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Optimal Uses of Risk Management Techniques

by

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Optimal Uses of Risk Management Techniques in Public Debt Management

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Process to design and implement a risk management strategy

1. Definition of objectives for risk management
   - Scope (e.g. central government only?)
   - Time horizon
   - Expression of objective function (follows from the “problem”)

2. Analysis of risk
   - Risk Identification
   - Application of methodologies/models for quantifying risk,
   - Identification of natural hedges

3. Analysis of government's capacity to absorb risk
   - Balance sheet strength: debt levels, net worth, reserves levels, other financial assets
   - Long term structural factors: e.g. projected structural fiscal balance, demographics
   - Fiscal and financial flexibility: access to financing, investor base diversity, level of budgetary rigidities

4. Decide on risk management strategy
   - Evaluate alternatives taking into account cost-risk trade-offs, market and other constraints.
   - Decide on strategy:
     - Risk avoidance (policy changes)
     - Risk retention
     - Risk transfer to third parties

5. Implementation
   - Choice of specific instruments
   - Implement policy change

6. Monitor and assess
   - Evaluation of implementation
   - Were objectives met?

- Decide on strategy:
  - Risk avoidance (policy changes)
  - Risk retention
  - Risk transfer to third parties

- Balance sheet strength: debt levels, net worth, reserves levels, other financial assets
- Long term structural factors: e.g. projected structural fiscal balance, demographics
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Analyzing risk: first, need to define both cost and risk

- Examples of cost measures
  - Nominal interest payments
  - Interest cost adjusted for unrealized capital gains/losses (e.g. FX)
  - Interest cost as a percentage of revenues
  - Total debt as a percentage of GDP

- Risk may be defined as the difference between the expected cost (baseline case) and the cost under a negative scenario (using a deterministic approach)

- Degree of vulnerability to market risk can be measured by a range of metrics
  - Debt maturing within 1 year
  - Average time to maturity
  - Debt with interest rates re-fixing within 1 year
  - Average time to re-fixing
  - Currency mismatch between financial assets and liabilities
  - Etc.

- Different cost and risk measures provide different information - do not rely on one cost and risk measure
What is a model?
- A simplified representation of a more complex system
- Designed to shed some insights on a problem that one is analyzing

Why is it useful?
- Allows analysis of different strategies under alternative scenarios for future interest rates and exchange rates
- Maintain integrity across different scenarios/strategies
  - “Apples to apples” comparison
- Forces discipline in the process: systematic analysis and examination of possible states of the world
- Gives deeper insight into the trade-offs and supports the identification of options and constraints
Different approaches to modeling risk

- **Two key types of model for debt management:**

  1. **Deterministic models/scenario analysis**
     - Known inputs (macro and market): few; arbitrarily chosen
     - Determine particular outcomes, NOT probability of different outcomes

  2. **Stochastic models**
     - Some or all inputs and outcomes are random variables: not specific values but can take on multiple values according to a specified probability distribution
     - Results in a range of possible events with different probabilities of occurring: risk
     - Statistical performance measures are assessed, summarizing strategies’ performance against distribution of scenarios

**Key difference:** handful of ad hoc scenarios vs. multiple probabilistic scenarios
### Deterministic vs. Stochastic Models

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<thead>
<tr>
<th></th>
<th>Deterministic</th>
<th>Stochastic</th>
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<tbody>
<tr>
<td>Simplicity</td>
<td>✓</td>
<td>×</td>
</tr>
<tr>
<td>Quick analysis of specific scenarios; “story telling”</td>
<td>✓</td>
<td>×</td>
</tr>
<tr>
<td>Internal consistency</td>
<td>×</td>
<td>✓</td>
</tr>
<tr>
<td>High number of shocks</td>
<td>×</td>
<td>✓</td>
</tr>
<tr>
<td>Key challenges</td>
<td>• Determining which shocks to examine</td>
<td>• Data requirements • Distributional assumptions • Stability of estimated relationships</td>
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A deterministic model always useful for stress testing, and a good place to start.
A cost-risk model will not provide an “optimal” debt portfolio, rather it provides systematic information to help the decision-making process.

When designing the model, it is important to take into account all of the relevant risks.

The choices made about inputs to the model will determine the outputs, e.g. choice of shock scenarios or sample period for rate volatility.

Most countries tailor risk analysis to their own circumstances.

The World Bank and IMF jointly have developed a framework and analytical tool to help countries design a medium-term debt management strategy (MTDS).
Implementing a risk management strategy: techniques

- Adjust the composition of debt by refinancing maturing debt with new instruments that move the portfolio towards the desired risk profile.
  - Pace of change will depend on the maturity profile – may be regarded as too slow
  - Is simple to implement – not resource intensive, operational risk more limited

- Repay debt before it matures through “buy backs”
  - Accelerates the pace at which the portfolio may be moved towards the desired risk profile
  - Allows “benchmark” bond outstandings to be increased at a faster pace
  - Will require a larger gross financing program
  - Requires more resources and skills, e.g. analysis of fair value for repurchase prices, running reverse auctions, maintaining a continuous program
  - There may be accounting (e.g recognizing additional expenses by buying debt above par), systems and legal issues to resolve
  - May be judged as too expensive, particularly for sizable proportions of bond issues
Implementing a risk management strategy: techniques (2)

- **Debt switch or exchange operations**
  - Similar to buyback operations, but new debt is issued at the same time
  - Reduces the timing mismatch between debt repurchase and new issuance (and therefore the resulting interest rate risk)

- **Use of assets to hedge the “undesirable” debt (immunization)**
  - Is an alternative if the debt can’t be repurchased at a reasonable cost
  - Requires a sophisticated operation to manage assets on an on-going basis
  - Will result in credit exposure and/or cost-of-carry
  - There may be additional accounting, systems and legal issues to resolve
  - May best be combined with the use of swap transactions
Implementing a risk management strategy: techniques (3)

- **Use of swap transactions**
  - A stand-alone contract involving an exchange of cash flows that allows the risk characteristics of existing debt to be transformed
  - Commonly used in OECD countries (especially interest rate swaps), but less so in developing countries
  - Requires more resources and skills
  - There are accounting systems and legal issues to resolve
  - Need to ensure that all stakeholders understand the transactions (e.g. parliamentary oversight committees, auditors)
  - Credit risk must be managed (both by the government and the financial intermediary). Usually managed through exchange of collateral.
  - May becoming more difficult and expensive to use because of regulatory change
First and foremost, the techniques used will be governed by a clearly articulated debt management strategy. Objective is to implement the strategy.

It is likely that there will be a combination of techniques used, based on relative cost and efficiency (including account for credit and operational risks)
World Bank and other MDB products support governments in managing risk

Example: IBRD financial products:

- Flexible loan terms and prepayment provisions
- Currency and interest rate conversions, free-standing swaps, caps and collars, and commodity swaps on IBRD debt
- Interest rate and currency swaps on non-IBRD debt
- Index-based weather hedges

Benefits:

- IBRD acts as intermediary between borrower and financial markets
- Borrower benefits from IBRD’s triple-A credit rating
- Minimal additional system requirements
- No need to post collateral
- No exposure to IBRD
- No credit charges, unlike commercial banks
- IBRD helps bridge knowledge/systems gap and build capacity to use derivatives
Increased use of IBRD risk management products in recent years.
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