Measuring and managing risks related to credit guarantees and on-lending

I. Introduction
Sovereign credit guarantees to state related entities can help catalyze private sector investments and fulfill desirable policy objectives. On-lending can channel resources from government borrowing to specific entities and desired projects. Guarantees, however, also create contingent liabilities and the on-lending of proceeds from government borrowing creates contingent assets, i.e. the government assumes the risk of the beneficiary’s inability or unwillingness to repay.

Prudent risk management can help mitigate these fiscal risks. Managing fiscal risks should be embedded in a holistic risk management framework, including various aspects such as the definition of objectives for risk management, risk analysis, the development of a risk management strategy, as well as implementation and monitoring of the strategy (figure 1).

Figure 1: Fiscal risk management framework

Source: World Bank Treasury
Measuring risks is an integral part of risk management and constitutes the analytical basis for various stages in the risk management process, including the design of a risk management strategy, its implementation, and risk monitoring.

II. Risk measurement process

Setting up a process to measure risks from guarantees and on-lending and to apply the results in risk management tools involves several steps (figure 2). As a starting point, risk managers need to understand the key characteristics of the guarantee portfolio and define the government’s specific risk exposure that influence the choice and set up of the approach to risk analysis. The core part of the process is to analyze the specific risk drivers of the guarantee beneficiary or on-lent party to develop a fundamental understanding of the entity the government is exposed to. The insights from the risk analysis can then be translated into risk measures, such as expected losses or market values, to quantify the government’s risk. Finally, the results from risk analysis and quantification shall be applied in risk management by informing the design of various risk management tools, such as guarantee fees or budget appropriations.

Figure 2: Steps in risk measurement process

1. Defining characteristics
   - Understanding key characteristics influencing approach to risk analysis
2. Risk analysis
   - Analyzing specific risk drivers
3. Risk quantification
   - Translating risk analysis into quantifiable measures
4. Application in risk management
   - Using risk measures to inform risk management tools

Source: World Bank Treasury

Defining characteristics

To understand how key characteristics influence a government’s choice and design of the risk measurement process, risk managers need to start by answering questions related to the characteristics of the guarantee portfolio, the specific risk exposure of the guarantor, resources and capacity in the credit risk team, and data availability.

The guarantee portfolio is defined by factors such as its relative size, the heterogeneity of the guaranteed entities, the industries these entities are operating in, whether they have actively, publicly traded securities outstanding, and whether comparable companies in the domestic or a similar economy exist.
The definition of the government’s risk exposure should include a clear definition of default, a time horizon for the exposure being analyzed. Also, a decision needs to be made whether only default risk will be analyzed or the fiscal impact of subsidies and recapitalization, undertaken to avoid default, will also be in scope.

The debt manager needs to define the credit risk team’s exact mandate and the likely future evolution of their mandate, understand what resources (e.g. staff, financial) are available to meet the demands, and which other units within the government have a mandate or experience in analyzing similar fiscal risks.

The extent to which reliable data are available is a key constraint in the choice of a risk measurement approach. Data include historic data on credit events matched with risk characteristics of beneficiaries prior to the credit event (e.g. financial ratios, assessment of business risk, etc.), and market prices on traded debt or equity securities. The risk manager also needs to identify what external data are available (e.g. from ratings agencies), and what obligations guaranteed entities have to report to the government.

Risk analysis

The most fundamental part in the risk measurement process is the analysis of key risk drivers that impact an entity’s credit quality and hence the probability a government’s guarantee would materialize. These drivers will likely be industry specific and may even be specific to individual entities, and include categories, such as business risk, operational risk, regulatory risks, and financial risks.

Methodologies to assess credit risk include credit scoring, statistical models, structural models, and the simulation of financial performance.

In credit scoring models industry specific risk factors and sub-factors are scored individually and then these individual scores are aggregated to ordinal ratings. Rating agencies, for example, use credit score cards to assign letter ratings to rated entities (issuer rating) or individual securities (issue rating). Financial institutions often use internal credit scoring models to assess credit risk in their portfolio.

In statistical models historic observable firm characteristics (e.g. financial ratios) and information on historic credit performance (e.g. defaults) are used to develop a logit or probit regression model predicting default (dependent variable) based on a guaranteed party’s current or projected performance (independent variables). Robert Altman pioneered statistical models in his Z-score methodology and the Turkish Treasury is currently using a statistical model to estimate credit risk.

In structural models equity is viewed as a call option and option pricing theory is used to calculate default probabilities. Default occurs when a firm’s asset values reach a significantly low level (represented by the strike price of the call option) compared to its liabilities. The original Merton model has been commercialized by Kealhofer, McQuown, and Vasicek (KMV) which matches the modeled difference between expected asset values and liabilities with historic default events to estimate default probabilities.

