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

Turkish Experience

M. Emre ELMADAĞ
Deputy Director General
Undersecretariat of Treasury, Turkey

4 December 2014
Ankara, Turkey
Presentation Plan

- Credit guarantees & onlending
  - Definitions and general characteristics
  - Issuance size of guarantees & onlending
  - Portfolio size

- Managing credit risk
  - Measures
  - Credit Rating Model (Working process, Altman-Z, internal credit ratings, PDs and expected loss)

- Statistics & Disclosure
# Credit guarantees & onlending

## Definitions and general characteristics

<table>
<thead>
<tr>
<th>Common Features</th>
<th>Beneficiaries</th>
<th>Only for</th>
<th>Approval body</th>
<th>Limit</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOEs &amp; special budget administrations</td>
<td>Public sector / foreign financing</td>
<td>Minister</td>
<td>Guarantee and on-lending limit through the annual budget law</td>
<td>Up to 1% of the guaranteed/on-lent amount</td>
<td></td>
</tr>
<tr>
<td>Public banks &amp; development banks</td>
<td>Municipalities &amp; Municipal administrations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Credit guarantees</th>
<th>On-lending</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partiality</td>
<td>Can be extended up to 95% of the guaranteed credit amount</td>
</tr>
<tr>
<td>Reserve account</td>
<td>Undertakings are met from risk account</td>
</tr>
<tr>
<td>Debt stock</td>
<td>No effect</td>
</tr>
</tbody>
</table>
Credit guarantees & on-lending

Issuance size of guarantees & onlending

Guaranteed debt stock: 10.7 bn $
receivable portfolio size: 9 bn $
of which 2 bn $ is overdue receivables
Managing credit risk

Measures

- Pre-conditions:
  - No overdue debt to Treasury
  - Sound financial capacity of the beneficiary institution
  - Stay in the annual guarantee and on-lending limit
  - If the beneficiary is a municipality it has to open an «External Debt Payment Account» in a commercial bank

- Guarantee/On-lent Fee
- Partial guarantee practice
- Risk Account
Managing credit risk
Credit Rating Model – working process

Data Collection

- Credit Scoring Model
  \[ P(D / ND) \]

- Prob. of Default
  \( PD \)

- Past Def. Performance
  \[ P(D / D) \]

- Past Collection Performance

Expected Loss

Internal Credit Rating

Partial Guarantee

Risk Account Appropriation

Guarantee/On-lent Fee

Guarantee and on-lent Limit
Managing credit risk

Credit Rating Model – PDs

\[ P(D/ND) \] probability of default given non-default in year \((t-1)\)

Altman-Z

Standard scoring model: \( Score \ Z_i = \beta_0 + \beta_1 X_1 + \ldots + \beta_n X_n \)

\( X \) denotes the explanatory variables
\( \beta \) denotes the weights
\( \beta_0 \) is the intercept

\[ P(D/ND)_i \] then derived using an exponential function: \( 1/(1+e^{-z_i}) \)

\[ P(D/D) \] probability of default given default in year \((t-1)\)

from historic data

\[ P(D/D)_i \] derived by dividing two consecutive defaults to total defaults
Managing credit risk

Pricing methodology – expected loss

\[ P(D/ND) = P_1 \]
from scoring model

\[ P(D/D) = P_0 \]
from historical data

\[ TM = \begin{bmatrix} P_1 & P_0 \\ 1 - P_1 & 1 - P_0 \end{bmatrix} \]

We drive all future PDs of the beneficiaries from a transition matrix

Recovery Rate = X% + Y%* Z%

X% : Collection rate of initial (non-restructured) cash flows
Y% : Restructured cash flows
Z% : Collection rate from restructured cash flows

When calculating the PV of Expected loss

• Probability of defaults
• Recovery rate
• Treasury funding curve
• Cash flow projections
## Managing credit risk

### Model outcomes – internal credit ratings

<table>
<thead>
<tr>
<th>Rating</th>
<th>Status</th>
<th>P(D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Non defaulted</td>
<td>P(D/ND) ≤ 5%</td>
</tr>
<tr>
<td>B</td>
<td>Non defaulted</td>
<td>5% &lt; P(D/ND) ≤ 15%</td>
</tr>
<tr>
<td>C</td>
<td>Non defaulted</td>
<td>15% &lt; P(D/ND) ≤ 30%</td>
</tr>
<tr>
<td>D</td>
<td>Non defaulted</td>
<td>P(D/ND) &gt; 30%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rating (*)</th>
<th>Status</th>
<th>P(D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Defaulted</td>
<td>P(D) &lt; 100%</td>
</tr>
<tr>
<td>F</td>
<td>Defaulted</td>
<td>P(D) = 100%</td>
</tr>
</tbody>
</table>

(*) If the institution has defaulted at least once in the last 2 years.

P(D/ND) is calculated from the scoring model.
P(D/D) is calculated from the historical data.
Managing credit risk

Model outcomes – Guarantee/onlent fee

\[ f(x\%) = \alpha \frac{1 - e^{-\beta x\%}}{1 + e^{-\beta x\%}} + f(0) \]

Partial guarantee ratio

\[ g(x\%) = \alpha \frac{1 - e^{-\beta (1-x\%)}}{1 + e^{-\beta (1-x\%)}} + 95\% \]
Statistics & Disclosure

Guaranteed Debt Stock and Undertaken Amounts

Million USD
Statistics & Disclosure

Undertaken Debt and Risk Account Budget Allocation

Million USD
Statistics & Disclosure

Disclosure

Annual/Monthly debt management reports

- Guarantees Provided
- Guaranteed Stock/Receivable portfolio
- Guaranteed Stock Debt Service Projections
- Undertaken Amounts
- Risk Account Realizations

http://www.treasury.gov.tr
Thank you...

M. Emre Elmadağ
emre.elmadag@hazine.gov.tr