Identifying and Managing Cost and Risk on Public Debt Portfolio: Step 2

Joint Vienna Institute, Vienna, Austria
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Outline

- Step 2: Cost & risk of existing debt
- Cost and risk: Conceptual issues
- Cost, risk, and the choice of time horizon
- Indicators for market risk exposure
Step 2: Cost & Risk of Existing Debt

Objectives

• Identify the current debt management strategy
• Identify outstanding debt and its composition
• Calculate basic cost and risk indicators

Outputs

• Detailed information on outstanding debt
• Debt servicing profile of outstanding debt
• Description of main portfolio risks
Why do we need to understand the current portfolio?

Provides clues on which strategies to explore:
- What is the starting point?
- Is the existing cost and risk structure satisfactory or do we need to change?
- Are there any risks we need to worry about in particular? What risks do we need to mitigate?

Provides important input for cost-risk analysis:
- Debt service projections
- Definition of general instrument types
Cost and Risk: Conceptual Issues
The Framework for the Strategy

Cost/Risk Analysis

Constraints

Information on cost and risk

Debt Management Strategy Development

Consistency/constraints, e.g. sustainability

Information on cost and risk

Initiatives

Demand constraints

Macroeconomic Framework

Debt Market Development
ALM

- A government balance sheet
  - Few government’s produce balance sheets – but they have one
  - Government have the power to tax – this is the most important asset
  - A stylized government balance sheet

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
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<tbody>
<tr>
<td>• Stream of future revenues</td>
<td>• Stream of future expenditures</td>
</tr>
<tr>
<td></td>
<td>• Debt</td>
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</table>

- If the present value of future taxes are less than the present value of future expenditures, fiscal policy is unsustainable
ALM (2)

- A government balance sheet, cont.
  - Preliminary insights
    - Revenues and expenditures will typically be denominated in local currency – local currency debt will be least risky
    - Tax revenues and expenditures will tend to be relatively insensitive to real interest rates – long maturity, fixed interest rate debt is least risky
  - Matching the financial characteristics of assets and liabilities can be done on a sub-portfolio basis
    - For example, matching the currency composition of external debt and reserves of the central bank
Tax Smoothing

- What is tax smoothing?
  - Tax revenues up during economic boom, tax revenues down during recession – counter-cyclical fiscal policy helps stabilize the economy through its business cycle
  - Tax smoothing is preferable if taxes are distortionary, i.e. if changes in tax rates affects the behavior of economic agents

- Counter-cyclical fiscal policy defines desired timing of debt issuance and debt charges
  - Issue debt in recession, pay down debt in boom
  - Reduce debt charges in recession, increase debt charges in boom
Basic Budget Arithmetic

**Primary Balance**
- Interest payments
= Fiscal Balance
- Principal payments
= Funding need

- The primary balance is decided by fiscal policy
- The interest cost are (at least partially) determined by debt management
- When the budget is presented, the focus is typically the fiscal balance
Implications for the DM Strategy?

- The “optimal” debt structure is derived from a joint analysis of the financial characteristics of the Government’s future primary balances and the debt portfolio
  - In practice this turns out to be complicated

- Alternative: Make simplifying assumptions regarding the primary balance, i.e. “restricted” ALM
  - Use projections of primary balance provided by the budget office as exogenously given
  - Assume primary balance remains at current level

- The implication is that the debt manager should focus on reducing the variability in debt charges
Cost, Risk and Time Horizon
Cost and Risk (1)

Decision-makers need information on

- **Cost**: Annual interest payments + the impact of changes in exchange rates

- **Risk**: Changes in future cost and the impact on the budget
  - Focus here is market risk – other risks, e.g. related to contingent liabilities, operational risks etc. should also be identified and managed
  - Local currency as numeraire?
  - Nominal cost?
  - Over what time horizon?
Cost and Risk (2)

• Since debt management objectives are expressed in terms of cost and risk, these concepts should have concrete interpretations in order to design debt management strategies that meet such objectives
  – Clear definitions of cost and risk is the first step of developing a comprehensive strategy

• Choice of time horizon and unit for cost measurement should be consistent with characteristics of the assets
  – Future stream of primary surpluses will normally be denominated in local currency
  – Medium to long term time horizon
Cost and Risk (3)

- Examples of cost measures
  - Nominal interest
  - Interest cost adjusted for unrealized capital gains/losses
  - Real interest cost
  - Interest cost as a percentage of GDP
  - Interest cost as a percentage of revenues
  - Debt to GDP, et.

