Advances in Risk Management of Government Debt

Advances in Risk Management of Government Debt is a landmark study about risk management practices of OECD debt managers. Risk management has become an increasingly important tool for achieving strategic debt targets, and is now an integral part of a wider strategic debt management framework based on benchmarks in most jurisdictions. However, the study shows that the extent and sophistication of risk management vary widely across countries.

This study brings together a number of recent reports on best practices for managing market risk, credit risk, operational risk and contingent liability risk. It was prepared by a collective of authors from the OECD Working Party on Public Debt Management, and includes case-studies of risk management practices in selected OECD debt markets.


The full text of this book is available online via this link:
http://new.sourceoecd.org/finance/9264104410

Those with access to all OECD books online should use this link:
http://new.sourceoecd.org/9264104410

SourceOECD is the OECD's online library of books, periodicals and statistical databases.
For more information about this award-winning service and free trials ask your librarian, or write to us at SourceOECD@oecd.org.
Advances in Risk Management of Government Debt
ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

The OECD is a unique forum where the governments of 30 democracies work together to address the economic, social and environmental challenges of globalisation. The OECD is also at the forefront of efforts to understand and to help governments respond to new developments and concerns, such as corporate governance, the information economy and the challenges of an ageing population. The Organisation provides a setting where governments can compare policy experiences, seek answers to common problems, identify good practice and work to co-ordinate domestic and international policies.

The OECD member countries are: Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The Commission of the European Communities takes part in the work of the OECD.

OECD Publishing disseminates widely the results of the Organisation’s statistics gathering and research on economic, social and environmental issues, as well as the conventions, guidelines and standards agreed by its members.

This work is published on the responsibility of the Secretary-General of the OECD. The opinions expressed and arguments employed herein do not necessarily reflect the official views of the Organisation or of the governments of its member countries.

Publié en français sous le titre :
Progrès en gestion des risques de la dette publique

© OECD 2005

No reproduction, copy, transmission or translation of this publication may be made without written permission. Applications should be sent to OECD Publishing: rights@oecd.org or by fax (33 1) 45 24 13 91. Permission to photocopy a portion of this work should be addressed to the Centre français d’exploitation du droit de copie, 20, rue des Grands-Augustins, 75006 Paris, France (contact@cfcopies.com).
Foreword

This landmark study provides an in-depth overview and analysis of risk management practices of OECD debt managers. Risk management has become an increasingly important tool for achieving strategic debt targets, and is now an integral part of a wider strategic debt management framework based on benchmarks in most jurisdictions. However, the study shows that the extent and sophistication of risk management vary widely across countries.

Sources of risk exposure are tied to domestic debt management operations, which include management of the domestic treasury bill and bond programs, and associated asset cash management operations. Risk exposure can also arise from managing national foreign currency reserves in those countries where reserves are not managed separately by the central bank. Derivative operations related to either domestic or foreign reserve activities of the central government such as interest-rate and currency swaps, are used as part of the management of market risk. However, their use provides new sources of credit risk exposure. Finally, the study identifies the risks associated with contingent liabilities as an important policy challenge for OECD debt managers.

The current publication is to an important degree the outcome of recent projects and meetings by the OECD Working Party on Public Debt Management. The first stage of the risk management project focused on market risk, credit risk, liquidity risk and refunding risk, resulting in three reports to the Working Party. A key finding was that these risks are most likely to be managed on a rigorous basis, while operational risk is managed with less formal methods (see chapter 2 of this study). Most recently, the Working Party discussed a report on the management of explicit contingent liabilities (included as Chapter 6 in this study), including to what extent debt managers should be responsible for, or involved in, the management of the associated risks.

This study was prepared by a collective of authors from the OECD Working Party on Public Debt Management, and includes also case-studies of risk management practices in selected OECD debt markets. All chapters were edited by Hans J. Blommestein, Co-ordinator of the Working Party’s activities.

Central Government Debt: Statistical Yearbook. The statistics in this series are derived from national sources based on a questionnaire prepared under the auspices of the OECD Working Party on Public Debt Management.

