HR Ratings® Credit Rating Agency

Methodology for Infrastructure

Rating for debt backed by revenue from the operation of highways, tunnels and bridges

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This methodology is the exclusive property of HR Ratings.

This Methodology describes the analysis applied to evaluate the credit quality of debt structures which source of payment comes from infrastructure projects, specifically highways, tunnels, and bridges. Therefore, this methodology evaluates the capacity of these projects to meet the payment obligations associated with these debt structures.

The document outlines the assumptions, metrics, and considerations used in the analysis process. It starts with a Quantitative Analysis (QA), from which the Annualized Stress Rate (ASR) is obtained. This Rate measures the annualized cumulative difference expected between the revenue in real terms earned under the base scenario and under the stressed scenario. The calculation of the ASR is in compliance with the restrictions established for the structuring, and consequently the prompt and full payment of the respective financial obligations. The Adjustment Considerations (AC) complement the QA by incorporating non-quantifiable risks or credit enhancements; this can adjust the QA in either direction or magnitude in order to obtain the Final Rating (FR).

- The QA starts with the preparation of a base financial scenario, which incorporates assumptions regarding: the vehicular traffic and its composition, the corresponding rates, the operating and maintenance expenses for the project, and the taxes, among other factors. These assumptions are used to determine the expected cash available for the debt service. Also, the debt servicing is projected according to the characteristics of the structuring, including the interest rate, the amortization curve, the designation of the reserve funds, and the existence of financial derivatives, among other characteristics. These processes are applied taking into consideration the base macroeconomic assumptions prepared by HR Ratings. The relevant variables for the structuring are projected considering the legal maturity date.

- After preparing the base financial scenario, the stressed financial scenario is developed. The stressed scenario maximizes the weakening structure's ability to pay, through a maximum drop in the vehicular traffic levels, without defaulting on the financial obligations (*breaking point*). It is important to mention that the flows under this scenario incorporate a cyclical projection for the traffic. The stressed scenario incorporates the economic and financial assumptions made by HR Ratings representing the least favorable impact on the operation, including interest rates, exchange rates, and inflation.

- The ASR is the core metric from which the results of the QA are drawn. This metric results from the calculation of the maximum annualized cumulative difference expected between the revenue, in real terms, under the stressed scenario and under the base scenario. This rating could be upgraded or downgraded based on the identified risks or credit enhancements. Such attributes are aspects that, due to their nature, are not found modeled in the base and stressed scenarios, and thus they are included as adjustment considerations (AC).

- The debt structures analyzed under this methodology require a legal assessment prepared by an independent, outsourced law firm with experience in infrastructure projects. The assessment must ensure that the structuring proposed satisfies the process of the authorizations and registries required, and that all the legal documents for the transaction constitute valid and legally binding obligations according to the terms agreed between the parties involved.

General Structure of the Rating Process

This document outlines the analysis process applied to evaluate the ability to pay, and by consequence, the credit quality of debt structures backed by revenue from infrastructure projects, such as highways, tunnels, and bridges.

The process that the analysis team applies to assign a rating will always be conditioned on the request for and subsequent delivery of an independent legal opinion, provided by a law firm with proven experience in infrastructure projects.[1] This opinion must evaluate the legal strength of the structured operation in terms of compliance with the obligations and legislation applicable to the debt placement process or the contracting of bank loans, among others, which includes a review of all the registries and authorizations required for this purpose. In addition, the opinion must indicate whether the documents constitute valid and legally binding obligations between the parties, according to their terms and conditions. Thus, once the law firm has reviewed all the legal documents, their legal opinion will state whether the legal structure for the operation is satisfactory.

The analysis team obtains the result of the QA, which translates into a preliminary quantitative rating prior to the FR, through an analysis of the following three components. First, the characteristics of the debt instrument in terms of currency or denomination, interest rate, term, amortization schedule, and other characteristics, such as the possibility of releasing remnants, minimum coverage levels, and capitalization of interest. The second component corresponds to the nature of the revenue that would represent the source of payment for the debt instrument in question. Lastly, an assessment of the expected interaction of all these components in terms of the existence of a potential credit risk that would have an impact on the performance expected for the operation.

The determination of the QA's result starts with a financial model that reflects the operational characteristics of the structuring, based on the creation of a revenue vector determined by the most probably traffic scenario, considering the composition of the traffic and the rates applicable for each type of vehicle. The scenario of traffic and revenue is referred to as the *base scenario*. Also, the scenario is prepared according to the most probable behavior of the relevant macroeconomic and financial variables for the analysis, as determined by HR Ratings. The modeling of the traffic and the revenue under this scenario is built following historical trends, and if relevant, the results of the traffic study prepared by an independent engineer.

The results obtained under the base scenario are compared against a stressed scenario. The purpose of the stressed scenario is to identify the limit at which the revenue ensures compliance will be met with all the debt obligations established in the structuring.

The stress is applied to the relevant variables for the structuring and the *breaking point* is reached through the maximum drop in terms of traffic. The modeling of the traffic for this scenario is specifically based on the application of theoretical volatility, which causes a cyclical behavior.

[1] The request for a legal opinion, by the analysis team, is subject to applicable legislation.

Furthermore, the macroeconomic scenario prepared by HR Ratings is used for variables such as inflation (important for determining the rates) and interest rates, as this will have a greater negative impact on the structuring.[2]

Generally the same operating and maintenance expenses for the asset[3] are maintained for both the base and the stressed scenario, and adjustments will only be applied for inflationary differences resulting from the macroeconomic scenario used.

The essence of the stressed scenario is that it defines the limit after which any additional reduction in the traffic, and by consequence in the revenue, would cause a default on the payment of the debt structure.

Once the analysis team has constructed the base and stressed scenarios, from which the vectors for the expected traffic and toll revenues can be obtained, the sum of the revenue is calculated in real terms for each scenario. Then, the existing annualized cumulative difference between both is measured, and it represents the maximum stress level referred to as the Annualized Stress Rate or ASR.

