Risk Sharing in the New Public Works Concession Law in Spain

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Budgetary constraints are forcing transport infrastructure authorities to raise private funds to finance the construction of new projects and the maintenance of existing ones by using concession contracts. One of the key elements in correctly defining a concession scheme is to establish an adequate risk-sharing mechanism among the stakeholders that take part in the process. This paper describes and analyzes the effect of the new Spanish Concession Law on risk sharing, in particular, the effect of the so-called progress clause on the calculation of risk held by the concessionaire. This law was designed both to reinforce private financing of public facilities and to improve the legal framework by defining a new risk-sharing approach, particularly in relation to the risks involved in estimating traffic demand. The paper finishes with an analysis of a specific application of the traffic risk-sharing approach for highway concessions in Spain.

Many developed countries around the world are making a major effort to avoid public deficits. This effort places significant budgetary constraints on the construction and maintenance of transport facilities. Some studies, however, emphasize the relevance of public capital stock together with research and development in promoting both sustainable economic growth and social equity in developed economies (*1–3*).

As a consequence, many governments are encouraging new ways to support private sector financing and operation of transport infrastructure. One of the most common ways of implementing private participation is through the concession system, which basically consists of transferring construction, maintenance, and operation of infrastructure to a private consortium, in exchange for the right to charge a user fee for a period of time, fixed or variable, but contractually agreed in advance. As described in Vassallo (*4*), infrastructure concessions incorporate some features that distinguish them from other construction and maintenance contracts and also from the basic asset privatization procedure.

Regulation of infrastructure concessions is studied in some detail in the literature concerning tendering theory (*5*), public contract theory (*6*) and principal–agent theory (*7*). A key issue is the difficulty of establishing complete clauses in long-term infrastructure concession contracts (*8*).

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NEW PUBLIC WORKS CONCESSION LAW IN SPAIN

In May 2003, the Spanish Parliament approved a new concession law (Ley 13/2003 Reguladora del Contrato de Concesión de Obras Públicas). The objectives of this law were, among others, to update the old highway concession model and extend it to every type of public works, to reinforce private financing of the construction and maintenance of public facilities, and to improve the legal framework by defining a new risk-sharing approach (*9*).

Before the implementation of the law for a specific type of infrastructure (e.g., roads, railroads, and water facilities), the approval of the general bidding terms for this kind of infrastructure is required. The general bidding terms are regulatory dispositions specifying how the law must be applied to a specific kind of infrastructure. The first draft of the General Bidding Terms for Highway Infrastructure Concessions (GBTHIC) was recently completed. However, when this draft was close to being approved, the government in Spain changed, which halted the GBTHIC approval process. At the time this paper was written, the new law had still not been implemented; thus, this paper is premised on the text of the law and on the draft of the text of the GBTHIC, not on what, in practice, has occurred.

The new law stipulates that a concession contract may cover the construction, maintenance, and operation of a new infrastructure or the maintenance and operation of an existing infrastructure. In addition, the new law regulates new private funding sources to finance concession projects: senior and subordinated loans, the issue of bonds and other securities, securitization, mortgaging the concession assets and shares, and so forth. A detailed analysis of all of the elements of the law that address private funding would require a separate paper, so this issue will be discussed briefly. However, it is important to note that the new law attempts to provide a secure framework upon which to promote the participation of the capital markets in funding infrastructures in Spain. Until the approval of the law, the financing of infrastructures in Spain was almost entirely through syndicated loans provided by banks.

Regarding traffic demand management in peak periods, the law allows variable tolls in order to maximize the social benefit. However it places two limits on this variability: a limit on the maximum tariff that can be charged in the peak hours every year, and a limit on the average tariff applied in a year. These limits are to be updated every year according to such factors as rate of inflation and labor cost. The maximum level imposed will avoid abuses on the concessionaire in the peak hours; the average limit intends to regulate the monopoly.

The following sections of this paper address the risk implications of the new law, setting aside for the moment the law's other interesting legal and financial issues.

RISK IN PUBLIC WORKS CONCESSION PROJECTS

Risks abound in public works concession projects and can be classified by (*9*)

- The financial and economic elements that the risks may affect: initial investment, project revenues, or maintenance and operation costs;
- The causes of the risk: market conditions, unpredictable events, legal and political issues, and other factors; and
- The agent or stakeholder that finally assumes the risk: public authority, concessionaire, constructor, operator, lender, insurance company, or other party.