Ove Jensen
Chairman
OECD Working Party on Public Debt Management

Hans Blommestein
Co-ordinator
OECD Working Party on Public Debt Management
# Table of Contents

## Part I

**Introductionary Overview and Analytical Framework**

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to advances in risk management of government debt by Hans Blommestein</td>
<td>11</td>
</tr>
<tr>
<td>A</td>
<td>Optimal Debt and Strategic Benchmark: the Risk Management Approach to Debt Sustainability</td>
<td>22</td>
</tr>
<tr>
<td>2</td>
<td>Overview of Risk Management Practices in OECD Countries by Hans Blommestein</td>
<td>27</td>
</tr>
<tr>
<td>3</td>
<td>Analytical Framework for Debt and Risk Management by Lars Risbjerg and Anders Holmlund</td>
<td>39</td>
</tr>
<tr>
<td>A</td>
<td>Structure of Debt Simulation Model</td>
<td>54</td>
</tr>
</tbody>
</table>

## Part II

**Recent Developments in Managing Market Risk, Operational Risk and Contingent Liability Risk**

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Recent Developments in the Management of Market risk by Ove Sten Jensen and Lars Risbjerg</td>
<td>61</td>
</tr>
<tr>
<td>5</td>
<td>Management of Operational Risk by Sovereign Debt Management Agencies by Peter McCray</td>
<td>67</td>
</tr>
<tr>
<td>A</td>
<td>Sovereign Debt Management Operational Risk Survey: Summary of Responses</td>
<td>72</td>
</tr>
<tr>
<td>6</td>
<td>Explicit Contingent Liabilities in Debt Management</td>
<td>89</td>
</tr>
</tbody>
</table>
### Part III


<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Author(s)</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Risk Management of Government Debt in Austria</td>
<td>Paul A. Kocher and Gerald Nebenführ</td>
<td>119</td>
</tr>
<tr>
<td>8</td>
<td>Risk Management of Government Debt in Belgium</td>
<td>Jean Deboutte and Bruno Debergh</td>
<td>129</td>
</tr>
<tr>
<td>9</td>
<td>Managing Risks in Canada’s Debt and Foreign Reserves</td>
<td>Pierre Gilbert, Zar Chi Tin and Mark Zelmer</td>
<td>139</td>
</tr>
<tr>
<td>A9</td>
<td>Investment and Credit Guidelines for the Exchange Fund Account</td>
<td></td>
<td>154</td>
</tr>
<tr>
<td>10</td>
<td>Risk Management of Government Debt in Denmark</td>
<td>Lars Risbjerg</td>
<td>157</td>
</tr>
<tr>
<td>A10</td>
<td>The Scenario and CaR Model</td>
<td></td>
<td>171</td>
</tr>
<tr>
<td>B10</td>
<td>Principles for Credit Risk Management</td>
<td></td>
<td>174</td>
</tr>
<tr>
<td>11</td>
<td>Risk Management of Government Debt in Finland</td>
<td>John Rogers</td>
<td>177</td>
</tr>
<tr>
<td>12</td>
<td>Risk Management of Government Debt in France</td>
<td>Bertrand de Mazieres and Benoit Coeure</td>
<td>189</td>
</tr>
<tr>
<td>13</td>
<td>Risk Management of Government Debt in Portugal</td>
<td>Rita Granger</td>
<td>199</td>
</tr>
<tr>
<td>A13</td>
<td>Benchmarking for Public Debt Management</td>
<td></td>
<td>210</td>
</tr>
<tr>
<td>14</td>
<td>Risk Management of Government Debt in Sweden</td>
<td>Per-Olof Jönsson</td>
<td>217</td>
</tr>
<tr>
<td>15</td>
<td>Risk Management of Government Debt in the United Kingdom</td>
<td>Toby Davies</td>
<td>231</td>
</tr>
<tr>
<td>A15</td>
<td>DMO Functional Structure</td>
<td></td>
<td>244</td>
</tr>
<tr>
<td>16</td>
<td>Risk Management of Government Debt in the Czech Republic</td>
<td>Petr Pavelek</td>
<td>245</td>
</tr>
<tr>
<td>A16</td>
<td>Government Debt Management Regulations</td>
<td></td>
<td>261</td>
</tr>
<tr>
<td>17</td>
<td>Risk Management of Government Debt in Poland</td>
<td>Arkadiusz Kaminski and Marek Szczerbak</td>
<td>263</td>
</tr>
</tbody>
</table>
List of boxes
6.1. Illustration of the risk of a loan guarantee ................................................. 105
9.1. Application of the model: finding a new balance ........................................... 145

