Risk Management Systems for Contingent Infrastructure Liabilities

Applications to improve contract design and monitoring

Christopher M. Lewis and Asboka Mody

Government guarantees for private infrastructure projects represent real liabilities, and their costs can average as much as a third of the amount guaranteed. Most governments do not know the full extent of these liabilities, because they have made no attempt to systematically estimate them. A companion Note (Viewpoint No. 148) proposes a new framework for identifying government exposures, valuing expected and unexpected risks, and budgeting for expected risks and reserving for unexpected ones. This Note shows how governments can use the valuation process to analyze the distribution of risks, decide which risks they should bear and which should be borne by the private sector, and reduce the frequency and size of calls on guarantees.

In what may be the first time that a sophisticated contingent valuation method was applied to government infrastructure projects, the World Bank and the Colombian government collaborated to estimate the government's exposure in three infrastructure finance projects:

- The US$20 million El Cortijo–El Vino toll road project, where the government guarantees construction costs and traffic volumes.
- A joint venture telecommunications project between Telecom S.A. and Siemens, where Siemens will supply switching equipment and cables for more than 80,000 new lines and the government guarantees annual minimum cash returns to Siemens in the period after construction.
- A US$755 million privately sponsored power project to supply a government-owned distribution company, where the government provides guarantees for the power purchase agreement (box 1).

The valuation of the government's exposure in these three projects used a technique called stochastic simulation to identify the net expected loss. In keeping with the lattice of risks outlined in the companion Note, the government assessed a number of risk exposures: market risk (relating to market volumes and prices), construction risk (from cost and schedule overruns), counterparty risk (operations risk and risk of failure of participating companies), currency risk (relating to exchange rates and liquidity), force majeure, termination risk (risk of contract buyout, possibly including penalties), and regulatory risk (the risk of adverse regulatory changes).

The assessment for the El Cortijo–El Vino toll road project showed that the greatest exposures for the government are from the market risk associated with traffic volatility and the risk of construction cost overruns. The total expected loss to the government under these two guarantees was estimated at about US$4.2 million (table 1). The assessment of the telecommunications project identified regulatory and market risk and construction risk as the largest risks. Regulatory and market risk exposure—stemming from Colombia's deregulation of...
To prevent CORELCA from failing, the ministry has taken a subordinated loan: a direct loan, a guarantee, or an insurance program and to design contracts that lead to fewer and smaller calls on guarantees. For example, in soliciting bids for the toll road project, the Colombian government asked prospective concessionaires to bid on the basis of a preliminary set of engineering designs. Recognizing that these designs provided too little detail, the government granted cost overrun guarantees that would compensate the concessionaire for the overrun between 30 and 50 percent of the bid, and none of the overrun above 50 percent of the bid. The traffic volume guarantee commits the government to reimbursing the concessionaire if traffic volume falls 10 percent below the projections agreed to in the project budget. If traffic volume exceeds projections by more than 10 percent, the additional revenues are placed in a reserve fund to cover future shortfalls in traffic volume or for road maintenance.

**Telecommunications**

The telecommunications project, a joint venture between Telecom S.A. and Siemens, has a structure similar to a build-operate-lease arrangement under which Siemens will install the switching equipment and cables for more than 80,000 new lines. Under a risk sharing agreement Telecom bears 20 percent of the risk/return within a 10 percent band around the expected revenue of the project and 100 percent of the risk/return outside this 10 percent band. The contracts do not clearly specify the allocation of construction risks.

**Power**

The government has provided several forms of support to the US$755 million expansion of the 240-megawatt Barranquilla thermal power plant. The 750-megawatt plant will be constructed by TEBSA to provide power to CORELCA, an undercapitalized state-owned power distributor on Colombia’s Atlantic coast that runs a narrow-margin energy distribution service. TEBSA is a special-purpose vehicle capitalized by the old Barranquilla thermal plant, now jointly owned by CORELCA and ABB Distral. The government support consists of a power purchase agreement between CORELCA and TEBSA, three guarantees, and a subordinated loan:

- **Under the power purchase agreement** CORELCA agrees to make capacity payments to TEBSA for the first twenty years of the plant’s operation. As long as the plant is operational, CORELCA must pay a schedule of fees that start high and decline over time.

