Methodology): March 2019.
- Developed by: HR

**Description:** For infrastructure, the partial guarantees model measures the average number of debt services that could be paid by using the guarantee, providing strength in terms of liquidity. Depending on the estimated average, certain number of notches will be awarded to the rating. For unsecured ratings, the model measures the percentage of the outstanding debt covered by the guarantee; however, the model controls for the Credit Rating of the entity providing the guarantee. According to certain values of coverage, notches will be awarded to the rating.

## n) Model used for Rating Special-Tax Bonds of U.S.A. Local Entities

- Version: 1
- File Name: Special-Taxes Model (Entity\_Bond).Jul.20
- Approved (Model): July 15, 2020
- Methodology: Special-Tax Bonds Methodology.
- Approved Methodology: April 2020.
- Developed by: HR Ratings

**Description:** The model rates Special-Tax Bonds of U.S.A. Local entities with four set of key factors. The first one consists in an economic analysis of the elasticities of the taxed goods & services, and the concentration and strength of the tax base. The second set studies the historical performance of the trend and volatility of the pledge. The third set measures two coverage metrics and the fourth the Additional Bond Test and the Debt Service Reserve Fund requirements. Lastly, the model allows qualitative adjustments based on very specific factors and limited by concepts.

## Updated Methodologies

### o) Models used for Mexican Structured Credit ratings.

#### 1. States and municipalities (Federal Income)

- Version: 2
- File Name: *Producto Estructurado (Entidad\_Banco\_Clave).Sep.20*
- Approved (Model): August 5, 2020.
- File Name: Programa Especial FEFOM
- Methodologies: Structured Debt of Mexican States: Federal-Transfers Backed Debt Methodology (September 2020); Structured Debt of Mexican Municipalities: Addendum to the Federal-Transfers Backed Debt Methodology (September 2020).
- Approved (Methodology): August 5, 2020.
- Developed by: HR



**Description:** The model is based upon the relationship of the Mexican economic growth and the revenue sharing obligations ("Ramo" 28) that the Federal Government transfers to the states and municipalities. Given an estimated income from said transfers, the minimum DSCR is determined along the debt structure. The revenues will be stressed through a TOE rate that will ultimately reduce the DSCR (always above one) in a critical period in such a way that the reserve funds can be reestablished in a previously determined post-critical period.

## 2. Municipalities (Own income, FEFOM)

- Version: 2
- File Name: *PE Programa Especial FEFOM (Entidad\_Banco\_Clave).Sep.20*
- Approved (Model): August 5, 2020.
- Methodology: Structured Debt of Subnational Entities and OPDs: Addendum to the Own-Revenue Backed Debt Methodology (September 2020)
- Approved (Methodology): August 5, 2020.
- Developed by: HR

**Description:** The model is also based upon the TOE rate and the capacity of the revenues to reestablish the reserve funds in the post-critical period. However, in this methodology, the ability to successfully isolate the source of revenue from the entity through a trust fund is of major importance.