- Different cost measures provide different information on cost - do not rely on one cost measure
Cost and Risk (4)

- Risk is function of:
  - The volatility of the underlying factors, the risk factors or sources of risk, *e.g.* interest rate volatility, exchange rate volatility
  - The portfolio exposure or the degree of sensitivity to the risk factors, *e.g.* fixed/variable interest rate, currency mismatch between assets and liabilities

- Risk is associated with the potential for the cost to deviate from its expected outcome on the budget and in the government’s balance sheet
  - A debt portfolio that has higher costs in recessions when public finances are strained for other reasons, is more risky than a portfolio for which the opposite is true
Cost and Risk - Summary

- The challenge is to identify a debt structure that minimizes the risk of fiscal adjustment.
- Clear definition of cost and risk very important for strategy development.
  - Choices will be country specific.
- Often more than one measure for cost and risk is needed to properly reflect cost and risk.
- Risk measure will depend on the definition of cost, and is focused on budget impact.
- Time horizon for public debt management is medium to long term.
Indicators for Market Risk Exposure
General Approach to Measuring Risk

Increase in debt service produced by a unexpected shift in market rates that may hit the budget at t+1

\[ Risk_t^{(j)} = Exposure_t^{(j)} \times Risk \text{ Factor}_t^{(j)} \]

- Exposure: Endogenous to debt management
- Risk Factor: Exogenous, except for refinancing risk
Measuring Exposure to Refinancing Risk

• Share of debt falling due within a specific time period - shape of the redemption profile

• Average Time to Maturity
Shape of the Redemption Profile

The redemption profile is a reflection of the funding sources (market access)
Average Time to Maturity (ATM)

\[ ATM_t = \sum_{\tau=1}^{n} \frac{\tau \cdot R_{t+\tau}}{STO_t} \]

- \( R_t \): Principal payment due at time \( t \)
- \( STO_t \): Nominal value of total debt stock at time \( t \)
- \( t \): Current period
- \( \tau \): Residual time to maturity
- \( n \): Final maturity

Example
- One loan is fixed rate amortizing with 4 years remaining maturity
- The other loan is variable rate amortizing with 4 years remaining maturity

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<thead>
<tr>
<th>Year</th>
<th>Time</th>
<th>Time of Repay</th>
<th>ATM</th>
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ATM: Focus on timing of repayment
Measuring Exposure to Interest Rate Risk

- Debt exposed to interest rate re-fixing within a specific time period
  - Maturing fixed rate debt to be rolled over
  - Variable rate debt (include interest rate swaps)

- Average Time to Re-fixing (ATR)

- Variable rate debt ratio
  - Variable rate debt as a percentage of total debt
Average Time to Re-fixing (ATR)

\[
ATR_t = \frac{r \cdot FRD_t}{STO_t} + \sum_{\tau=1}^{n} \frac{\tau \cdot RF_{t+\tau}}{STO_t}
\]

FRDₜ: nominal value floating rate debt outstanding at time t

r: time to next interest rate reset in years

STOₜ: nominal value of total debt stock at time t

τ: residual time to maturity

t: current period

n: final maturity

RFₜ: nominal value fixed-rate debt due at time t

• Example
  – One loan is fixed rate amortizing with 4 years remaining maturity
  – The other loan is variable rate amortizing with 4 years remaining maturity

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ATR: Focus on timing of interest rate re-fixing
Measuring Exposure to FX risk

- Share of external debt in total debt
- Currency composition
- Degree of currency mismatch
  - ALM considerations
    - Government inflows in foreign currency
    - Currency composition of central bank reserves
    - Degree of synchrony with a hard-currency economy
Why Calculate Risk Exposure Indicators?

- As risk has different dimensions, debt managers normally use a set of risk indicators/targets rather than relying on a single one.
- As a mean of controlling and communicating the risks on the government’s debt, debt managers use a number of risk indicators to reflect different aspects of risk and describe the debt management strategy being applied.
Risk Indicators as Strategic Targets

- **Strategic targets**
  - Represent the characteristics of the desired debt portfolio, and
  - Express the sovereign’s preferences with regard to the cost/risk tradeoffs

- Strategic targets need to be derived from the cost/risk analysis and are unique to each sovereign

- Forward looking

- Indicators for flow vs. stock
  - Does it matter?
Examples of Strategic Targets

- **Hungary (2014)**
  - The share of FX debt should not exceed 45%, and be falling
  - FX exposure after swaps should be 100% EUR, +/- 5%
  - Interest rate re-fixing for domestic debt should be 17-39%
  - For FX debt, 66% should be fixed interest rate, +/-5%

- **Belgium (2013)**
  - Refinancing risk: Max 20% within 1 year, 55% within 5 years
  - Re-fixing: Max 22.5% within 1 year, 60% within 5 years

- **Latvia (2014)**
  - Share of domestic debt: Min 35%
  - Refinancing risk: Max 25% within 1 year, 50% within 3 years
  - Fixed rate debt with maturity more than 1 year: More than 60%
  - Foreign debt composition: 100% EUR +/- 5%
  - Duration 3.4-5.0 years
Summary

- Risk is a function of the risk factor and the exposure
- As risk has different dimensions, debt managers normally use and monitor a set of risk indicators rather than relying on a single one
- Whenever indicators a debt manager decides to use, it is important that they are calculated on a regular basis, e.g. monthly, and tracked over time
- Market risk indicators are useful means of understanding and communicating risks on the debt
- A set of risk exposure indicators can be used to describe the strategy – strategic targets