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This methodology is the exclusive property of HR Ratings and will become applicable after 08/22/2023.

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.

Depending on the nature of each case, the methodology can be used in conjunction with the *Federal Transfers Backed Debt Addendum (Municipalities)* and the *Own-Revenues Backed Debt Addendum (States and Municipalities)*. These addendums allow for the incorporation of particular aspects considering the nature of each source of payment.

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 (*TSR*) 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 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* and *33* 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.

Once the *TSR* is determined, the Credit Rating of the SD will be determined, to which Qualitative Adjustments can be incorporated. Adjustments can be made based on different factors such as the state's unsecured rating, contractual affirmative or negative covenants, or any situation that could trigger an early maturity event.

The rating process of HR Ratings for the Structured Debt of the federal entities of the United Mexican States considers a legal analysis on the structure according to what is established in the HR Ratings General Methodological Criteria.

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 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 (*TSR*). The reduction of revenue is conditioned to there being enough 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: *Federal Transfers Backed Debt Addendum (Municipalities)* and *Own-Revenues Backed Debt Addendum (States and Municipalities)*. 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

The credit analysis of an SD is based on an initial assumption that there is a legal and operational separation between the financial structure and the ability and/or willingness to pay of the entity. For this reason, the methodology allows to capture the credit quality of the SD without considering the credit quality of the entity. It should be noted, however, that although this separation allows HR Ratings to carry out a quantitative analysis that does not incorporate the credit rating of the entity, this may have an impact through Qualitative Adjustments.

The separation starts from the establishment of the figure of the trust, which must comply with the following characteristics: 1) be irrevocable and transparent until it has fulfilled its purposes, 2) be an administration trust, this implies the existence of a third party (trustee) that administers the goods and/or resources that are used as a payment source between the debtor (trustor) and the creditor (trustee, institution that grants the credit or investors holders of the titles of the emission); 3) be a trust in which the parties establish a debt structure in order to meet their payment obligations; 4) be a payment vehicle, by which the debtor undertakes to keep resources available at all times in order to cover its payment obligations; and 5) determine the priority of payments. All this is done through an affectation of said resources in favor of the trust.

In the case that the legal analysis indicates that the documentation does not establish the legal and operational separation, two situations can arise. The first is that in which the credit contract or debt title explicitly specify that the entity must contribute resources for the payment of the debt. In this situation, HR Ratings could assign the unsecured credit rating of the entity to the SD. On the other hand, in the case that the structure does not establish the obligation for the contribution of resources from the entity, HR Ratings will suspend the rating process.

Finally, in the case that HR Ratings identify some change in the legal documentation, depending on the magnitude or relevance of the changes, it could place the rating in "Review in Process". During this period it will be evaluated if the changes have a financial impact and an update of the legal analysis will be required.

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 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. 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

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exercise will determine the Target Stress Rate (*TSR*), 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 guarantee.