For structures that permit early partial capital payments, the ASR is calculated considering up to the last period when the debt is settled under both scenarios, which will result from the modeling of the terms and conditions for each structuring. Consequently the total settlement date for the debt could be different from the legal maturity date.

To sum up, the financial model that will be used to determine results of the QA will incorporate the maximum stress possible that the structuring could support in terms of reduced traffic. So, the revenue will be reduced permitting the structuring to meet the financial obligations according to the circumstances for default or an early maturity event as determined in the legal documents.

Additionally, the potential difference between the QA and the FR will be determined with the application of AC, which will reflect quantitative and qualitative aspects of both the project and the financial structure, and is incorporated qualitatively. These aspects cannot be included in the financial model used for the quantitative analysis.

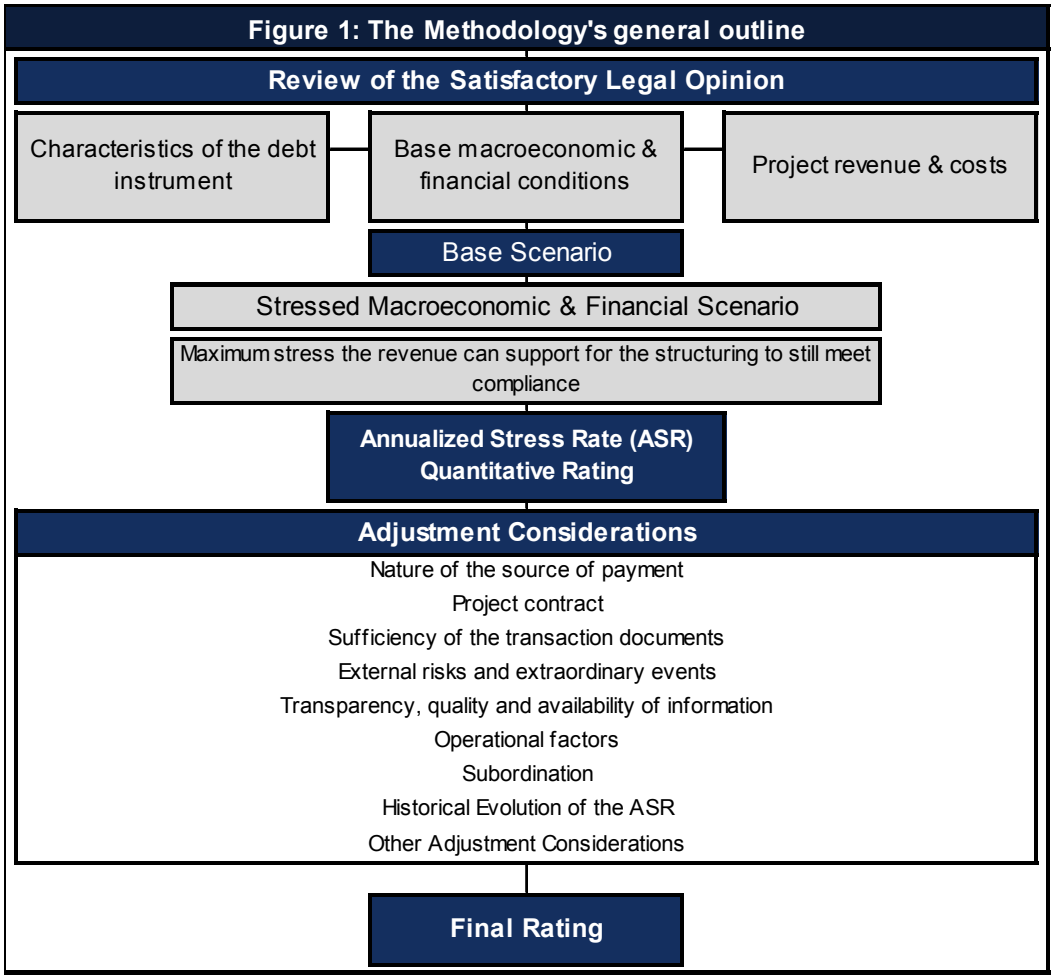
The quantitative and qualitative aspects could include, for example, the following: the nature of the source of payment, external risks and extraordinary events that could affect the proper operation of the project, transparency, quality and availability of information, the existence of technical committees,[4] sureties posted by third parties, and also operational factors noting the experience of the operator, the capacity to substitute vendors, and the experience of the independent engineer and the auditors.

Figure 1 summarizes the stages of the HR Ratings rating process, and its main components. It is important to note that this chart is not intended to be exhaustive, it rather shows the rating process schematically.

[2] The HR Ratings Economic Analysis Department prepares the macroeconomic assumptions and not the Infrastructure department team. These assumptions are applied to all structures and are changed only if the Economic Analysis Department modifies their estimates. Two scenarios are always analyzed: low growth with low inflation and stagflation. The scenario that generates a greater stress on the structure is the scenario applied.

[3] Regarding the operating and maintenance expenses, major and minor, for the asset, HR Ratings may request the budget prepared by a third party, which would include the future expenses for the asset according to the level of vehicular traffic estimated by any traffic study prepared for the project. Also, HR Ratings will request monthly expense reports, as part of its follow-up and monitoring for each structuring.

[4] HR Ratings will review the degree of Independence the technical committee has in terms of decision making, and also the fact that the protocols and mechanisms established contain adequate incentives and in keeping with the interests of the holders.



Fuente: HR Ratings

Terminology

This section details the principal terms used throughout this document, which are of particular importance in developing the possible ways for analyzing a structuring.