Transportation concession risks may also be classified as construction risks, operation risks, and demand risks. Construction risk includes not only the risk derived from the construction itself (climate, geology, efficiency of the works, and so on), but also the risk of land requisition and the risk of obtaining the necessary permissions and licenses in a timely manner. Operation risks have not generally been important in the granting of transportation concessions because they have represented neither a significant amount compared with the high levels of initial investment, nor a major element of uncertainty in the contract.

Up to now, the most complicated risk to assign has been demand risk. Traffic is the key factor in obtaining revenues and determining the financial viability of the project, and traffic forecasting is not easy: Demand depends on a wide range of factors that are difficult to predict, such as expected economic growth, future competition from parallel facilities, and user behavior regarding tariffs. The uncertainty of the estimates becomes larger the further into the future predictions are made; consequently, predictions about the last years of the concession can hardly be calculated with certainty. This situation has forced many public authorities in charge of infrastructure concessions to focus their work on implementing new traffic-related risk-sharing schemes. In the past few years, many have been implemented.

One interesting scheme designed to mitigate traffic risk in Chile is based on the least present value of the revenue, which has been analyzed in-depth in the economic literature of the past few years [Gomez-Lobo and Hinojosa (*10*) and Engel et al. (*11, 12*)]. In brief, through this mechanism the concession contract is awarded to the bidder that offers the least present value of the revenues to be obtained during the lifespan of the project. The concession contract ends when the concessionaire has received the present value of the revenues that it declared in its offer. Consequently, for the same level of tariff, if traffic is lower than expected, the term of the concession will be longer; if the traffic is higher than expected, the term will be shorter.

Finally, some schemes, such as the one implemented in the E-407 toll highway in Toronto, were based on permitting a certain flexibility in the price cap regulation approach, depending on the traffic growth, in order to mitigate revenue perception risk. The regulation addressed in the contract states that the concessionaire can increase the tariff from one year to the next whenever it wants, as long as a minimum traffic growth per year is achieved.

RISK ALLOCATION IN NEW SPANISH LAW

The approach of the new law regarding risk distribution in infrastructure concessions is based on the following principles:

- The private sector should be allocated most of the market risks.
- The public sector should be allocated the risks that cannot be adequately managed by any other stakeholders.
- The public sector may assume or mitigate some risks, but this assumption should generally avoid increasing Spain's public deficit. To that end, the law defines that the mitigation will consist basically of modifications in the economic parameters (prices, concession term, and so on) initially fixed in the contract. Public subsidies are contemplated as a means of rebalancing the economics of the contract in exceptional circumstances, but their use is strongly constrained by the law.
- The risk mitigation must be understood in a symmetrical way, either in favor of the concessionaire or in favor of the Public Authority.

Legal and Political Risk

Because infrastructure belongs to the public sector, the government has the right to change the terms of the contract to coincide with the public interest. If this change affects the economic balance of the concession, the initial conditions can be modified in favor of the concessionaire or the administration compensate for this change. Moreover, if the administration takes some action not foreseen when the contract was signed, and this action substantially affects the economics of the contract, the economic balance should also be reestablished.

In the case that either the public authority or the concessionaire considers that there was "substantial rupture" in the underlying economic assumptions of the economics of the contract, they must try to agree on a solution. (The law does not specify the meaning of "substantial rupture.") If they do not arrive at an agreement, they can decide whether to solve the disagreement in the court or by arbitrage. Until the conflict has been resolved, the concession terms will be those set up by the public authority.

Unpredictable Events

Unpredictable events are those that are impossible to foresee at the beginning of the concession contract and that may substantially affect the economics of the concession. Unpredictable events include, for example, a terrorist attack that could destroy the infrastructure for a time, events of force majeure (fire caused by atmospheric electricity, natural phenomena with catastrophic implications, and damages caused by war and serious alterations of the public order), or the development of a new means of transportation that diminishes much of the demand on the infrastructure concession.

The new Spanish law says that the administration must reestablish the economic balance of the contract, to the benefit of the relevant party, when circumstances of force majeure lead directly to "substantial rupture" of the financial terms of the concession. The Spanish Concession Law does not include, as a justifiable cause for rebalancing the financial terms of the concession, many kinds of unpredictable events that are not manageable by the concessionaire, because force majeure is understood by the law as a small part of these events. This situation has provoked extensive criticism of the law, especially by financial institutions that feel that a relevant risk that can be managed by neither the private sector nor the insurance companies nevertheless remains implicit in the project.

Demand Risk

To avoid the drawbacks caused by the difficulty in estimating traffic demand, the new law has defined a system for reducing traffic risk in order to avoid as much as possible both future renegotiations and commitment of public resources. To that end, the law provides that the bidding terms could set up a procedure to mitigate traffic risk by establishing, for instance, a bottom band in terms of any variable—

traffic or revenues, for example—related to the financial result of the concession, defined in the bidding terms, under which some of the fixed variables of the contract could be changed to rebalance the financial terms of the contract. A detailed description of the implementation of this procedure is given in the next section.