List of figures
3.A1. Structure of government debt simulation model ........................................... 54
6.1. Probability distribution of net assets ............................................................ 105
7.1. Currency value at risk .................................................................................... 122
7.2. Interest expense 2004-2011 .......................................................................... 123
7.3. Value at Risk ................................................................................................. 124
7.4. Current exposure in previous year ............................................................... 126
9.1. Funds management governance framework ................................................. 141
9.2. Debt strategy framework ............................................................................. 143
9.3. Composition of EFA assets .......................................................................... 149
9.4. EFA assets by credit rating .......................................................................... 149
9.5. EFA funding composition ............................................................................ 150
10.1. Structure of Government Debt Management ............................................. 161
10.A1. Structure of simulation model ................................................................. 171
11.2. Interest rate risk: share of floating rate debt ............................................. 182
11.3. Interest rate risk: modified duration .......................................................... 182
11.4. Refinancing risk: redemptions within one year .......................................... 184
11.5. Refinancing risk: redemption profile .......................................................... 185
13.1. IGCF organisational chart .......................................................................... 200
13.2. Refixing profile of the debt portfolio vs. the benchmark ............................. 203
13.A1. DEM rate history ..................................................................................... 212
13.A2. Strategies and scenario generators ........................................................... 213
16.3. Monthly refinancing vs. redemption profile of T-Bonds during 2002 and 2003 (CZK billion) .......................................................... 255
16.4. State debt redemption profile vs. interest rate refixing profile (inc. swaps), September 30, 2003 .......................................................... 256
17.1. Maturity profile of State Treasury domestic debt, as of mid 2003 ............. 273
17.2. Maturity profile of State Treasury foreign debt, as of mid 2003 .................. 274
List of tables

5.A1. Break-up of Staff involved with middle office functions .......................... 75
13.A1. Liability and asset management .............................................................. 211
16.1. Published strategic targets for 2003 ......................................................... 248
16.2. Czech state debt portfolio in 2003 ............................................................ 254
17.1. Average time to maturity and duration of PLN denominated marketable debt (in years) ................................................................. 270
PART I

Introductionary Overview and Analytical Framework
PART I

Chapter 1

Introduction to Advances in Risk Management of Government Debt

by

Hans J. Blommestein

OECD

This chapter provides an overview of the key policy issues addressed in the new landmark OECD study, Advances in Risk Management of Government Debt. Risk management has become an increasingly important tool for achieving strategic debt targets, and is now an integral part of a wider strategic debt management framework based on benchmarks in most OECD jurisdictions.

A strategic benchmark plays a key role in the control of risk. The benchmark in its function as management tool requires the government to specify its risk tolerance and other portfolio preferences concerning the trade-off between expected cost and risk.

The risk management policy framework constitutes the critical connection between the formulation and implementation of debt management decisions. This risk framework includes in most countries market-, credit-, and operational risk, while only in a relatively few OECD countries attention is paid to the risks related to contingent liabilities (although there is a growing interest in exploring their role in this policy area).

Debt managers need to have a view on the optimal structure of the public debt portfolio. Ideally, they should be able to assess how a portfolio should be structured on the basis of cost-risk criteria so as to hedge the government’s fiscal position from various shocks. The optimal debt composition is derived by looking at the relative impact of the risk and costs of the various debt instruments on the probability of missing a well-defined stabilisation target.

Emerging market debt managers are generally facing greater and more complex risks in managing their sovereign debt portfolio and executing their funding strategies, than their counter-parts managing sovereign debt in the more advanced markets. At the same time, many emerging markets are not in the position to benefit from efficient international or domestic risk-sharing. In view of these structural obstacles, debt and risk management (including the specification of a strategic benchmark) need to be integrated into a broader policy reform framework.
I. The growing importance of risk management of public debt in the OECD area

Modern risk management has become an important tool for achieving strategic debt targets in the OECD area. In essence, risk management policies, based on the use of formal methods, are now an integral part of debt management in most OECD jurisdictions. In general, risk management tolerances and policies are approved (and often set) by the Ministry of Finance (or appropriate Ministry). This strategy about risks entails an explicit political decision about the trade-off between costs and risks. The actual risk management operation is often run at a separate agency responsible for management of the sovereign debt or at the central bank if it manages the debt, and is typically segregated from other treasury operations.