Debt Service

Includes interest and principal payments in the periods laid out in the structuring. Structures differ significantly in terms of the frequency of payment, and also the causes for default, which are defined in the documents for the debt. As our analysis will show, it is important to consider: whether the payments accrued can be capitalized or not; whether the amortizations of the principal are fixed or target; and to distinguish between target and fixed amortizations, on the one hand, and early amortizations on the other. These factors are important for preparing metrics such as coverage.

Cash Available for Debt Service (CADS)

The CADS is the difference between the revenue and the expenses that must be covered before servicing the debt, following at all times the payment waterfall defined in the structuring. The revenue is the resource generated by the operation of the asset, while the expenses generated by these assets primarily involve the maintenance required for the operation of the project.

In addition to the expenses associated with the project, the analysis team must consider the payments the structuring has to make, periodically for taxes[5], fees paid to various service providers, maintenance of the structuring, considerations required by law, derivatives, and to contract sureties posted by third parties. The expenses covered by cash from sources other than the source of payment for the debt are not included.

The CADS is always expected to be sufficient to settle the financial obligations, which typically cover the payment of the principal, ordinary and/or past due interests, and commissions for early payments.

Coverage Metrics

Debt Service Coverage Ratio

The Debt Service Coverage Ratio (DSCR) indicates the number of times the CADS can cover the debt service in a certain period of time. The DSCR is used in this methodology to measure the release of remnants on the structuring, among other functions.

The DSCR has different definitions. Thus, the documentation for each structuring may describe those that apply, and also the calculation used according to the contractual definitions. Generally, this quotient will reveal financial weakness in the structuring when it is closest o or under the unit (DSCR <= 1x).

The analysis team will distinguish between the primary and the secondary DSCR. Generally, the primary coverage measures the ratio between the CADS and the debt service in the same period, which could include, or not, the amortization of the principal, depending on the type of structuring analyzed.

The secondary coverage, in addition to the CADS, includes the resources available in the different funds the structuring operates and its flows can be used to cover the debt service.

Depending on each structuring, these funds may, for example, be the remnant funds, the debt service reserve fund, or a contingency fund, or even any surety contracted to secure prompt payment of the debt. Therefore, the secondary coverage includes all the resources available within the structuring to cover the debt service.

[5] This includes follow-up on the payment of the taxes applicable, such as income tax and value added tax. Also, if there are any fiscal losses, tax obligations, or asset depreciation, HR Ratings may request the accounting and fiscal financial statements, and also the audited reports, where such is the case.

Reserve Funds and Trust Accounts

Structures may apply different tools to strengthen their ability to pay or, in other words, to reduce their liquidity risk. The most common of these are defined following:

Remnants

These are resources remaining within the structuring after all the debt service payments, expenses, and other obligations defined in the corresponding payment waterfall, have been covered, including the replenishment and adjustment of the target balances defined for the various accounts or funds.

The remnants refer to the flow generated during a certain period and/or the cumulative amount from past periods retained by the structuring until these amounts are released to the settlor or the issuer according to the conditions established in the transaction documents.

Remnant Fund

The remnants corresponding to a certain period are deposited into this fund, according to certain circumstances, which must be clearly detailed in the transaction documents. The amounts deposited into this type of fund may, depending on how the fund is set up, be used to cover operating expenses or even the debt service.

In addition, the resources accumulated in this fund may be released, subject to certain conditions, as defined in the documents for the structuring, such as: (i) a fixed amount for the primary coverage, so that if this falls below said amount, the remnants are retained, (ii) that all funds maintain the balances required, and (iii) that there are no default events, among others. If the conditions established in the legal documents are not met, then the structuring will accumulate the remnants and may use these to make prepayments on the capital (Cash Sweep).

If the conditions established in the documents are met, the whole of the remnants may be released, or a certain percentage held in the corresponding fund.

Debt service reserve fund

Typically, the debt service reserve fund will have a target balance, either a fixed or variable amount. The fund must accumulate sufficient resources to cover the sum of the debt service for a certain number of projected periods. If the target balance for the reserve fund is not met, the resources may be absorbed from the remnant fund. However, each debt structuring will define the mechanism for replenishing the balance in this fund after falling below the target amount.

It is important to mention that any fund that could exist within the structure analyzed that if all or any of these should be created through the contracting of a letter of credit from any financial institution, said instrument must offer and guarantee the same liquidity as a reserve fund. HR Ratings will ask an independent and outside law firm to review the document (surety or letter of credit) covering the instrument to ensure its validity and legal enforceability. The credit quality of the surety or letter of credit will depend on the counterparty rating for the guarantor.

Lastly, if the structuring does not have this fund or the legal documents do not require the creation and maintenance of a reserve fund, the analysis team may apply an AC to the results of the QA, since such situation could increase the liquidity risk throughout the performance of the structuring.

Additional characteristics of debt structures

Structures may differ according to the fixed periodical amortizations and/or the rule for releasing remnants. In terms of the release of remnants, we can differentiate between open structures and closed structures.

Open structures are those that allow the release of a portion or all the remnants subject to the satisfaction of certain financial or legal requirements established in the documents. Meanwhile, *closed* structures are those that do not permit any release of remnants until the debt has been settled in full.

In general, the available resources on *closed* structures after the payment of the interest, the amortizations, and the replenishment and adjustment of the various target balances in the reserves, are used for early or accelerated payments on the outstanding balance. This type of structuring is known as zero flow and, as with open structures, it must comply with the payment of the total outstanding balance on the debt by the completion of the term on the structuring.

In terms of *required amortizations*, structures may be divided into those that make *target* capital payments and those that make *fixed* payments. A fixed amortization schedule will determine the amount of principal required to be covered in each period, so as to create a condition for default if the schedule established is not met.

The target or expected amortization schedule will determine the target amount of principal that, if there is sufficient cash available, according to the payment waterfall established, must be amortized in each period. However, unlike the fixed schedule, this would not generate a default event if the amount suggested or expected is not covered in each period, unless the legal documents stipulate otherwise. Despite this, the outstanding balance must always be covered in full on the legal maturity date for the structuring.