- **The Ministry of Energy guarantees** CORELCA’s ability to make these payments to TEBSA, and the Colombian government guarantees the ministry’s ability to honor this commitment.

- **To prevent CORELCA from failing,** the ministry has taken a subordinated debt position in the company to help ease any liquidity crisis.

- **Ecopetrol,** the supplier of gas to TEBSA and CORELCA, guarantees force majeure payments.

The loss variances for each project were also analyzed, and scenario analyses were run to see how different conditions would affect the risks of each project. Scenario analysis is an extremely important tool for governments in reviewing their exposure to a project finance transaction in the context of general fiscal policies. In the toll road project, for example, such analysis can show how anti-inflationary fiscal policy would affect the government’s exposure under traffic volume guarantees. Scenario analysis is also useful in analyzing alternative approaches to achieving the government’s objective in an infrastructure project. For example, in addition to underwriting the power purchase agreement, the Colombian government provided a subordinated loan to CORELCA. As a result, the evaluation of any action designed to increase the value of the energy guarantee must take into account its impact on the value of the subordinated loan to CORELCA.

**Risk sharing between the public and private sector**

The valuation process allows governments to critically assess the distribution of risks under a direct loan, a guarantee, or an insurance program and to design contracts that lead to fewer and smaller calls on guarantees. For example, in soliciting bids for the toll road project, the Colombian government asked prospective concessionaires to bid on the basis of a preliminary set of engineering designs. Recognizing that these designs provided too little detail, the government granted cost overrun guarantees that would compensate the concessionaire for

### BOX 1 CONTINGENT LIABILITIES FOR THREE COLOMBIAN PROJECTS

**Toll roads**

The government provided a construction cost overrun guarantee and a traffic volume guarantee once road construction was finished. Under the terms of the cost overrun guarantee the government would cover 100 percent of the cost of overrun up to 30 percent of the original construction bid, 75 percent of the overrun between 30 and 50 percent of the bid, and none of the overrun above 50 percent of the bid. The traffic volume guarantee commits the government to reimbursing the concessionaire if traffic volume falls 10 percent below the projections agreed to in the project budget. If traffic volume exceeds projections by more than 10 percent, the additional revenues are placed in a reserve fund to cover future shortfalls in traffic volume or for road maintenance.

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TABLE 1
EXPECTED GOVERNMENT LOSSES IN COLOMBIAN INFRASTRUCTURE PROJECTS
Millions of U.S. dollars

<table>
<thead>
<tr>
<th>Type of risk</th>
<th>Elle Cortojo-El Vino toll road project</th>
<th>Telecom S.A.-Siemens joint venture</th>
<th>CORELCA energy guarantees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market</td>
<td>3.1</td>
<td>2.5</td>
<td>52.0</td>
</tr>
<tr>
<td>Construction</td>
<td>1.1</td>
<td>9.8*</td>
<td>0</td>
</tr>
<tr>
<td>Counterparty</td>
<td>0.3</td>
<td>0.1</td>
<td>5.0</td>
</tr>
<tr>
<td>Currency</td>
<td>0</td>
<td>-1.3</td>
<td>2.0</td>
</tr>
<tr>
<td>Force majeure</td>
<td>0.2</td>
<td>0.3</td>
<td>7.0</td>
</tr>
<tr>
<td>Termination</td>
<td>-0.2</td>
<td>0.2</td>
<td>1.0</td>
</tr>
<tr>
<td>Regulatory</td>
<td>0</td>
<td>10.1</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>4.5</td>
<td>21.7</td>
<td>67.0</td>
</tr>
</tbody>
</table>

a. It is unclear from the contracts whether this risk is borne by Telecom or Siemens.


cost variances within a wide band around the submitted bid. While the guarantees served the purpose of attracting qualified bidders, their structure allowed concessionaires to extract a near-certain rent from the government of about 35 percent of the original bid.

