Session 4: Improving comparability and predictability through measurement

Measurement of contingent liabilities

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Why measure?

- **Inform** the decision-making authority about the cost and risk of a particular contingent liability.
- **Monitor** any quantitative ceilings or limits set upon contingent liabilities.
- **Disclose** statistics on contingent liabilities.
- **Calculate** the fiscal risk exposure of the government generating from the contingent liabilities.
- **Price** the instrument in question to decide upon the fee or premium to charge from the beneficiary.
- **Record** contingent liabilities in the public financial accounts.
- **Assess** the impact of the contingent liability on the risk sharing with the private partners in case of the PPPs.
- **Budget** for contingent liabilities.
## Different measures of contingent liabilities

<table>
<thead>
<tr>
<th>Face value (maximum possible loss)</th>
<th>Maximum probable loss (cash flow at risk)</th>
<th>Expected loss</th>
<th>Unexpected loss</th>
<th>Market value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full nominal value of the contingent liability corresponding to the maximum possible loss</td>
<td>Maximum loss that may occur at a given confidence level, when the exposure is measured through probability distribution of losses</td>
<td>Present value of the expected future payments times their respective probabilities, the mean of the distribution of losses</td>
<td>Difference between the maximum probable loss and the expected loss indicating the risk of the contingent liability</td>
<td>Consists of the expected cost and the risk premium, corresponding to the price that the market would charge for the contingent liability</td>
</tr>
</tbody>
</table>
Valuation methods – implicit valuation (indirect)

Gives the market value of the guarantee (includes the market risk premium)

• If the beneficiary has previously issued bonds, the prices of these bonds indicate its credit risk
• Market value of a risk free government bond - market value of the bonds issued by the potential beneficiary = implicit market value of the guarantee
• If the beneficiary has not issued bonds, bond prices of comparable institutions can be used or if the recipient has a rating, the yield spread for that rating category can be used.
• Information needed may not be readily available.

Source: OECD 2005, Advances in risk management of government debt
Valuation methods – option models (direct)

gives risk neutral valuation (does not include market risk premium)

• A credit guarantee is regarded as a "put option" where the government gives the lenders the right to sell the loan at its face value in case the borrower defaults.

• To the lender, the value of the put option equals the value of a government guarantee.

• They provide analytical solutions.

• Information needed may not be readily available.

• Suitable for small amounts of guarantees where building simulation models might be seen unnecessary.

Source: OECD 2005, Advances in risk management of government debt
Valuation methods – simulation models (direct)

gives risk neutral valuation (does not include market risk premium)

- Fundamentally similar to option pricing
- A distribution of losses to the government from a guarantee is generated by these models
- This distribution is used to calculate the expected cost from the guarantee
- They are designed to take many considerations into account compared to more restrictive option pricing

Source: OECD 2005, Advances in risk management of government debt
Approaches to credit risk analysis used by government risk managers

• Credit scoring
  – Score cards are used, industry specific
  – Similar methodology used by rating agencies
• Statistical models
  – Aims at measuring default probability by using statistical techniques
  – Usually requires historical data
• Scenario analysis
  – Deterministic or random (stochastic, e.g. Monte Carlo simulation)
• Structural models
  – Option pricing theory is used to calculate default probability of an entity
  – Difficult to estimate the underlying parameters

Source: Fritz Bachmair 2016, A Credit Risk Analysis Framework for Sovereign Guarantees and On-lending
Country practices

- The choice among valuation techniques depends on the structure of the guarantee + availability of data
- Countries adopt different analytical techniques which are usually a combination of these methods (credit scoring and statistical approaches are used in South Africa and Turkey, simulation and option models are used in Chile for example)
Example of Turkey – Credit Rating Model

Source: Turkish Treasury
Example of Turkey – Credit Rating Model

Past performance

Probability of default given default (PD/D)

**Probability of default (PD)**

Probability of default given non-default (PD/ND)

Credit scoring model

Source: Turkish Treasury
Example of Turkey – Credit Rating Model

Expected loss

- Probability of default
  - Cash flow projections
  - Past collection performance

Source: Turkish Treasury
Example of Turkey – Credit Rating Model

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Thank you for your attention...