Subordination of Offerings

HR Ratings defines as “Senior” any debt instrument that receives the cash flow generated by an asset directly or indirectly, without this being used before payment is made on the financial obligations associated with another instrument, which would imply it does not come after any other obligation in the payment waterfall.

We classify as “Subordinate” any debt instrument whose payment is subject to the payment of any other instrument in the payment waterfall for any specific asset or the cash flows generated by this asset.

Legal Opinion

According to the General Methodological Criteria published by HR Ratings, a legal opinion will always be sought from an independent and outside law firm on the structured product, placed or expected to be placed.[6] The purpose of the opinion is for the law firm, through their analysis, to inform HR Ratings that the legal documents used for the rating process cannot be challenged before any court or authority on the placement or contracting of the debt or during the respective term.

The legal opinion does not evaluate the capacity of the asset to generate revenue to service the debt, rather the existence of legal elements to ensure the collection, distribution, and transfer of the revenue generated by the asset.

In addition to the legal opinion, the HR Ratings analysis team reviews, from an operational and financial perspective, the same documents to ensure there are no legal limitations that could have a direct or indirect adverse impact on the performance of either the asset or the structuring.

This review is not intended to substitute or replace the opinion resulting from the analysis performed by the law firm. However, the HR Ratings analysis team may decide to suspend the rating process if they find the characteristics surrounding the structuring to be unsatisfactory.

If the rating process involves a structuring expected to be placed in the future, the rating assigned by HR Ratings will be subject to the terms and conditions of the final legal documents being set according to the preliminary versions reviewed by the analysis team, and on which the independent legal advisor has issued their legal opinion. Any change in these conditions could affect the rating assigned.

Finally, in the event that the debt has already been contracted or the offering placed and the parties involved in the operation decide to amend the original legal documents, HR Ratings will ask the law firm to update their initial legal opinion. In these cases, it will be determined whether the rating review process would be subject to the current or to the new terms and conditions. However, in either of these situations, the analysis committee will make the decision case by case and this will be mentioned in the corresponding rating report.

Technical characteristics

To ensure a complete and transparent rating report for investors, a technical description of the most relevant aspects of the assets is included. The technical aspects may influence the modeling of the financial projections within the quantitative analysis used to calculate the ASR.

The details of the technical characteristics for this type of infrastructure project include, insofar as possible and without limitation, the following: the type of ground and type of roadway (according to the number of lanes in each direction), the length of roadway and

[6] According to applicable legislation.

the right of way, the years of operation, the toll collection systems (in the case of a toll project) and the vehicular traffic count, the security, assistance and moving of cash and equivalents, and also the control center and the zone of influence where the project operates, among others.

In the case of highways, a brief description may also be included of the connections, junctions, sections, number of collection points, characteristics of the substitute project for travel through the same area, and any other relevant factor that may be pertinent to add to better understand the operation of the project.

Determination of the Quantitative Analysis (QA)

Base Scenario

Study of the traffic projection and demand

The quantitative analysis process starts with building a base scenario, which incorporates the most probable macroeconomic assumptions for the projection of the vehicular traffic and for the rates corresponding to each type of vehicle, all according to the expectations of HR Ratings.

The traffic will be projected based on the last full year of operations for each roadway section relevant to the project. The expected growth rate for the next year is applied and so on successively. Once the total traffic vector has been projected,[7] the analysis team will separate this according to the composition of the traffic mix estimated for each year projected. The traffic mix will be based on that observed during the last years of operation. Then, the historical seasonality will be considered to obtain the monthly traffic projections.

A complete historical analysis of the demand curve for the roadway section in question must be performed, insofar as possible, in order to prepare the projections. HR Ratings will consider the factors that could stimulate demand, such as the quality of the service offered, the alternate routes available, or the complement to existing roadways.

A highway can serve different purposes of economic activity, for example, to transport goods and to promote tourism. This means that demand analysis is performed for each highway and its sections by type of vehicle. For example, a particular highway could benefit from the tourist activity in areas away from urban centers. Meanwhile, a tunnel, a bridge, or a bypass could shorten the distance between two industrial centers, assisting with the integration of a market and generating scale economies by reducing transportation costs.

However, HR Ratings considers that most of these infrastructure projects are highly susceptible to seasonal trends, therefore these trends must be considered for the projection of the traffic and revenue.[8] Demand can also vary with a change in the rates. Where the historical information so permits, HR Ratings will evaluate the asset's price elasticity of demand given adjustments observed in the rates.

[7] The total traffic vector considers all the years on the legal term for the operation analyzed.

[8] The nature and seasonality are more relevant for structures with fixed amortizations.

The sensitivity to these adjustments can vary according to the type of vehicle and the roadway section corresponding. When the historical information available for the operation of the highway is not sufficient to construct a demand curve, or when there is any expansion or relevant modification of any section of the highway, HR Ratings will ask the client for a traffic study prepared by an independent engineer or a firm expert in vehicular traffic projections.

The demand study will also be important in cases where the roadway sections have no or little operating history. However, the analysis team will determine whether to incorporate the estimates prepared and whether to apply adjustments.

All the assumptions regarding the traffic performance and the evolution of the vehicular mix will be justified and incorporated into each of our models and the analysis documents.

Once the analysis of the demand has been completed, the growth trend for the traffic will be determined considering that this is not necessarily constant over time. A convergence value may be determined within the projections.

The analysis may also incorporate the extraordinary growth rates corresponding to an initial period, when the project starts to gain traffic prior to the maturity, to then determine a convergence value for the growth rate. This type of modeling is intended to establish a “structural” trend value for the project. The value of the convergence rate will be established according to the experience of the analysis team.

However, as a result of the analysis and monitoring of the behavior of highway projects rated by HR Ratings, an initial period would generally be extended for a maximum of five years. At the end of this period, it has been observed that the economic activity of the region will have adapted to the new highway, tunnel, or bridge.