Construction and Operation Risk

The new Spanish concession law establishes that the construction risk should be borne as part of the cost of the project. However, the law allows the concessionaire the possibility of transferring this risk to the construction company. In addition, the law makes it clear that when the concessionaire delays execution of the work, and the delay is due to *force majeure* or to a cause attributable to the administration granting the concession, the concessionaire shall be entitled to an extension in the duration of the concession.

Regarding operation and maintenance risk, the new law incorporates two novel features: the so-called progress clause and the introduction of bonuses and penalties related to the fulfillment of certain quality criteria. The progress clause consists of the obligation of the concessionaire to maintain and operate the public works according to the technical, environmental, and safety regulations that may be applicable at each moment. In turn, with the introduction of penalties and bonuses derived from quality indicators, the law intends to encourage the concessionaire to render the best possible service to the larger society.

Some of the main private concession companies in Spain have complained about the introduction of this progress clause, arguing that it transfers a large amount of risk to the concessionaire. These companies argue that, according to this clause, if changes in environmental regulations require that the infrastructure be located, for instance, at a subterranean level so as to reduce noise pollution, the concessionaire will be forced to carry out these expensive works without any right to be compensated. These companies' complaints do not have much justification because, as was explained in the section on legal and political risk, the public authority is obliged to compensate the concessionaire when actions from the administration may lead to substantial rupture of the economics of the contract. In spite of this, a more detailed regulation of this clause seems warranted to design a more comprehensive risk-sharing framework.

Although the progress clause may be considered one of the most important contributions of the new law, this clause began to be incorporated in the last highway concession contracts tendered in Spain before the law was approved. In those contracts, the development of the progress clause stated that the concessionaire will be obliged to apply subsequent measures approved according to the corresponding guidelines for roads and highways. In this case, the concessionaire will not have any right to claims for compensation from the administration, except if the measure entails substantial costs not previously contemplated. This scheme was the one adopted in the GBTHIC draft regarding risk sharing. Obviously, the interpretation of "substantial cost" raises the same problems that were commented upon in the legal and political risk section.

APPLICATION OF DEMAND RISK SCHEME TO HIGHWAY CONCESSIONS

Because of the interest in the demand risk-sharing scheme defined by the new Spanish law, this section focuses on the regulation that, based on the law, was specifically designed for highway concessions in Spain. The Transport Department of the Polytechnic University of Madrid carried out the development of the draft clauses regarding risk sharing of the GBTHIC by order of the Ministry of Public Works. This section give specific details about the mechanism established.

Definition of Symmetrical Bands

To understand the mechanism it is necessary, first, to define the basic equation of the economic balance of a concession. This equation can be displayed as follows:

$$I_o - S = \sum_{i=1}^{i=n} \frac{[p_i \cdot q_i(p_i) - c_i - t_i]}{(1+\alpha)^i} \tag{1}$$

where

I_o = initial investment,
S = initial subsidy provided by the public authority,
α = weighed average cost of capital (WACC) of the project,
n = concession term,
p_i = price for year i,
$q_i(p_i)$ = actual traffic in year i depending on p_i,
c_i = operation and maintenance costs in year i, and
t_i = corporate taxes in year i.

Equation 1 says that the revenues obtained by the concessionaire minus the costs necessary to render the service must be able to remunerate a cost of capital equal to α. This equation will be taken into account by every bidder at the time of preparing its offer. Depending on the traffic that each one forecasts, its efficiency in terms of cost, and its cost of capital, the bidder will be more or less competitive in the tender.

One of the issues that was more intensively discussed in the implementation of the traffic risk-sharing mechanism was the definition of the top and bottom band variable previously introduced. In this process four alternatives were contemplated: a traffic-based variable, a revenue-based variable, a profit-based variable, and a variable based on the accumulated present value of the revenues (APVR) obtained by the concession.

$$I_o + \sum_{i=1}^{n} \frac{c_i + t_i}{(1+\alpha)^i} = S + \sum_{i=1}^{i=n} \frac{[p_i \cdot q_i(p_i)]}{(1+\alpha)^i} \tag{2}$$

From Equation 1 it is easy to obtain Equation 2. Once the concession discounted revenues (right side of the Equation 2) exceed the concession discounted costs (left side of Equation 2) the internal rate of return of the project will be higher than the cost of capital. Consequently, the key variable in determining the extent to which the concession is able to cover its discounted costs is the accumulated present value of the revenues obtained (APVR). As was discussed before, this variable was already used in Chile in the tendering of several highway concessions.