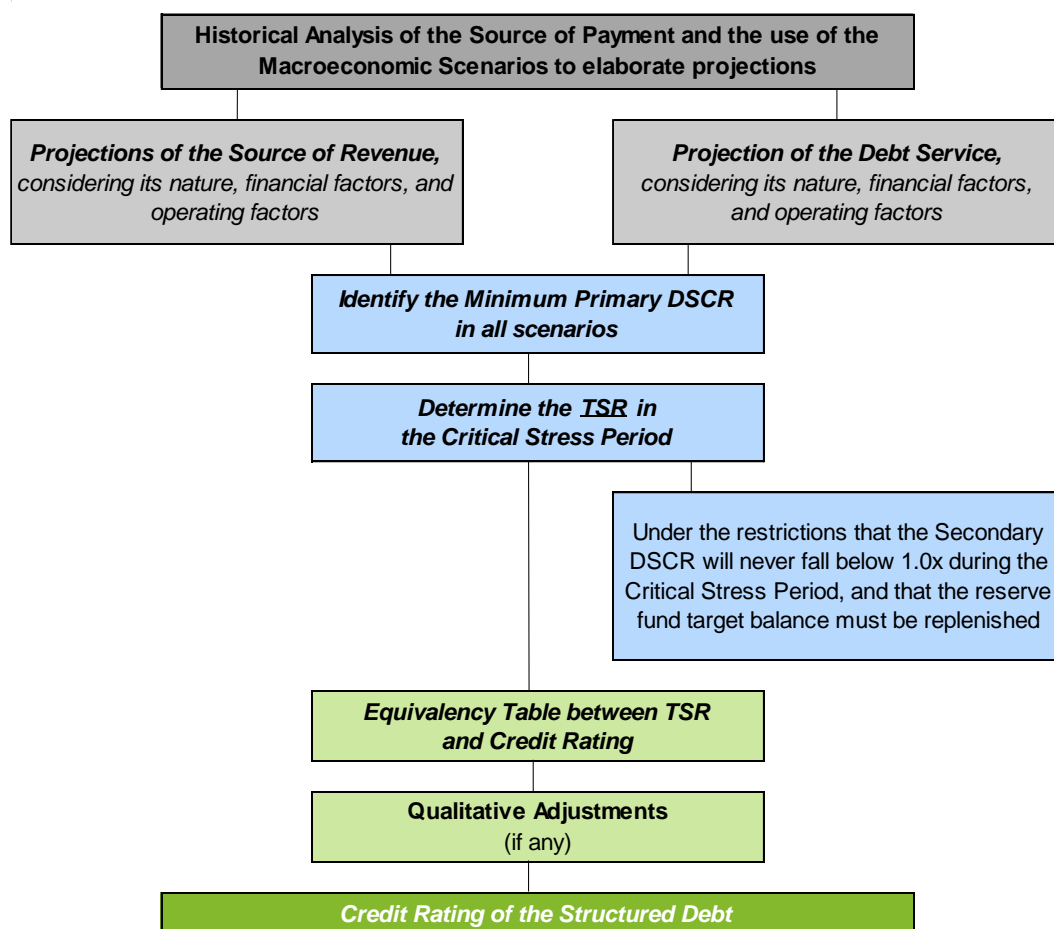
If the SD has a reserve fund and/or a payment guarantee, the *TSR* must meet the additional condition that the remainders of the future flows of the payment sources must be replenishable to the target amount of the reserve, in accordance with the stipulations of the legal documentation and/or pay the funds used from the guarantee¹. 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 enough funds to replenish the reserves and/or pay the guarantee in a specific time².

The credit rating is determined based on the value of the *TSR*, 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 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:

¹ The analysis process of an SD with a Partial Guarantee or Prompt Payment Guarantee is presented in the methodology: "Partial Guarantees Methodology" published by HR Ratings on www.hrratings.com.

² 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.

Figure 1: HR Ratings' Evaluation Process



Source: HR Ratings

The emphasis on the calculation of the *TSR* 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.

This methodology refers to the revenue from federal funds that can currently be affected according to the Fiscal Coordination Law (LCF, 2018), any future changes in the law regarding the origin, criteria, and calculation of the revenue that subnational entities can affect will be analyzed under this same methodology. In case the nature of the federal revenue changes, HR Ratings could develop a particular analysis process.

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 reference³. 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 carries out its estimation for the RFP and for the different federal revenue funds that can be affected by the states. The main relationships calculated in this process are: 1) RFP to national GDP, 2) General Participation Fund (FGP) per state to national FGP, 3) Social Infrastructure Contribution Fund (FAIS) per state to national FAIS and 4) Federal Entities Strengthening Contribution Fund (FAFEF) per 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 municipalities⁴. 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)⁵.

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: $\{t_{-5}, \dots, t_0\}$ ⁶; the current calendar year is considered as year zero (t_0)⁷.

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.

³ 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.

⁴ 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).

⁵ 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.

⁶ 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.

⁷ 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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Figure 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.

Figure 2: Applying Stress to the Projections of the RFP

Year	Base Scenario			Stress Scenario			Stress Factors	
	Nominal GDP	RFP		Nominal GDP	RFP		Regular	Cyclical
	Amount	Amount	% of GDP	Amount	Amount	% of GDP		
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	\$ 597,938	\$ 217,850	36.43%	\$ 538,145	\$ 217,850	40.48%	n/a	
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	\$ 435,459	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

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, ..., t₀}. 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 FGP⁸.