Additionally, the rates for each category of vehicle will be projected for the different relevant sections, based on the current rates and the policies established for their increase, according to the bases for rate adjustments for each project. The rates are projected in nominal pesos with annual adjustments according to the inflation projected by HR Ratings, which are normally incorporated at the beginning of the year, based on the inflation for the previous calendar year; however each project has different criteria for adjusting rates. The analysis team will consider in the projections the degree to which the rates have historically been adjusted according to inflation or the terms of the project and will consider these historical adjustments in the projection for the rates.

Revenue

Initially, the revenue is modeled in nominal terms with the adjustments corresponding accordant to the projection of the traffic and rates. However, HR Ratings recognizes the value of an analysis based on real revenue and rates in terms of comparability between different financial operations over time. Therefore, the calculation of the ASR will consider the revenue generated in real terms.

This will allow HR Ratings to comparatively analyze different projects according to the years of operation accumulated. Also, the analysis team may convert the values for a debt instrument from Investment Units (UDIs) into nominal pesos for the purposes of the comparative exercise.

Highway infrastructure projects generally define rate adjustment schemes, which consider annual rate increases according to the variance in the value of the INPC (Mexican Consumers Price Index). Also, there may be additional increases subject to certain conditions. HR Ratings will consider these mechanisms in its flow estimate, and the impact these could have on traffic.

Operation

HR Ratings will include in the quantitative analysis as many operational aspects as possible. Those operational factors that cannot be included in the quantitative analysis and which may carry collateral risks, direct or indirect, to the credit quality of the structuring will be evaluated in the section "Operational factors" in the Adjustment Considerations.

In order for HR Ratings to correctly assess the functioning of the project, and also the characteristics of the demand, all the information available for the operation must be incorporated into the financial model, insofar as possible. Extensive historical information helps to identify the behavior of the traffic against changes in the rates, the construction of nearby projects, changes in the quality of the service offered by the project and nearby projects, seasonal trends, and macroeconomic events, among others.

The projections in terms of the composition of the traffic are based, in part, on the analysis of the operation's history. Therefore, in those cases where HR Ratings considers that the information provided by the concessionaire and/or the operator does not meet the minimum standards of quality necessary, HR Ratings will require a traffic study prepared by an expert with proven experience in the sector. The analysis team will review the results of this traffic study and could take into consideration the information that best meets the growth expectations for the project.

Another relevant factor in building the financial model refers to the behavior observed and expected for the operating, administrative, and minor maintenance expenses for the project.[9] Given the nature of these expenses, abrupt inter-annual changes would not be expected, usually presenting a constant growth over time. In most cases, this growth is based on the variance observed in the Mexican Consumers Price Index (INPC). For our financial projections, the analysis team takes into account the different scenarios prepared by the HR Ratings economic analysis department.

The estimate for the project's expenses, prepared by an independent engineer, for not only the fixed but also the variable costs, is useful for the analysis team to project the expected expenses. In addition, the periods where major maintenance is to be performed can be included in the financial model, for greater certainty. HR Ratings may make adjustments to the annual budgets provided based on information for expenses actually incurred in previous years.

Given the inherent cyclicality of major maintenance expenses for highway projects, the debt structure may include a reserve fund allocated solely to this purpose. If there is such a fund in place, the analysis team will incorporate this into the financial model, and also the mechanism for replenishing the target balance after use and the ability of the operator to continue with an established multi-year program without compromising the liquidity and solvency of the structuring. Similarly, the mechanism for expending the major maintenance expense must be clear and flexible.

[9] The operating and administrative expenses include the benefits required by law, taxes (where applicable), the maintenance costs for the instrument or loan, the payment of sureties, payment for derivatives, among others.

Liquidity and third party sureties

The determination of the QA results considers all the restrictions the structuring must meet, particularly those focused on reducing the liquidity risk. HR Ratings will analyze how the different reserve funds are operated, and also the mechanisms for these to be replenished after their use. The characteristics of these funds will be those that, in situations of stress, can provide the structuring with additional and sufficient liquidity to be able to meet the financial obligations.

Given the nature of these funds, the structuring may use the resources held in the reserves in periods of economic and financial stress. Under these circumstances, the analysis team will then review the prompt replenishment to the target balance.

Additionally, a third party may offer surety for a percentage of the payment of the debt service or the outstanding balance. This could represent a credit enhancement for the structured operation. The sureties contracted must be incorporated, insofar as possible, into the quantitative analysis so that their potential effect on the liquidity level and solvency of the structuring is fully incorporated into the calculation of the ASR.

Insofar as possible, the analysis team will include the financial characteristics of the surety in the model, such as the amount covered or exposed, the amount available, whether the surety is revolving, the place it holds in the payment waterfall, the level of consideration, and the term for settlement, among others. Also, certain qualitative characteristics will be considered, such as irrevocability and without condition or restriction.[10]

Last but not least, the analysis team will evaluate the ability of the guarantor to comply with their commitment on the debt, through the counterparty rating in effect in the market. If the rating for the guarantor is lower than the rating for the structuring given by HR Ratings, the surety will not be considered a credit enhancement.

Stressed Scenario

The HR Ratings economic analysis department projects and updates long-term macroeconomic variables and scenarios as part of its normal operations. The base scenario represents what this Credit Rating Agency considers the most probable future performance given the current and projected economic and financial context. Based on this, the analysis team prepares the stressed scenario for a specific debt structure applying various phases:

First, the projection of the financial performance expected for a structuring throughout its life will incorporate the stress assumptions for the interest rate, inflation, and the exchange rate, among others.

Each stressed macroeconomic scenario is generated and provided by HR Ratings. There are two types of stressed scenarios: the first with low economic growth and low inflation (LGLI) and the other a scenario with low economic growth and high inflation

[10] When the surety cannot be incorporated into the Quantitative Analysis, this will be evaluated as an adjustment consideration.