The risk management function is therefore part of the wider institutional framework for debt management, which includes the integration of the management of domestic and foreign debt. In fact, the trend to more autonomous debt management agencies is accompanied by an increased emphasis on risk assessment and risk management. As a result, the risk management function is now a central feature of debt offices in many OECD countries. This risk control function is in many debt offices organised in the form of separate risk management unit and as part of the middle office.

The current publication is to an important degree the outcome of meetings by OECD debt managers to discuss the implications of the trend that risk management has become an increasingly important tool for achieving strategic debt targets. Risk management should be seen as an integral part of a wider strategic debt management framework based on benchmarks (see Section II, this chapter). The risk management policy framework constitutes the critical connection between the formulation and implementation of debt management decisions. This risk framework includes in most countries the following risks: market risk (interest and currency risk), credit risk, and operational risk. In relatively few OECD countries debt managers are involved in the risks related to contingent liabilities, although there is a growing interest.

This publication provides an in-depth overview of risk management practices in OECD countries. Special focus is on the technical problems and policy issues related to market-, credit-, and operational risk as well as the risks associated with contingent liabilities. The discussion of recent trends
and developments will be preceded by the presentation of an analytical framework for debt and risk management. The publication also provides an in-depth analysis of the use of recently developed cost and risk measures, asset-liability models, simulation models, and benchmarks. The final part gives an overview of risk management policies and risk control procedures and techniques, in a selected number of individual OECD countries.

II. The role of strategic benchmarks as risk management tool

A strategic benchmark plays a key role in the control of risk. The benchmark in its function as management tool requires the government to specify its risk tolerance and other portfolio preferences concerning the trade-off between expected cost and risk.

To that end, debt managers need to have a view on the optimal structure of the public debt portfolio. Ideally, they should be able to assess how a portfolio should be structured on the basis of cost-risk criteria so as to hedge the government’s fiscal position from various shocks. The optimal debt composition is derived by looking at the relative impact of the risk and costs of the various debt instruments on the probability of missing a well-defined stabilisation target (e.g. the stabilisation of the debt ratio at some target value, thereby reducing the probability of a fiscal crisis; see Annex 1.A). This framework would allow the pricing of risk against the expected cost of debt service. This price information makes it possible to calculate the optimal combination along the trade-off between cost and risk minimisation.

This means that the choice of debt instruments that a government should issue depends in large part on the structure of the economy, the nature of economic shocks, and the preference of investors. For example, fixed-rate nominal debt (expressed in local currency) would help hedge the budgetary impact of supply shocks, while inflation-indexed debt are better hedges than nominals in case of demand shocks. This example also makes clear that cost-effectiveness (although very important) should not be the sole decision criterion when governments and debt managers assess which (new) instruments to issue or not.

Against this backdrop, the government needs to specify a strategic benchmark, representing the desired structure or composition of a liability (and asset) portfolio in terms of financial characteristics such as currency and interest mix, maturity structure, liquidity, and indexation. It is a management tool that requires the government to specify its risk tolerance and other portfolio preferences concerning the trade-off between expected cost and risk.
For a debt manager a strategic benchmark represents the longer-term structure of the debt portfolio the government wishes to have (given also the risks at the asset side). Strategic benchmarks have two key roles:

1. They provide guidance for the management of costs and risk.
2. They define a framework for assessing portfolio performance in relation to cost, return, and risk.

III. The use of risk management tools by OECD debt managers

OECD surveys show that the extent of risk management varies widely across countries, with some debt managers conducting very limited risk management and others engaged in extensive activities in this regard. The majority of OECD countries are actively engaged in risk management, with risk typically not managed on a consolidated basis across all government entities. Sources of risk exposure are tied to the domestic debt management activities of the central governments, which include management of the domestic treasury bill and bond programs, and associated asset and cash management operations. Sources of risk exposure can also arise from managing national foreign currency reserves in those countries where the reserves are not managed separately by the central bank. Derivative operations related to either the domestic or foreign reserve activities of the central government provide sources of risk exposure, as well.