After assessing the risk transfer associated with the toll road project and quantifying the risks in the project, the government changed its toll road guarantee program. It now commissions more detailed engineering studies before it solicits bids to limit the uncertainty in the bidding process, and provides a narrow guarantee. The new policy is less expensive than the old one but provides the same benefit to the concessionaires. The change made the Colombian toll road program more efficient—achieving a higher risk-adjusted rate of return by reducing the government’s risk of delivering a fixed benefit.

The valuation process enables a government to assess how efficiently risks have been allocated and derive lessons from its findings. To do this the government must first assess which party (public or private) has the best access to the information needed to objectively and most accurately evaluate the underlying risks. It must then assess which party is in the best position to monitor, control, and service the risks once they are underwritten. If the government is in the best position to underwrite the risks directly, it should consider providing direct credit, targeting the credit to the area of concern. The government should then determine whether it also has the information and skills to most effectively monitor and control the risks or whether a private servicer should be employed to service the loans. Where the government delegates servicing, it must have systems for monitoring the performance of the servicers.

Even if the government has the best access to information on a risk, it might choose to provide assistance through a guarantee targeted at a specific layer rather than through direct credit. The reason is that a contingent guarantee can be more narrowly focused on the market failure, as in the switch from providing a broad guarantee to funding engineering reports in the Colombian toll road concessions. Because guarantees and insurance can be narrowly targeted, they can be used to get the private sector to absorb as much risk as possible.

Where the private sector is better able to underwrite and service the underlying risks but some government assistance is needed, public-private risk sharing is often the best solution. In this case pro rata guarantees and insurance under which the private sector and the government share all losses on a risk equally are often the best form of assistance. Risk sharing gives the private entity an incentive to price the coverage
appropriately, ensuring that it will not shift additional risks to the government. Other risk sharing mechanisms within and between classes of risk are also feasible. But they usually require more government oversight and more government underwriting expertise.

Managing federal-state partnerships

Risk management tools and techniques are also helpful in analyzing the structure of government programs that share responsibilities between the federal and state levels. Such programs can combine the national government’s ability to redistribute resources across economically diverse regions with the ability of state and local governments to identify investment needs at the local level. The national government funds the program, while state and local governments provide the underwriting and administrative function. A potentially powerful combination, this type of federal-state partnership is analogous to a parent company’s providing a guaranteed source of financing to a subsidiary established to perform a particular service.

Such federal-state partnerships are not without risks, however. If the federal government does not retain oversight of the underwriting function, the national budget remains at risk. But if it is overly prescriptive in setting regulations for the program, it reduces the flexibility of the state and local governments to identify needs in the local community. The goal is to reach the optimal tradeoff between delegation of project selection and federal oversight of state underwriting performance.

Minimizing the loss shifting

Governments need to implement strong risk management programs to limit their contingent liability exposure to additional loss shifting by the guaranteed party. The valuation process provides a basis for determining the best strategy for limiting such exposure. Governments can require the guaranteed party to hold a certain amount of capital or collateral to serve as a first-loss protection barrier for the project, thereby aligning the guaranteed party’s incentives to remain vested in the project with the government. They can place restrictions on the use and investment of reserves held by the guaranteed party, to ensure that their value is unimpaired during periods in which a loss event is likely. They can structure their support to promote pro rata risk sharing, where a private party shares risk equally with the government for some or all types of loss. Since the private party in this transaction would then bear the same risk per dollar of exposure as the government, the government can benefit from the private sector’s pricing of risks. Finally, governments can levy risk-based guarantee fees that both reduce the budgetary cost of issuing guarantees and improve the alignment of incentives between the guaranteed party and the central government.

Conclusion

Allocating risks efficiently and limiting the ability of private agents to shift additional losses to the government reduces the budgetary costs of issuing guarantees and improves the allocation of scarce budgetary resources. But techniques for assessing risk are only as good as the information on which the models are based, and over time institutions change, markets evolve, and new information on risk exposures emerges. A series of loss events can reveal risks that were previously unknown or unquantifiable, leading to radical changes in risk assessment. Using the risk management framework outlined in this and a companion note, governments can quickly incorporate new information on risk exposures into their pricing of new contingent liabilities and reestimate the expected costs of previously issued liabilities.


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