(stagflation). The analysis team will use the scenario that reflects the maximum conditions of stress given the characteristics of the structuring to be analyzed.

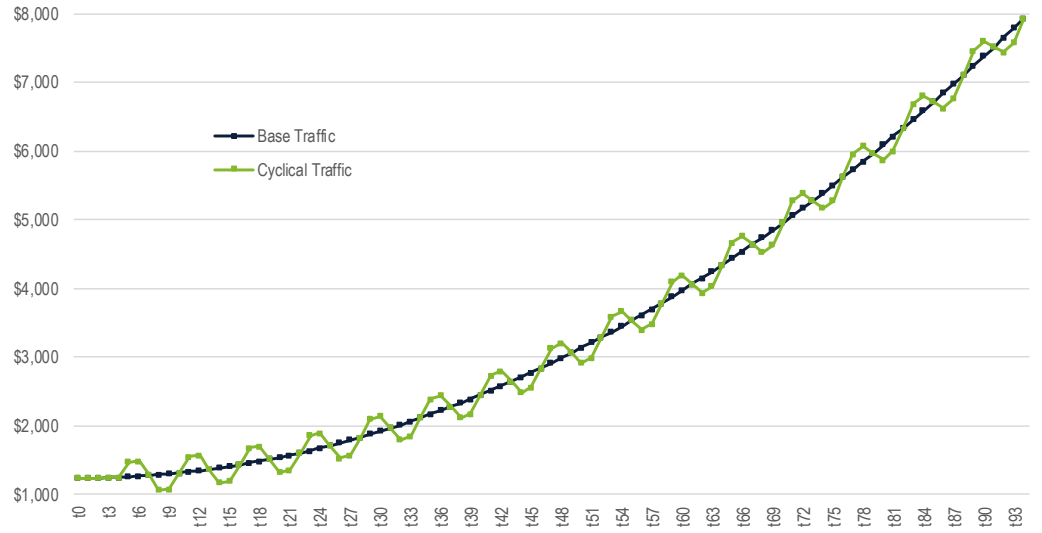
The LGLI scenario considers lower interest rates than those for the base macroeconomic scenario, as inflation is controlled. However, the economic growth would be lower among the scenarios mentioned. Meanwhile, the stagflation scenario incorporates interest rates above those for the base scenario in order to restrict the elevated inflation and lower economic growth than for the base scenario, but higher than for the LGLI scenario.

The assumptions for the macroeconomic scenarios generated by HR Ratings change over time, depending largely on the economic and financial information reviewed by the economic analysis department. These changes are presented in the reports published regularly by this department.

The second phase for the preparation of the stressed scenario consists of converting a base traffic scenario into a scenario with cyclical projections.[11] The cycle will determine the variances, positive and negative, in the traffic in terms of the estimate for a certain period.

The projection of the traffic under the stressed scenario starts with the estimated growth curve for the traffic in the base scenario. A periodical cycle is incorporated into this, which will be proportionately homogeneous in terms of maximum and minimum separation in relation to the original base growth curve, and also its length.

Base Scenario and Cyclical Base Scenario



Source: HR Ratings, hypothetical case

[11] The parameters used to model the cycle will be those that are approved by the analysis team and, by consequence, in effect at the time of the analysis.

The incorporation of a cyclical behavior in terms of the expected performance of the traffic will, by consequence, lead to cyclicality in the generation of the revenue. This could, in turn, have an impact on the financial performance of the structuring analyzed.[12]

Once the analysis team has determined the projection for the cycle, reductions in the traffic are applied in order to obtain the maximum reduction the structuring is able to support before the revenues generated would cause a default on payment (*breaking point*).[13]

Lastly, the difference is calculated between the sum of the total revenue under the base scenario and the revenue under the stressed scenario, both in real terms. This difference is used to determine the ASR, according to the formula explained in the next section.

Calculation of the Annualized Stress Rate (ASR)

The ASR is calculated in order to standardize the stress level on the revenue, in real terms, that the different debt structures and sources of payment are able to support, taking into consideration the difference in term for the structures rated by HR Ratings. The ASR is defined as the absolute value for the cumulative difference between the revenue in real terms generated under the stressed scenario and that generated under the base scenario.

$$ASR = \left| \left(\frac{\sum_{t=1}^{n} Real\ Revenue\ Stressed_t}{\sum_{t=1}^{n} Real\ Revenue\ Base_t} \right)^{\left(\frac{12}{n}\right)} - 1 \right| = \left| \left(\frac{Cumulative\ Real\ Revenue\ Stressed}{Cumulative\ Real\ Revenue\ Base} \right)^{\left(\frac{12}{n}\right)} - 1 \right|$$

Where:

$$n = number\ of\ months\ used\ for\ the\ analysis$$

As mentioned, the base scenario is built on the most probable future trends for traffic and revenue that would fully cover all the obligations associated with the structuring analyzed. Therefore, the stressed scenario corresponding to the base scenario will use lower traffic and revenue trends. This will result in the absolute value for the above equation being negative.

The application of the stressed scenario will result in an optimal ASR whose cumulative revenue will permit, at the limit, compliance with the financial obligations of the debt structure. This process will find the maximum stress the structuring can support in terms of traffic and, by consequence, revenue. Here, the stress will be such that the sum of the balances, after covering the debt service and considering the different funds the structuring may have, will be sufficient to cover the balance contracted for the debt at the end of the operation.

The optimization process is described following:

[12] It is important to emphasize that the cycle will always operate on the traffic projection, therefore the cycle observed for the revenue is the result of this analytical process.

