Development of Debt Management IT Systems in Peru

Ministry of Economy and Finance
Presented to:
“Sovereign Debt Management Forum”
World Bank
Washington DC, October 2012
Agenda

- The first step - Developing the system to register the debt and the debt service
- The second step - Supporting risk analysis and the design of the Debt Management Strategy
- “In house” or Buying a Software - Things to take into account
THE FIRST STEP
Developing the system to register the debt and the debt service

- From 1992-1998, Statistics Module, Cash Planning, and Accounting were developed and implemented in Clipper. They were not integrated.

- From 1998-2000, SIGADE was implemented with a mixed team with international consultants and MEF staff, however some problems arose:
  - The complexity of the debt portfolio.
  - Structural adjustments were needed and involved a significant period of time and money.
  - Permanent dependence of SIGADE.

- In 2000, we decided to start the developing of SIAD (Sistema Integrado de Administración de Deuda) “in house” which started to operate in 2001.
Agenda

✓ The first step - Developing the system to register the debt and the debt service

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THE SECOND STEP
Supporting risk analysis and the design of the Debt Management Strategy

- In 2002 we started to look how other countries quantify the risk of their debt portfolio. As a result, we implemented a deterministic model in a Simulation Module created in SIAD.

- In 2004 there was an institutional decision to develop quantitative tools in order to:
  - Evaluate the effect of management operations in the Peruvian debt portfolio.
  - Analyze the sensitivity of public debt service to interest rates and exchange rate shocks.
  - Find optimal composition of the public debt in order to reduce market risks and refinancing risk.
  - Determine stress scenarios for public debt service.
THE SECOND STEP
Supporting risk analysis and the design of the Debt Management Strategy

- We decided to build a model for assessing Cost and Risk of the debt portfolio and to find an Efficient Frontier because:

  ✓ There were no models that would handle the complex structure of our debt portfolio.
    
    - Citibank: Did not incorporate the fiscal requirements.
    - ABN-AMRO: Only took into account interest rate risk

  ✓ High cost and dependency for its maintenance.
  ✓ Lack of flexibility to undertake future changes in the model.
**THE SECOND STEP**
*Supporting risk analysis and the design of the Debt Management Strategy*

- The Simulation Module offers the flexibility to work with two type of models:

  **Stochastic Monte Carlo Simulations**
  - Allows for more complex analyses.
  - It allows the calculation of any percentile (90%, 95% and 99%).
  - It incorporates the effect of correlations and volatilities.
  - Flexibility to incorporate other stochastic models for the financial variables (exchange rates and interest rates).

  **Deterministic model**
  - Simpler to design and use.
  - Individual analysis of changes in the financial variables and their effect on the public debt portfolio.
  - No dependency of parameters, except for the magnitude of the effect (that is selected previously).
THE SECOND STEP
Supporting risk analysis and the design of the Debt Management Strategy

- Challenges in developing the model
  - Software: difficult to do in excel
  - Strong mathematical background needed to develop stochastic models
  - Iterative process, learning by doing
  - Lack of data for estimating the volatility and correlations of some financial variables
  - Lack of support for implementing this model. Some authorities do not understand the importance and difficulties of doing this task
THE SECOND STEP
Supporting risk analysis and the design of the Debt Management Strategy

INPUTS

Averages
Volatilities
Correlations

Stochastic Scenarios
(Financial Variables)

Initial Database
Financing Requirements
PAEAD

Modified Database

Simulation

OUTPUT

Year 1

Year 2
THE SECOND STEP
Supporting risk analysis and the design of the Debt Management Strategy

Reference quantitative goals as of the closing of 2012

<table>
<thead>
<tr>
<th>Item</th>
<th>December 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of Nuevos Soles in the portfolio</td>
<td>48.1% - 53.7%</td>
</tr>
<tr>
<td>Percentage of fixed rate debt in the portfolio</td>
<td>74.4% - 76.3%</td>
</tr>
<tr>
<td>Average life (years)</td>
<td>12.7 - 13.4</td>
</tr>
<tr>
<td>Average life to refix (years)</td>
<td>11.3 - 12.2</td>
</tr>
<tr>
<td>Concentration of amortizations in the next 12 months</td>
<td>4.1% - 3.7%</td>
</tr>
<tr>
<td>Annual amortization payment concentration rate</td>
<td>8.9% - 3.9%</td>
</tr>
<tr>
<td>Percentage of financing flow with local currency</td>
<td>52.7% - 70.9%</td>
</tr>
</tbody>
</table>

1 / Indicator that measures the most immediate pressure on payments
2 / Measures the deviation of the portfolio’s amortizations payments over and above predetermined maximum levels. This indicator allows for an evaluation of the payments pressure for the next 5 years (refinancing risk), representing an additional element to define policy over the terms for the new debt to be contracted.
3 / Includes the financing of the debt management transactions.
THE SECOND STEP
Supporting risk analysis and the design of the Debt Management Strategy
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ACHIEVEMENTS OF SIAD

✓ Efficient and effective Administration and Control of Public Debt information.

✓ Reliable and timely information about Outstanding Debt, Disbursements, Debt service (executed and projected payments).

✓ Allowed for more efficient integration with SIAF (Sistema de Administración Financiera).

✓ Offer the possibility to calculate risk debt indicators.

✓ Service at Risk Model to evaluate the impact of funding and liability management operations in the debt portfolio structure and the redemption profile.
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### “IN HOUSE” OR BUYING A SOFTWARE

#### Things to take into account

<table>
<thead>
<tr>
<th>Concept</th>
<th>“In house”</th>
<th>Off the shelf systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>You can adapt the system to your current needs</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Update the system according to your new specific needs</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>IT staff in charge of this activity in the entity</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Time for developing the software</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Cost</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>
“IN HOUSE” OR BUYING A SOFTWARE
Things to take into account

- Institutional decision and support

- Need to plan in advance
  - Objectives
  - Analysis of the requirements
  - Modeling
  - Design
  - Application Development
  - Testing

- Be aware of Operational Risk!!!!!!!
  - Staff turnover
  - Programming language
  - Documentation
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