The use of the APVR band scheme has important advantages compared to the use of a traffic band scheme. The traffic is not by itself a good indicator of the financial performance of the concession because it does not take into account tariffs. Moreover, the use of profits (revenues minus expenses) instead of revenues alone is also problematic for several reasons. First, if profits are employed, the concessionaires will not have an incentive to be efficient in terms of costs when their profits approach the top band. In addition, when the profits are close to the bottom band, the concessionaire can exaggerate reported costs to force changes in the contract clauses in its favor. Second, unlike revenues, operation costs pose relevant problems of asymmetrical information. So, whereas the concessionaire

knows perfectly the amount of these expenses, the Public Authority has not enough capacity to determine whether the costs declared by the concessionaire are real or not.

Consequently, it seems more suitable to define a band scheme on the basis of revenues. However, a pure revenue band scheme does not look appropriate because it does not take into account those revenues obtained previously by the concessionaire. A discounted flow of revenues is adopted instead of a nondiscounted one in order to consider the effect that the cost of capital has in the financial performance of the concession.

Another advantage of using the APVR is that it is easy for the public authority to monitor because the only data necessary to calculate this variable are tariffs and traffic. Tariff caps are usually contractually tied to the inflation index in this kind of contract, so they are always known by the administration. Similarly, traffic volumes can be easily obtained by the public authority by monitoring the flows in the toll plazas. The monitoring of traffic flows by the public authority in its turn avoids the lack of incentive (on the part of the concessionaire) of ensuring that all the vehicles pay the toll. Because the public authority will estimate the APVR as the product of the corresponding tariff, per the traffic flow, rather than by directly monitoring the revenues, the concessionaire has a clear incentive to charge the toll to all the vehicles that pass through the toll plazas.

For all those reasons, and according to the studies referred to in Engel et al. (*11, 12*), it was agreed to use the accumulated present value of the revenues forecasted by the public authority in charge of regulating the infrastructure. The evolution of the net present value of the revenues along the concession lifespan yields a curve that will be used as a reference axis to set up the bands (bottom traffic band and top traffic band). Beyond these bands the terms of the contract are modified if the real traffic is either much higher or much lower than expected. This curve is calculated as shown in Equation 3.

$$[\text{APVRA}(s)]^* = \sum_{i=1}^{s} \frac{R_i^*}{(1+\theta^*)^i} \tag{3}$$

where

$[\text{APVRA}(s)]^*$ = accumulated present value of the revenues estimated by the public authority in year s;

R_i^* = revenue estimated by the public authority in year i;

θ^* = discount rate included in the bidding terms fixed by the public authority; and

s = year in which the $[\text{APVRA}(s)]^*$ is calculated.

The definition of the discount rate fixed by the administration in the bidding terms that is to be employed is not a simple task, and it is analyzed in more detail in the next subsection. Adopting the hypothesis (which in reality is to be observed in most cases) that the discount rate is higher than the traffic growth, the $[\text{APVRA}(s)]^*$ curve will be convex as shown in Figure 1. The $[\text{APVRA}(s)]^*$ curve must be fixed by the public authority and not by the bidders in order to avoid asymmetrical information problems. If the curve was based on the traffic forecasts estimated by the bidders, they would be tempted to declare a traffic higher than predicted in order to benefit both from losses and profits. Using an $[\text{APVRA}(s)]^*$ curve fixed by the public authority prevents the bidders from overestimating traffic levels.

The $[\text{APVRA}(s)]^*$ curve, as previously defined, will be used as a symmetry axis of two bands—the top band and bottom band—that should be established by the bidders in their offers. As mentioned in the previous paragraph, the public authority should fix a limit (shown in Figure 1) over which the lower band cannot be placed. The objective of this limit is to make sure that, in any event, the concessionaire will assume a significant part of the traffic risk. These bands will represent the border beyond which some economic conditions of the contract fixed in the bidding terms (term, tariffs, and so on) may be changed in order to rebalance the financial terms of the concession. These bands will be compared every year with the real APVR(s), calculated as shown in Equation 4. If, as shown in the example from Figure 1, the real APVR(s) is placed, during the life of the concession, between the bottom and the top band, the economic conditions established at the beginning will not be changed.

$$\text{APVRA}(s) = \sum_{i=1}^{s} \frac{p_i \cdot q_i(p_i)}{(1+\theta^*)^i} \tag{4}$$

Figure 2 shows the case in which the revenues are much lower than expected. This continues until they reach a level in which the real APVR(s) curve—calculated with the real revenues—dips below