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 Scenario⁹.

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 years¹⁰.

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 RFP¹¹. 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, or the FAFEF depending on the case. The

⁸ 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.

⁹ 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 state(s).

¹⁰ If there is any extraordinary event in the amount or distribution of FGP of a specific state, the six-year period may be extended.

¹¹ 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.

weighted average of these years will be taken to prepare the projection for each state in each scenario. The process to apply the 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 municipalities¹². The FAFEF funds will be paid to the states monthly in twelve equal installments¹³.

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 year¹⁴.

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 Figure 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*¹⁵. 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 Figure 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 years¹⁶.

¹² 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.

¹³ 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.

¹⁴ The projection process for the national, *Ramo 28*, *Ramo 33* or any other state 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 .

¹⁵ 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*.

¹⁶ 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.

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 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 part¹⁷.

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 Scenario¹⁸.

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 (TSR)

HR Ratings' quantitative model is based on the calculation of the *TSR*, 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 *TSR*; it continues with the description of the model and

¹⁷ Currently, there are states that transfer more than 20% to their municipalities.

¹⁸ 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.

offers and 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 term of the SD the Federal transfers it receives mainly from the Participations (*Ramo 28*) and the Contributions (*Ramo 33*). Said transfers must be in turn transferred directly to a trust 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 trust 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: *Trust Expenses*.

For the terms of this methodology, *Trust Expenses* refer to disbursements to be made by the Trust 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 assist 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:

$$DSCR_t^{Primary} = \frac{Pledged\ Revenue_t - Trust\ Expenses_t}{Debt\ Service_t}$$

Definition: *Critical Stress Period*.

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

$$\{t_{m-6}, \dots, t_{m-1}, t_m, t_{m+1}, \dots, t_{m+6}\}$$

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:

$$DSCR_t^{Secondary} = \frac{Pledged\ Revenue_t - Trust\ Expenses_t + Available\ Reserves}{Debt\ Service_t}$$

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 trust, 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*¹⁹.

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 $DSCR_t^{Primary} \geq 1.0x$. However, it is most common that the SD evaluated with this methodology has access to reserves; therefore, its use would permit lower $DSCR_t^{Primary}$ 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*.

¹⁹ 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.

Calculating the TSR

Definition: *Target Stress Rate (TSR)*

The *TSR* 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 with the condition of replenishing the reserves used during the *Post-Critical Stress Period*. The *TSR* can be defined as the unique value that solves the optimization process while complying with the following conditions:

Calculate: the TSR^E

Subject to:

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

Where:

TSR^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 TSR^E to the *Revenue Allocated* is defined as *Critical Revenue*, the calculation of which is shown in the following expression:

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

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

Equivalence between the TSR and the Credit Rating of the SD

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

Figure 3: Ratings to TSR

Credit Ratings	TSR 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 figure 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 *TSR*.

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 *TSR* Calculation

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

In this 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 TSR^E is 80.62% and enables that the $DSCR_{t_{m+6}}^{Primary} = 0.49$ and the $DSCR_{t_{m+6}}^{Secondary} = 1.0x$. 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.

Figure 4: Model to determine the Target Stress Rate (TSR)