[13] The definition of default may vary according to the legal documents for each structuring.

$$\text{Optimize: } \left(\frac{Real\ Cumulative\ Revenue\ Stressed}{Real\ Cumulative\ Revenue\ Base}\right)^{\left(\frac{12}{n}\right)} - 1$$

Subject to:

$$\sum_{t=1}^{n} Cash\ Available_t + Reserve\ Fund \geq \sum_{t=1}^{n} Interest_t + Contracted\ Debt\ Balance$$

This problem requires an additional condition for each period, which will vary depending on the type of structuring:

a) If the amortization schedule is target

$$Stressed\ Cash\ Available_t + Reserve\ Fund_t \geq Stressed\ Interest_t$$ [14]

b) If the amortization schedule is fixed

$$Stressed\ Cash\ Available_t + Reserve\ Fund_t \geq Stressed\ Interest_t + Principal_t$$

It should be noted that although the restrictions on the optimization problem above are defined in nominal terms, the revenue in real terms is used to estimate the ASR.

HR Ratings recognizes that the ASR is sensitive to the remaining periods in the term on the structuring. This is because the obligations will decrease over time as the principal is amortized, therefore the structuring will support higher levels of stress as the principal is amortized and the amount of interest, accordingly, lowers.

Table 1 offers a hypothetical example of a debt structure where the calculation of the ASR is shown according to the equation presented above. For the purposes of example, this case assumes the revenue flow covers the debt service directly. A highway project structuring will usually cover its debt service with the cash available once the operating, administrative, and maintenance expenses for the project have been covered, and also other expenses, such as taxes.

In this hypothetical case, the condition that restricts the optimization problem is met:

$$\$133{,}760{,}913.31 + \$10{,}000{,}000.00 = \$100{,}000{,}000.00 + \$43{,}760{,}913.31$$

As shown in the table, given the drop in revenue, the ASR that would resolve the optimization problem is equal to 0.51% (remembering that this rate is calculated in real terms, therefore it includes inflation assumptions for each scenario). This value is given a rating in the Quantitative Analysis.

The ASR is obtained from the following equation:

$$ASR = \left|\left(\frac{\sum_{t=1}^{n} Real\ Revenue\ Stressed_t}{\sum_{t=1}^{n} Real\ Revenue\ Base_t}\right)^{\left(\frac{12}{n}\right)} - 1\right| = \left|\left(\frac{934{,}517}{1'080{,}626}\right)^{\left(\frac{12}{340}\right)} - 1\right| = 0.51\%$$

[14] This condition will not apply to the last payment on the instrument.

Table 1: Calculation of the ASR				
Number of months			340	
Annualized Stress Rate (ASR)			-0.51%	
Period	**Nominal Base Revenue**	**Stressed Nominal Revenue**	**Base Real Revenue**	**Stressed Real Revenue**
t_1	$2,820	$2,820	$2,820	$2,820
t_{2-10}	$25,544	$25,437	$25,228	$25,122
t_{11-20}	$28,733	$28,385	$27,817	$27,480
t_{21-30}	$29,106	$28,514	$28,425	$27,847
t_{31-40}	$29,484	$28,643	$28,298	$27,491
t_{41-50}	$29,867	$28,773	$28,810	$27,755
t_{51-60}	$30,256	$28,903	$28,792	$27,504
t_{61-70}	$30,649	$29,034	$29,204	$27,666
t_{71-80}	$31,047	$29,166	$29,297	$27,521
t_{81-90}	$31,450	$29,298	$29,605	$27,580
t_{91-100}	$31,859	$29,431	$29,813	$27,540
$t_{101-110}$	$32,273	$29,564	$30,015	$27,497
$t_{111-120}$	$32,692	$29,698	$30,342	$27,563
$t_{121-130}$	$33,117	$29,832	$30,434	$27,416
$t_{131-140}$	$33,547	$29,968	$30,884	$27,588
$t_{141-150}$	$33,983	$30,103	$30,861	$27,338
$t_{151-160}$	$34,424	$30,240	$31,438	$27,616
$t_{161-170}$	$34,872	$30,377	$31,296	$27,263
$t_{171-180}$	$35,325	$30,514	$32,005	$27,647
$t_{181-190}$	$35,784	$30,652	$31,741	$27,190
$t_{191-200}$	$36,248	$30,791	$32,585	$27,680
$t_{201-210}$	$36,719	$30,931	$32,320	$27,225
$t_{211-220}$	$37,196	$31,071	$33,053	$27,611
$t_{221-230}$	$37,680	$31,212	$32,912	$27,262
$t_{231-240}$	$38,169	$31,353	$33,531	$27,544
$t_{241-250}$	$38,665	$31,495	$33,518	$27,302
$t_{251-260}$	$39,167	$31,638	$34,018	$27,479
$t_{261-270}$	$39,676	$31,781	$34,138	$27,344
$t_{271-280}$	$40,192	$31,925	$34,516	$27,417
$t_{281-290}$	$40,714	$32,070	$34,773	$27,389
$t_{291-300}$	$41,243	$32,215	$35,023	$27,357
$t_{301-310}$	$41,779	$32,361	$35,422	$27,436
$t_{311-320}$	$42,322	$32,508	$35,540	$27,299
$t_{321-330}$	$42,871	$32,655	$36,086	$27,486
$t_{331-340}$	$43,428	$32,803	$36,068	$27,243
Cumulative Revenue	$1,202,901	$1,036,160	$1,080,626	$934,517

Source: HR Ratings, hypothetic case

Adjustment Considerations (AC)

Once the Quantitative Analysis for the structuring has been completed, the next step is to evaluate the impact of the criteria presented in this section, which could affect the analysis either way. The reasons for determining whether to reward or punish the structuring as a result of the analysis of the AC are expressed in the analysis committee corresponding, where the lead analyst on the rating or the department head will initially propose to the committee the action based on the analysis performed. The members of the committee may also propose a punishment or reward on the Quantitative Analysis. The considerations will not have a set weighting as the impact these may have on the credit quality could be different depending on each structuring. These quantitative or qualitative factors, evaluated qualitatively, can be grouped as follows:

Nature of the source of payment

Given the importance of the source of payment for the HR Ratings analysis, the analysts must confirm, with the support of the independent and outside law firm, that the collection rights for the source of payment for the debt are correctly assigned to the Settlor/Issuer through the respective contract, whether this is a concession title, a service agreement, and any other similar contract, entered into between the Settlor/Issuer and the corresponding party or parties.