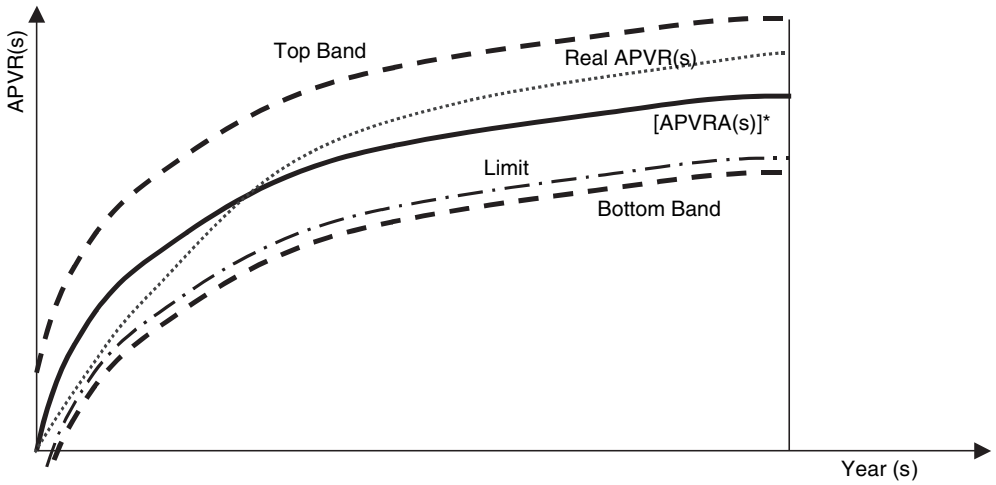

FIGURE 1 $[\text{APVRA}(s)]^*$ curve and structure of bands.

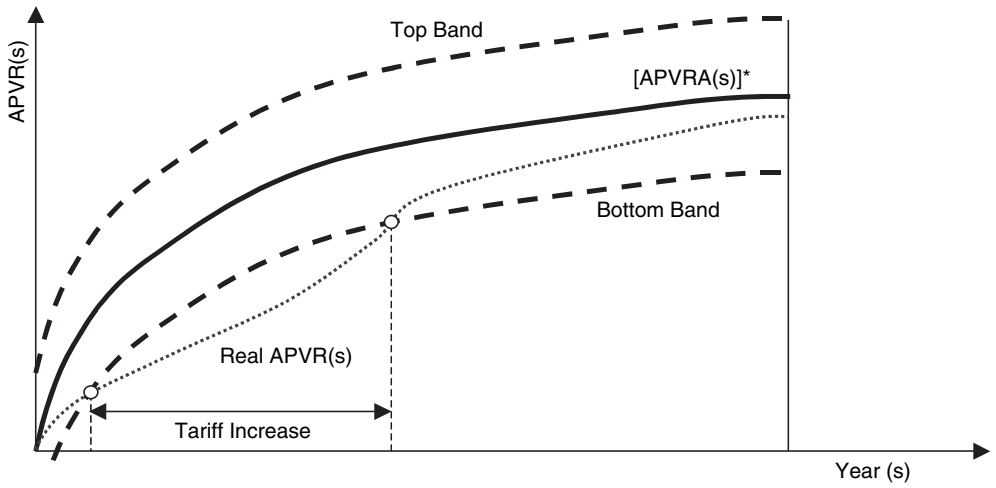

FIGURE 2 Tariff increase if APVR(*s*) is lower than preestablished bottom band.

the bottom band fixed in the contract. This fact will activate the rebalance of the concession contract to reduce the concessionaire's losses. In this case, represented in Figure 2, the rebalance is produced by increasing the maximum tariff level set up initially in the contract. As price elasticity in transportation infrastructure usually falls between −0.5 and −1, this tariff increment will allow the concessionaire to increase its revenues afterwards. This fact will probably lead the real APVR(*s*) to overtake the bottom band some years later. Once this occurs, the tariff will be restored to its original level, because the financial terms of the contract will have been reestablished.

Figure 3 displays the case in which, even when the maximum tariff has been increased, the real APVR(*s*) curve is unable to rise above the bottom band during the contract term initially fixed. In this case, the contract may possibly be extended by some years from the term initially agreed, until the point in which the real APVR(*s*) reaches the value of the bottom band for the last year of the term initially fixed.