As noted in Chapter 2, this volume, market risk, credit risk, liquidity risk and refunding risk are the risks most likely to be managed on a rigorous basis. Operational risk and legal risk are less likely to be formally managed. Thus far, most OECD debt managers have played only a small role in managing the risks associated with contingent liabilities. More recently, however, government debt managers in a greater number of OECD countries are becoming interested or involved in the monitoring of explicit contingent liabilities, designing contingent-based instruments, and making recommendations to the government on appropriate provisioning (Chapters 2 and 6, this volume).

The use of recently developed risk management tools typically allows for a separation between considerations about the funding strategy and risk management targets. Another desirable feature of these risk models is that all sovereign liabilities are managed as a single (integrated) portfolio. The next conceptual and practical step is to expand the pure liability risk management framework with public assets, resulting in an asset and liability management (ALM) framework. The central insight here is that resources (and the assets that generate them) are key for the assessment and management of risk (and not only the structure of liabilities). Several different measures are typically used in combination to monitor market risk and credit risk. In general, OECD countries with active risk operations update market risk and credit
risk positions on a daily basis. Risk management systems that are in use tend to be a combination of internally developed models, specialised purchased applications and general software.

IV. Organisation of risk management and place of the auditing function

The risk management function has become a central feature of the operation of debt offices in many jurisdictions. This function is usually organised in the form of a separate risk management unit which may be part of the middle office (MO). In some cases this MO unit has responsibility for a wide range of analytical tasks, including the development of alternative debt strategies, and the monitoring and operational management of the stock of outstanding sovereign debt. Even if the MO’s mandate is limited to the control of risk in a more narrow sense, it still has a very central role in the debt office. The principal reason is the need to include all departments and all aspects of the debt office’s work in the risk control framework, thereby incorporating all relevant departments and all debt management activities in an integrated risk management framework. This portfolio framework should be based on clearly articulated responsibilities for all staff involved, a transparent framework for the monitoring and control of activities, as well as clear and transparent reporting arrangements. In order to execute effectively the risk management function, the head of the MO should have the proper level of seniority and authority, while reporting directly to the senior management of the debt office.

In parallel, the demand for transparency and accountability about the risk profile has increased. Therefore the auditing function also plays a crucial role. To that end, a debt office needs to have a professional audit unit. This unit would have as an important task the assessment of the quality of risk control systems. In addition, DMO operations (including risk management operations) need to be audited by an external agency with the required competence and capacity (this is usually the general audit agency of the government such as de Rekenkamer in the Netherlands or the GAO in the US).

V. Major challenges and next steps in OECD jurisdictions

Surveys by the OECD WPDM revealed a number of areas which appear to be at the forefront of current risk management work or thinking in OECD member countries:

1. The use of benchmarking and stress testing in setting risk limits. The development of appropriate benchmarks and stress tests is in practice not a straightforward exercise.
2. OECD debt managers pay increasingly attention to the significant balance sheet risks associated with contingent liabilities. Several key questions need to be addressed. First, to what extent should debt managers be made responsible for, or involved in, the design and/or management of guarantees? In other words, which contingent liabilities should be managed by the debt manager? Second, should debt managers include the risks of state guarantees when analysing and deciding on the risk profile of the conventional government debt portfolio? If so, to what extent? Third, how to design and implement a framework for monitoring contingent liabilities, how to design contingent-based instruments, and how to calculate provisions for expected losses in the government budget?

3. To what extent should debt managers manage overall government's balance sheet risk? In other words, to what extent should debt managers be assigned responsibility for overall risk management of the government's balance sheet? At this strategic level the key question is which (part of the) liabilities, but also assets, are under the responsibility of the debt manager. After determining the scope of the risk framework, the next step is to agree on the degree of centralisation and integration of the risk control framework.