If the Settlor/Issuer does not own the collection rights on the contract, the analysis team will verify whether there is a contract in place where the owner assigns these rights to the Settlor/Issuer. It will take into account the elements related to the nature of the source of payment that could have positive or negative implications for the rating.

In addition, whether the owner of the collection rights is a public or private body and the possible risks or benefits this could have in terms of the rating is taken into consideration.

Added to the legal considerations for the structuring, due to the nature of the source of payment, HR Ratings refers to the relevant level of predictability and volatility. Highways with no history or in their initial phase may be particularly difficult to project, therefore adjustment considerations may be incorporated given this level of uncertainty.

Project Contract

Independent of any legal opinion issued by the law firm, the analysis team will conduct its own evaluation of the principal characteristics of the project contract, which may involve a concession title, a service agreement, or any other similar contract.

This evaluation incorporates the strength or weakness of the source of payment in operational, legal, and financial terms. The characteristics taken into account may include, but are not limited to: (i) the jurisdiction over the highway section analyzed, whether this is state or federal, (ii) the contract term and the possibility of extending that term, (iii) the policy for rate adjustments, (iv) the existence of a management and/or treasury trust, and also the principal conditions and characteristics of this trust, (v) the

financial solidity of the service provider (i.e. the concessionaire), restrictions on ownership and change of ownership control, (vi) the ability to substitute the operator, (vii) the causes for rescission, rescue, or early termination of the project contract, (viii) restrictions on the indebtedness of the service provider, (ix) possible indemnity in the event of the rescission or rescue of the project, (x) the sureties offered to creditors (including, as applicable, the holders of trust certificates), and (xi) the contracting of insurance and coverage.

Transaction documents

Based on the legal opinion and other support documentation for the structuring, the analysis team will evaluate the characteristics considered essential for a structuring, and also the risks and/or credit enhancements these documents could add to the operation, such as: (i) the correct transfer and assignment of the source of payment and/or the surety or sureties, (ii) the covenants of the parties (issuer, trustee, settlor, guarantor, common representative), (iii) the causes for breach or default set forth in the transaction documents, (iv) Crossed maturity clauses for offerings placed under cover of a program or any other offering that shares the same source of payment, (v) the ability to substitute the trustee, the master servicer, the common representative, the operator, or any other party involved in the transaction whose behavior could affect compliance with the obligations established in the transaction documents, (vi) structure, voting, and powers of the technical committee (as applicable), (vii) sureties posted by third parties, etc.

HR Ratings will estimate the risk associated with any covenant established in the transaction documents that would compromise the financial, legal, and/or operational stability of the structuring. The most common cases involve early maturities called due to low levels of primary coverage or the inability to replenish any reserve fund after use.

Operational factors

Although the concept of the ASR already includes various operational factors for a highway, bridge, or tunnel infrastructure project, this section distinguishes others that for any reason may not have been incorporated into the quantitative analysis.

The aspects considered include the following: (i) the insulation level of the debt structure for the risk of the issuer, concessionaire, and/or operator, (ii) the experience of the operator with similar projects and their quality, (iii) the pricing policies and ability to substitute a subcontractor, (iv) the experience and background of the independent engineer, (v) the situation of the right of way, (vi) ratings given by the SCT or similar in terms of the quality of the roadway, (vi) the renewal of insurance and bonds, and any other aspect that would be relevant to the analysis team during the onsite visit conducted.

Subordination

The analysis committee evaluates all the aspects related to the subordination of a debt instrument. To this effect, the committee may opt to apply an adjustment if the characteristics of the senior instrument had an impact on the performance of the subordinate instrument.

External risks and extraordinary events

The analysis team will consider, within the AC, the vulnerability of the project to acts of force majeure. These include the impact the construction of alternate routes representing direct competition for the project could have on the asset, and also meteorological events, natural disasters, public demonstrations, blockages, and acts of vandalism.

Transparency, quality and availability of information

According to the General Methodological Criteria applicable to all classes of assets rated by HR Ratings, the analysis team will evaluate, during the rating process, the clarity and timeliness of the information received, and also the availability and professionalism of the persons responsible for delivering this information to HR Ratings.

It should be noted that a lack of information, particularly regarding the traffic and revenue for the different projects, may not be necessarily due to poor recordkeeping on the part of the operator (which may be an entity other than the holder of the collection rights), as it may simply be the case that the project is still under construction or has only recently started operations. In these cases, it will be particularly important to incorporate the independent study prepared by the expert.

If the lack of information is due to an inadequate record system, the analyst may suggest to the analysis committee a punishment in terms of notches to reflect the risk of uncertainty. These events tend to also lead to even more conservative estimates for the traffic and other control variables in order to mitigate the risk in question.

Finally, any deficiency in the delivery of information may also include cases where the parties involved have decided to make legal changes during the term on the debt structure. As mentioned under these circumstances, the analysis team will ask for the legal opinion delivered by the law firm to be updated. In this case, HR Ratings will require the timely delivery of all the legal documents that amend the transaction, which will be sent to the law firm.

Historical Evolution of the ASR

HR Ratings recognizes that on being an annualized metric, the ASR is sensitive to the remaining periods on the debt term. This is because the financial obligations will decrease over time as the principal is amortized, therefore the structuring will support higher levels of stress as the principal is amortized and the amount of interest, accordingly, lowers. Therefore, HR Ratings may, in addition to the ASR obtained from the quantitative analysis, consider the historical evolution of this metric over time.

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