Finally, Figure 4 displays the case in which the traffic is much higher than predicted and the real APVR(*s*) rises above the top band. This situation triggers the contract clause, which rebalances the terms in favor of the infrastructure users or the administration. In the example shown in Figure 4, once the real APVR(*s*) curve rises above the top band, the public administration will have the right to reduce the maximum tariff in order to share extra revenues among the concessionaire and the users. Similarly, if by reducing the tariffs, revenues still keep increasing, the contract could finish earlier if the real APVR(*s*) curve reaches, before the final term arrives, the value of the top band as set for the last year of the term according to what was initially agreed.

Discount Rate Selection

Theoretically, the discount rate should be as close as possible to the cost of capital of the project. The cost of capital of every bidder, though similar, need not necessarily be identical. Thus, one possibility could be to permit every bidder to establish its own discount rate to set up the bands according to that bidder's cost of capital. However, this approach may yield for the bidders inefficient incentives, because they could declare for strategic reasons θ^* values higher or lower than those predicted by them. This explains why the discount rate θ^* must

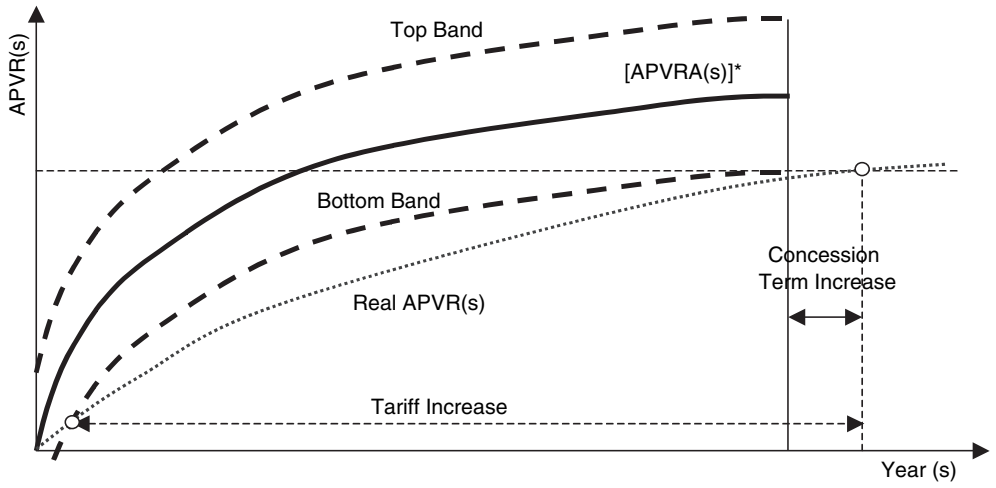

FIGURE 3 Tariff increase and term increase if APVR(*s*) is lower than preestablished bottom band.

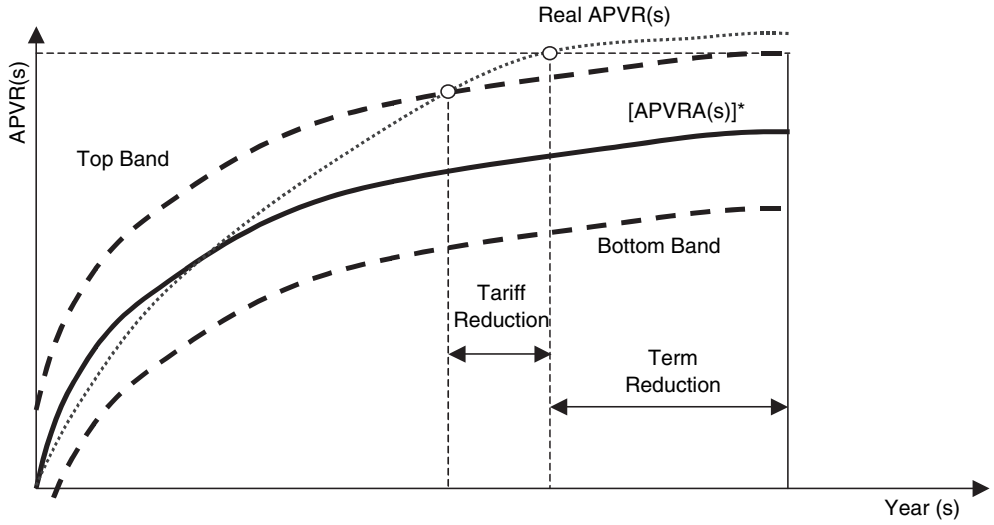

FIGURE 4 Tariff and term reduction if APVR(*s*) is much higher than preestablished top band.

be set up by the public authority. A more detailed analysis of the asymmetric information problems regarding discount rate selection is so complex as to deserve detailed elaboration in a separate paper.