Cyclical Pledged Revenues	Debt Service	Primary DSCR	Min. DSCR	Critical Revenue (TSR)	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	2.78	\$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	2.74	\$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	2.70	\$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	2.66	\$5,695,531	\$25,000,000	\$25,000,000	9.93x	\$5,695,531
\$9,132,443	\$3,487,076	2.62x	t_{m-6}	\$1,769,754	0.51	-\$1,717,322	\$25,000,000	\$23,282,678	7.68x	\$0
\$9,133,813	\$3,539,382	2.58x	t_{m-5}	\$1,770,019	0.50	-\$1,769,363	\$23,282,678	\$21,513,315	7.08x	\$0
\$9,156,648	\$3,592,473	2.55x	t_{m-4}	\$1,774,444	0.49	-\$1,818,028	\$21,513,315	\$19,695,287	6.48x	\$0
\$9,179,539	\$3,646,360	2.52x	t_{m-3}	\$1,778,881	0.49	-\$1,867,479	\$19,695,287	\$17,827,808	5.89x	\$0
\$9,202,488	\$3,701,055	2.49x	t_{m-2}	\$1,783,328	0.48	-\$1,917,728	\$17,827,808	\$15,910,080	5.30x	\$0
\$9,225,495	\$3,756,571	2.46x	t_{m-1}	\$1,787,786	0.48	-\$1,968,785	\$15,910,080	\$13,941,295	4.71x	\$0
\$9,248,558	\$3,812,920	2.43x	t_m	\$1,792,256	0.47	-\$2,020,664	\$13,941,295	\$11,920,631	4.13x	\$0
\$9,271,680	\$3,812,939	2.43x	t_{m+1}	\$1,796,736	0.47	-\$2,016,203	\$11,920,631	\$9,904,428	3.60x	\$0
\$9,294,859	\$3,812,958	2.44x	t_{m+2}	\$1,801,228	0.47	-\$2,011,730	\$9,904,428	\$7,892,699	3.07x	\$0
\$9,373,865	\$3,812,977	2.46x	t_{m+3}	\$1,816,539	0.48	-\$1,996,438	\$7,892,699	\$5,896,260	2.55x	\$0
\$9,453,543	\$3,812,996	2.48x	t_{m+4}	\$1,831,979	0.48	-\$1,981,017	\$5,896,260	\$3,915,243	2.03x	\$0
\$9,533,898	\$3,813,015	2.50x	t_{m+5}	\$1,847,551	0.48	-\$1,965,464	\$3,915,243	\$1,949,779	1.51x	\$0
\$9,614,936	\$3,813,034	2.52x	t_{m+6}	\$1,863,255	0.49	-\$1,949,779	\$1,949,779	\$0	1.00x	\$0
\$9,696,663	\$3,813,053	2.54x		\$9,696,663	2.54	\$5,883,610	\$0	\$5,883,610	2.54x	\$0
\$9,779,085	\$3,813,072	2.56x		\$9,779,085	2.56	\$5,966,013	\$5,883,610	\$11,849,623	4.11x	\$0
\$9,925,771	\$3,813,091	2.6x		\$9,925,771	2.60	\$6,112,680	\$11,849,623	\$17,962,302	5.71x	\$0
\$10,074,658	\$3,813,110	2.64x		\$10,074,658	2.64	\$6,261,547	\$17,962,302	\$24,223,850	7.35x	\$0
\$10,225,778	\$3,813,129	2.68x	t_{m+11}	\$10,225,778	2.68	\$6,412,648	\$24,223,850	\$25,000,000	9.03x	\$5,636,498
\$10,379,164	\$3,813,149	2.72x		\$10,379,164	2.72	\$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	2.72	\$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	2.72	\$6,567,140	\$25,000,000	\$25,000,000	9.28x	\$6,567,140

Source: HR Ratings

With these characteristics and with a $TSR^E = 80.62\%$, the credit rating in this example is “HR AAA (E)”. Notwithstanding, and as shown in the Table 5, the value of the TSR^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.