4. To what extent should treasury and cash management functions be included in the risk management framework?

5. Which accounting principles should be used by the debt manager? Are public accounting systems in the various jurisdictions capable of providing a true and reliable valuation of the debt? Are they suitable for producing a complete balance sheet of the government, including off-balance sheet commitments (such as contingent liabilities) and assets? And are (public) accounting standards capable of true and reliable valuations of the various risks? Is it possible to use fair value accounting? Which valuation methodology should be used (mark-to-market versus mark-to-curve)?

6. The pros and cons of using dynamic, macro-economic asset-liability models versus more modest versions of ALM (e.g. static or financial ALM) needs to be further studied.

7. Debt managers will also need to make an assessment of the usefulness and feasibility of using quantitative macro models. This includes an assessment of: structural models versus time-series; the complexity, simplicity and the need for robustness; the scope for stress testing; the use of deterministic scenario vs. stochastic simulation models; the employment of these models in benchmarking exercises; performance measurement; the impact of macro-economic volatility; and so on. A dynamic macro ALM framework is conceptually superior as it allows the incorporation of all future flows of tax revenues and expenditures by using a structural macro model that also
I.1. INTRODUCTION TO ADVANCES IN RISK MANAGEMENT OF GOVERNMENT DEBT

determines the principal debt costs (such as price indices, interest rates and exchange rates). This risk framework is of course only as good as it weakest link. In particular the use of the underlying econometric model of the economy may be too unreliable due to unstable parameters of interest (as a result of the Lucas critique). In that case the use of a dynamic, macro ALM framework is not very useful for assessing and preparing policy options.

Clearly, further progress in the practical use of risk management tools by sovereign debt managers is in large part dependent how successfully these policy issues and problems are being tackled.

VI. Complexities in the design and implementation of strategic benchmarks in emerging debt markets

As noted, the specification of strategic benchmarks requires the government from emerging markets to specify its risk tolerance and other portfolio preferences concerning the trade-off between expected cost and risk. To that end, debt managers need to articulate a view on the optimal structure of the public debt portfolio, derived from the overall debt management objective of minimising a country’s fiscal vulnerability. But this means that the choice of debt instruments depends in large part on the structure of the economy, the nature of economic shocks, and the preference of investors.

However, in designing and implementing strategic benchmarks, debt managers operating in emerging markets are generally facing greater challenges than their counter-parts managing sovereign debt in the more advanced markets. The structure or composition of the outstanding debt in emerging markets is in most cases much more complex, while volatility in the macro environment is usually much higher than in advanced markets. An increasing body of research shows that emerging market economies lack the natural stabilising structural characteristics that allow the use of effective counter-cyclical policies. Moreover, emerging debt managers are facing original sin (the situation in which it is difficult or impossible to borrow in nominal terms in the domestic currency). Emerging debt managers are therefore facing greater and more complex risks in managing their sovereign debt portfolio and executing their funding strategies. At the same time, many emerging markets are not in the position to benefit from efficient international or domestic risk-sharing.

Somewhat paradoxically, it can be argued that these debt managers have a greater need for quantitative risk management tools but, at the same time, the greater complexity of the structure of the risk as well as higher macro volatility make it much harder to implement and use some of these more advanced risk tools. For example, structural macro models are less stable in a
more volatile environment and therefore the reliability and robustness of their use in a dynamic ALM framework are questionable.

Because of these structural difficulties, it will also be much harder to define quantitative benchmarks with desirable properties in terms of the trade-offs between costs and risk. As a result, it will be more difficult for emerging debt managers (in comparison with their counter-parts from more advanced debt markets) to construct an optimal debt portfolio that can serve as a reliable guide for performance measurement.

A key challenge in emerging markets such as Brazil, China, Argentina and India is to develop meaningful benchmarks tools and related risk control procedures, that are at the same time relatively simple and robust to employ in a relatively more volatile environment.

Another challenge is how to deal with the fact that serial default on debts is in fact the rule rather than the exception in many jurisdictions. Because of this (in some lower-income country cases the odds of default are as high as 65 per cent) some analysts have argued that debt managers from emerging markets should aim for far lower levels of external debt-to-GDP rations than has traditionally been considered prudent. For example, for emerging markets with a bad credit history this may imply prudent ratios for external debt in the 15-20 per cent of GDP range.