The next question is how the public authority should fix the θ* discount rate. Theoretically the most adequate discount rate must capture the WACC as closely as possible. The WACC depends basically on the cost of capital for the shareholders, the cost of the debt, and the leverage ratio of the concession company. However, estimating the WACC in the financial structure of a project is quite complicated because the leverage ratio grows very sharply during the first years of the concession and then decreases progressively until the end of the concession term. Moreover, the risk of this kind of project is variable over its life, going from high before the construction of the works to low when the operation is consolidated.

Because of the difficulties that authorities face in estimating the discount rate using a theoretical approach, one solution could be for them to approximate this value on the basis of experience. Generally, public authorities that have procured and monitored the same type of projects for a long time have a good though not perfect estimate, based on that experience, of the cost of capital of the projects they have procured. This estimate may be described as the cost of the riskless debt plus a project risk premium. The cost of the riskless debt is given by the cost of the bonds issued by the government with a duration more or less equal to that of the project term. The premium can be estimated by analyzing other projects previously procured. This approach was successfully employed in several highway concession tenders under an LPVR scheme in Chile (*10*). In this case the public authority gave bidders a choice between a variable or fixed real interest rates. The fixed rate was set in the bidding documents as a risk-free rate of 6.5% plus a risk premium of 4%, giving a total real rate of 10.5%. The variable rate was set as the monthly average of the real risk-free rate of the financial system in month *j,* plus a 4% risk premium. Only one of the four bidders declared a preference for the variable rate, and the winner opted for a fixed rate. Although there is still much research to be done in this field, the suggested approach of setting up θ* has been proved to be accurate enough to be employed in practice.

Change in Conditions of Contract

Up to now, the paper has focused its attention mainly on defining when the terms of the contract must be recalibrated. This section explains the alternatives that were contemplated in addressing the issue of how the contract should be modified in order to provide the biggest flexibility to every infrastructure public authority. Because the law provides only a general outline for this possibility, this section describes the contents of the GBTHIC draft.

The three possible ways to rebalance the economics of the contract studied in the development of the draft of the GBTHIC were

- To open a renegotiation between the public authority and the concessionaire to set up the new contract conditions,
- To specify initially one or several variables that may be modified according to a predefined set of criteria established in the bidding terms, and
- To combine the first and the second approaches.

The first alternative, open renegotiation, was proved inefficient in many experiences (*13*); renegotiations are usually long, time-consuming, and constrained by strong political pressures. The second alternative seems at a first glance to be more efficient because endless renegotiations are avoided. However, this scheme presents the challenge of defining adequately the criteria that would trigger the automatic updating of one or several variables related to the concession as the limiting bands, both upper and lower, are surpassed. The third approach has both the advantages and drawbacks of the two previous ones.

The GBTHIC draft establishes that the bidding terms of every concession project must specify, as far as possible, the variable or variables that can be changed and the way in which they are to be changed as soon as either the upper or lower limits are surpassed. Along with that, the draft provides for another possibility, stating as well that in the event that occurs, the concessionaire and the public authority may arrange by mutual consent a different way to rebalance the financial terms of the contract.

One of the variables that can be used to change the contract condition is tariff caps. When tariff caps are used, the contract indicates the maximum amount by which the prices can be modified in order to limit their impact on the users. It is important to take into account that using tariffs as the mechanism to rebalance the financial terms of the contract has a risk of elasticity. Economic theory tells us that if the elasticity of demand is higher in absolute value than 1, a tariff increment will entail a reduction in the revenues received from the users. A study recently carried out in Spain (*14*) demonstrated that the elasticity of demand for highway use in Spain was between −1.1 and −0.5; thus, tariff raises hardly entail revenue reductions. In spite of that, it is still possible that demand will turn out to be more elastic than expected, so it does not seem advisable to set up tariff caps as the unique variable to be used to rebalance the financial terms of the concession.

If the variable to be adjusted is the length of the contract term, the method for estimating it is much more straightforward. As Figure 3 shows, if the real APVR(s) is permanently lower than the bottom band, the term of the concession will be extended until the real APVR(s) will be equal to the value of the bottom band in year n. Likewise, as Figure 4 shows, if the real APVR(s) is permanently higher than the top band, the concession will be shortened until the point at which the real APVR(s) will be equal to the value of the top band in year n. Choosing the concession term as the variable to rebalance the economics of the contract has two drawbacks. First, the extension of the contract due to a drop-off in revenues increases the value of the project but does not necessarily improve chances of timely repayment to the lenders. Second, once the real APVR dips below the bottom band or rises above the top band, the incentive of the concessionaire to get more revenues is substantially reduced. However, these drawbacks are not as important as they might seem at first glance. On the one hand, although it is true that an extension in the contract term does not improve the capacity of the project to meet the loan requirements, it is also true that the capacity of the project to strengthen a renegotiation of the debt does increase substantially. On the other hand, although it is true that once the APVR(s) goes permanently beyond the top or the bottom band the present value of the revenues that the concessionaire receives is the same, it is also true that the operation costs can be substantially reduced if the concession finishes before schedule. Consequently the concessionaire will still have a certain incentive to receive as much traffic as possible, though one that is not as big as when the APVR curve falls between the top and the bottom band.