Figure 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 (TSR)	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	2.78		\$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	2.74		\$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	2.70		\$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	2.66		\$9,131,074	2.66x	\$5,695,531	\$25,000,000	\$25,000,000	9.93x	\$5,695,531
\$9,132,443	\$3,487,076	2.62	t_{m-6}	\$2,301,706	0.66x	-\$1,185,370	\$25,000,000	\$23,814,630	7.83x	\$0
\$9,133,813	\$3,539,382	2.58	t _{m-5}	\$2,302,051	0.65x	-\$1,237,331	\$23,814,630	\$22,577,299	7.38x	\$0
\$9,156,648	\$3,592,473	2.55	t _{m-4}	\$2,307,806	0.64x	-\$1,284,667	\$22,577,299	\$21,292,632	6.93x	\$0
\$9,179,539	\$3,646,360	2.52	t _{m-3}	\$2,313,576	0.63x	-\$1,332,784	\$21,292,632	\$19,959,848	6.47x	\$0
\$9,202,488	\$3,701,055	2.49	t _{m-2}	\$2,319,360	0.63x	-\$1,381,696	\$19,959,848	\$18,578,152	6.02x	\$0
\$9,225,495	\$3,756,571	2.46	t _{m-1}	\$2,325,158	0.62x	-\$1,431,413	\$18,578,152	\$17,146,739	5.56x	\$0
\$9,248,558	\$3,812,920	2.43	t_m	\$2,330,971	0.61x	-\$1,481,949	\$17,146,739	\$15,664,790	5.11x	\$0
\$9,271,680	\$3,812,939	2.43	t _{m+1}	\$2,336,799	0.61x	-\$1,476,140	\$15,664,790	\$14,188,650	4.72x	\$0
\$9,294,859	\$3,812,958	2.44	t _{m+2}	\$2,342,641	0.61x	-\$1,470,317	\$14,188,650	\$12,718,333	4.34x	\$0
\$9,373,865	\$3,812,977	2.46	t _{m+3}	\$2,362,553	0.62x	-\$1,450,424	\$12,718,333	\$11,267,909	3.96x	\$0
\$9,453,543	\$3,812,996	2.48	t _{m+4}	\$2,382,635	0.62x	-\$1,430,361	\$11,267,909	\$9,837,548	3.58x	\$0
\$9,533,898	\$3,813,015	2.50	t _{m+5}	\$2,402,887	0.63x	-\$1,410,128	\$9,837,548	\$8,427,420	3.21x	\$0
\$9,614,936	\$3,813,034	2.52	t_{m+6}	\$2,423,312	0.64x	-\$1,389,723	\$8,427,420	\$7,037,697	2.85x	\$0
\$9,696,663	\$3,813,053	2.54		\$9,696,663	2.54x	\$5,883,610	\$7,037,697	\$12,921,307	4.39x	\$0
\$9,779,085	\$3,813,072	2.56		\$9,779,085	2.56x	\$5,966,013	\$12,921,307	\$18,887,320	5.95x	\$0
\$9,925,771	\$3,813,091	2.60	t _{m+9}	\$9,925,771	2.60x	\$6,112,680	\$18,887,320	\$25,000,000	7.56x	\$0
\$10,074,658	\$3,813,110	2.64		\$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	2.68		\$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	2.72		\$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	2.72		\$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	2.72		\$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 $DSCR_{t_{m+6}}^{Primary} = 0.64x$ and the $DSCR_{t_{m+6}}^{Secondary} = 2.85x$, 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)”.

Characteristics in the Application of the Model

Time horizon for the *TSR* Calculation

The analysis process is conducted throughout the period in which there is an outstanding balance of the debt acquired pending payment²⁰. However, in order to incorporate the sensitivity of creditor faced with the weakness of a structure in coming periods, the time horizon in which the payment period will sought with the minimum Primary DSCR will reduce. This time horizon is extended over the next two macroeconomic cycles according to the Cyclical Stress generated by HR Ratings and described in the two preceding sections.

Notwithstanding this, HR Ratings considers that the structure of the amortizations may imply a credit risk that, on applying the time horizon criterion, it will not be captured in the analysis, above all the curve of these amortizations is ascending. In case of stagflation, as the debt structure approaches maturity, a greater weakness associated with a lower primary DSCR level than expected in the next two macroeconomic cycles is estimated, HR Ratings will consider this period for the determination of the critical stress period.

Finally, when the remaining term of the debt is less than thirteen months at the time of the analysis, HR Ratings could consider the results obtained during the prior review period for the determination of the credit rating or use the remaining months to construct the *TSR*.

Determination of the Target Stress Rate (*TSR*) of *Ramo 33*

This section explains the calculation process of the *TSR* 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 *TSR*, 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

²⁰ 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.

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 FAFEF and the FAIS, in the long term.

For the calculation of the *TSR*, in the first place, it must be considered if the funds allocated from the payment source in the contracting year are enough to service the debt of the SD around the period of the minimum *DSCR*²¹. Once the foregoing has been reviewed, the *TSR* 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 *TSR* 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 analysis would be like 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 *TSR*.