In models simulating financial performance, the probability distribution of risk factors (e.g. revenues, debt levels) is simulated to estimate the expected value of the resulting loss function and hence estimate default probabilities. The Swedish National Debt office is applying simulation models for individual guarantees with significant exposure.
Risk quantification

To translate results from risk analysis into quantifiable measures, a risk manager should first decide which target metrics is most appropriate in light of how the risk measure will be applied in risk management (see next section). The two most widely used metrics are expected losses and market values. Expected losses estimate the expected government payout under a given guarantee, while market values include a risk premium in addition to expected losses, to compensate the guarantor for the risk she is taking. Other metrics include the face value of the guarantee, maximum probable exposure (i.e. under a stressed exchange rate scenario if guaranteed loan is in foreign currency), and unexpected losses (loss that government will sustain in an adverse scenario).

The two primary approaches to quantifying risk are either through the use of price differentials or through the estimation of default probabilities.

Using price differentials the value of a guarantee is calculated by using market price information on traded debt instruments of the guaranteed entity or a reasonable proxy. The value of the guarantee then equals the price of a risky loan (non-guaranteed) minus the price of a guaranteed loan with the same characteristics. As reliable data are often difficult to come by, the value can be for example proxied by comparing bond spreads for entities with the same rating as the guaranteed entity and that of the guaranteeing government (figure 3).

Figure 3: Average bond spreads over US Treasury by rating and maturity from Moody’s

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Source: Moody’s Investors Service

Using the second approach requires a more “bottom-up” estimation of three components: exposure at default, default probabilities, and loss given default. Default probabilities can be estimated using one of the methods discussed above (i.e. credit scoring, statistical models, structural models, simulation). Exposure at default depends on the exact definition of default and could be, for example, principal outstanding or annual debt service payments. If a credit scoring methodology is used, the ordinal rankings (e.g. letter ratings) can be translated into default probabilities using information from rating agencies which publish historic default probabilities by rating and maturity (figure 4). Loss given default can be based on historic recovery data either from the government itself or external data providers,
such as ratings agencies, and be differentiated by debt type and seniority, the firm-specific capital structure, industry, and macroeconomic factors (e.g. credit cycle).

Figure 4: Default probabilities by rating and maturity from Moody's

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*Data in percent
Source: Moody's Investors Service

Application in risk management

Results from risk analysis and risk measurement should inform the design and application of various risk management tools. Measuring and analyzing risk can inform the design of a risk management strategy, the setup of guarantee agreements, and the monitoring of risk.

Specifically, risk management tools which can incorporate information from risk analysis and measurement include the guarantee fees, guarantee limits, partial guarantee coverage, budget appropriations, contingency reserve accounts, and risk reporting and monitoring.

Guarantee fees can be based on the riskiness of the guaranteed party and, for example, reflect the expected losses to the government or market values of guarantees. Guarantee limits can be applied on the flow or stock of guarantees outstanding and differentiated by the credit quality of the guaranteed entity (e.g. higher limits for good credits). The degree of guarantee coverage could also depend on the beneficiaries’ ability to repay to reduce moral hazard by providing for risk retention at the borrower level. In budgeting, appropriations made should cover the risk the government is taking, either on a net present value basis at the time of issuance or on an annual basis. Closely linked to budgeting, a contingency reserve account can create fiscal buffers for times when guarantees materialize. To report on and monitor risks from guarantees and on-lending, risk analysis should be conducted periodically and communicated to decision makers and potentially the wider public in an appropriate format.

III. Conclusion

Guarantees and on-lending by governments can help meet policy and development objectives but also create fiscal risks. To manage these risks, governments should design holistic risk management frameworks that include the analysis and measurement of risks. To set up a risk measurement process, risk managers should first clarify the specific situation of their respective exposure, and then conduct a thorough risk analysis which can be translated into quantified measures. The results of risk analysis and measurement can be used to inform various risk management tools designed to mitigate governments’ fiscal risks.
IV. Issues for Discussion

- When you first developed a credit risk system, how did you set up the process and what were your lessons learned that other countries might benefit from?
- In designing a credit risk analysis system, what key challenges (e.g. data availability, developing industry-specific methods, capacity within the team, etc.) have you been faced with and how did you decide to overcome or manage these?
- How is the risk the government is exposed to when issuing guarantees or on-lending different from that of other market participants, such as banks making loans?
- What external data and/or support are you using in your team?
- How do you ensure the insights from your risk analysis are taken into account when policy decisions are made?
- Looking ahead, what efforts will you undertake to adapt and refine your methodology?
References
Altman, et al. (2010). The Z-Metrics Methodology for Estimating Company Credit Ratings And Default Risk Probabilities


Moody’s. www.moodys.com