Influence of Symmetrical Bands in Tender Criteria to Grant the Concession

The mechanism used in Spain to award highway concessions before the approval of the law was based on a set of parameters added according to preestablished weighting: the technical and environmental characteristics of the proposal, the credibility of the traffic estimations and the coherence of the bidders' financial plans, and the economic efficiency of the proposal in terms of a preestablished economic variable (generally lower tariff cap, lower term, lower subsidy required, and so on).

Because the bidders have the freedom to establish in their offers the bands subject to some requirements, the way in which they establish the bands should be evaluated in the tendering process. The law does not specify the way to implement this issue. However, the GBTHIC draft states that the longer the width between the top and bottom bands, the larger will be the score (or points) awarded, in this regard, to any particular bidder. The objective of this measure is to give advantage to those bidders who assume a higher risk.

DISCUSSION AND ONGOING RESEARCH

As has been described in this paper, the risk-sharing scheme implemented by the new public works concession law in Spain has some important advantages that will likely improve the future efficiency of the system. The following ones can be highlighted:

- The scheme defines the different risks existing in concession contracts and establishes to what extent they are going to be held by the different stakeholders.
- The scheme clearly specifies which events may cause the modification of the economic terms of the contract in order to rebalance the financial terms of the concession. Consequently, the bidders know, at the time of preparing their offers, which specific cases may lead to changes in the contract conditions initially stated.
- This clear framework helps to avoid future renegotiations between the concessionaire and the public authority arising from offers that were initially too optimistic and is an incentive to the bidders to prepare offers as realistically as possible.
- The scheme reduces traffic risk by fixing, depending on the accumulated present value of the revenues finally obtained by the concession, the future changes in the economic conditions of the contract.
- The scheme is able to avoid budgetary implications for the public administration because the reestablishment of the economic balance is carried out generally by changing the economic terms of the contract instead of by committing additional public resources.
- The scheme permits the uses of variables, such as the concession contract term, that are easy to modify in an automatic way to reestablish the economics of the contract once the bands have been surpassed.

Despite these factors, the scheme does have some problems, including the following:

- The risk of unpredictable events that may affect substantially the economics of the concession is not included in the law as a triggering event for rebalancing the economics of the contract. This fact implies that lenders will perceive a higher level of risk in financing concession projects in Spain and, consequently, the cost of the debt will be higher.
- The so-called progress clause transfers to the concessionaire the risk derived from the evolution of the technology and the environmental, safety, and quality needs required by society in the future as long as the economics of the contract are not substantially affected. However, the law neither defines what is understood by "substantial implications" in this case nor establishes an effective procedure to cope with potential conflicts that may arise.
- The demand risk-sharing mechanism that reestablishes the economic balance of the concession when the demand overtakes certain predefined levels is based on the hypothesis that traffic demand can

be forecasted by the public authority with a certain level of accuracy. Unfortunately, traffic demand in most transport facilities is not easy to forecast accurately. This fact represents a limitation on the usefulness of this approach.

- The demand risk-sharing mechanism could be interpreted as working against social equity because the contract tends to increase the tariffs during periods with low demand that are usually the result of an economic crisis. However, as was discussed in this paper, the potential use of tariffs to rebalance the economy of the contract can be limited to few occasions.

Many interesting topics could not be discussed in detail in this paper. However, it is useful to offer a list of such topics for further research. Conclusions drawn from the subsequent analysis of these topics will expand upon the contributions of this paper. The most relevant topics are as follows:

- The best way of effectively solving the ambiguities derived from the interpretation of both the progress clause and the risk of unpredictable events could be evaluated. In particular, a study of the means of solving potential conflicts regarding the interpretation of "substantial rupture" of the economics of the contract could be very helpful.
- The asymmetric information problems regarding discount rate selection could be evaluated.
- The consequences of inaccuracies that the administration must take into account when it establishes the parameters for both the discount rate and the traffic level could be analyzed, as could the influence of these inaccuracies on aiming at adequate incentives for the concessionaire.
- The potential application of the risk-sharing scheme to other transportation infrastructure concessions could be studied.

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