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 guarantor's credit rating determines the guarantee's capacity of covering the necessary debt obligations during a period of stress, hence, the guarantor's credit rating must be equal or higher to the debt's credit rating for the guarantee to be considered during the process of analysis²².

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.

²¹ Any situation that is different from the one mentioned will be considered by HR Ratings and such information will be detailed in the report.

²² 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

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 or equal 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 the rating issued to the SD, HR Ratings will not incorporate its credit improvement within its analysis.²³

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 *TSR* 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 quality²⁴. 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 trust 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 SD²⁵. In this vein, the payment source is always used 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

²³ 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.

²⁴ If HR Ratings has not rated the issuer of the Zero Coupon Bond, the lowest rating in the market shall be used.

²⁵ HR Ratings considers that the fact that the flow circulating through the trust 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.

Primary DSCR and therefore, 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 like 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 TSR^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 TSR^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 enough reason for the annulment of the original allocation made by the state to the SD²⁶.

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 Federal fund as a primary payment source and an own fund as an additional payment source (secondary or substitute) or vice-versa²⁷.

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 method²⁸. 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.

²⁶ 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.

²⁷ 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.

²⁸ 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.

- 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 *TSR*, 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-”²⁹. 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 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

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 part³⁰. 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,

²⁹ The rating level established in this section refers to an SD the debt of which is backed by Federal transfers.

³⁰ Unlike bank loans, in most cases securities issues do not have a guarantee or recourse in terms of additional funds provided by the issuer.

it can be assumed that the entity would seek to restructure its debt or alter the legal documentation to make use of the funds affected by the trust, which would weaken the credit quality of the SD. Therefore, if the unsecured rating is lower than "HR BBB-", HR Ratings may propose an unfavorable adjustment, of one notch, to the SD's rating.

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 *TSR*³¹.
- If the fund is not liquid, but it guarantees 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.
- 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 2.0x³².
 - 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.

³¹ 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.

³² The value of the Primary DSCR projected may be rounded to the unit to the same as the value of the reserve fund.

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 clause³³.

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 default³⁴.

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

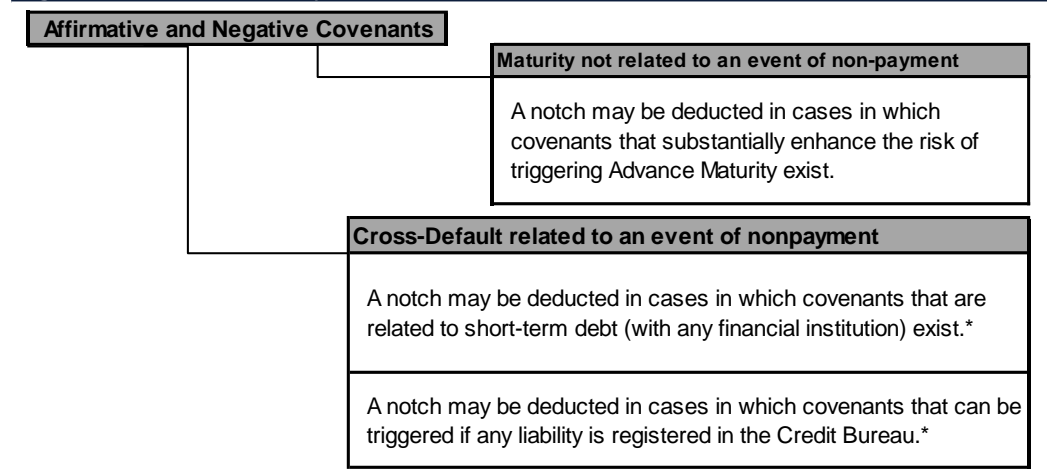
The qualitative adjustment will be based on HR Ratings’ perception and experience of the probability that the bank or holders’ meeting trigger an Advanced Maturity. Different rating actions may be taken in these cases, from the change of attribute to an unfavorable adjustment in terms of *notches*. The 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. Therefore, failing to pay the obligation would lead to the SD rating being at time the equivalent to HR D (E).

Figura 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:

³³ 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 TSR.

³⁴ 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.

Figure 6: Advance Maturity



Source: HR Ratings.

*The adjustment is only applicable in cases where 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 Figure 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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