Moreover, advanced markets are capable to share to a significant degree their risks with their creditors, while this is not (or much less) the case for emerging market economies. This is an additional (though related) reason why the benchmark should incorporate the prudential notion that governments in emerging markets should hold relatively less foreign debt than those from advanced market jurisdictions, while they also need to hold higher reserves (and smaller current account deficits). The strategic benchmark (derived in principle for the entire portfolio of assets and liabilities) is also likely to show the notion that larger shares of inflation-indexed local currency debt (in comparison with many existing portfolios) are beneficial.

In view of these structural obstacles, the risk management of government debt should therefore be part of a broader policy reform framework. What is needed is the integration of debt and risk management (including the specification of a strategic benchmark) into this framework. The paramount, overall objective in many emerging markets is reducing the country’s fiscal vulnerability and restoring the credibility of monetary policy, while tackling incomplete and weak financial and insurance markets. This objective requires such standard measures as cutting public expenditures, boosting the private saving rate, broadening the tax base, and strengthening a country’s capacity to export. It also requires institutional reform measures including stronger
property rights and more efficient bankruptcy procedures, thereby improving the conditions for the development of more complete and stronger markets for risk-sharing and risk-pooling. This in turn would contribute to eliminating the sources of deep-seated emerging market risks, including currency and maturity mismatches, weak and ineffective prudential oversight, opaque supervisory practices often mirrored by non-transparent transactions in banking and capital markets, a weak institutional infrastructure, and an inadequate exchange rate regime.\textsuperscript{17}

It is against this backdrop of a broader policy reform agenda that a risk management framework for government debt as those used in advanced markets should be implemented, including the specification of a strategic benchmark (see Annex 1.A for details). Nonetheless, this integrated framework should be sufficiently flexible and pragmatic to absorb various shocks so as to overcome crisis situations. This may involve a temporary deviation from a pre-announced debt issuing programme based on a strategic benchmark.\textsuperscript{18} For example, during a serious crisis situation the DMO may have to resort to issuing shorter maturity instruments than previously announced, and the issuance of fixed nominal debt or inflation indexed bonds may have to be temporarily suspended. It may also be necessary to provide liquidity for fixed rate positions. These pragmatic responses\textsuperscript{19} will not necessarily undermine the debt strategy as being expressions of opportunistic debt management as long as the debt managers and other financial authorities continue to communicate in a transparent fashion with markets, including by explaining the rationale of their actions. Moreover, as soon as market conditions return to a normal situation, the earlier announced debt strategy must be continued (for example, reducing the share of floating debt, increasing the share of inflation linkers, and lengthening the maturity of domestic debt).

However, short-term deviations from the strategic benchmark should not become short-term “solutions” to procrastinate, rather than prompt and decisive actions to overcome a sudden stop in capital inflows. When a country is responding to a foreign credit crunch (in financing its external deficit) by issuing massive amounts of short-term foreign currency debt, then the resulting mismatch on the country’s balance sheet is setting the stage for a very costly currency crash.\textsuperscript{20}

In sum, structural weaknesses in emerging markets create more volatility in macro-economic outcomes. The more volatile the economy is, the more prudent the policy stance needs to be.\textsuperscript{21} This fundamental notion of prudence should be reflected in the strategic benchmark.
Notes

1. These meetings were held under the aegis of the OECD Working Party on Debt Management (WPDM).


3. Past and ongoing work by the OECD WPDM on risk management includes: market risk (interest and currency risk), credit risk and operational risk. Currently, the WPDM is focusing on the problems and management issues related to the risks of contingent liabilities. Chapters 2 and 6, this volume, provide details on the result of these projects.

4. Another project of the OECD WPDM focuses on the use of benchmark portfolios, including the role of risk management objectives, when designing performance measurement systems.


7. Some of these issues were identified as part of the OECD Working Party’s project on contingent liabilities.

8. A first report on the work done by the OECD Working Party on contingent liability risk is included in this volume as Chapter 6.


13. It has also been argued that emerging markets are more vulnerable for a slowdown in growth, leading to unsustainable debt levels. In this view, lower growth has a significant impact on debt ratios via a reduction in tax income and the primary surplus [William Easterly (2002), How Did Highly Indebted Poor Countries Become Highly Indebted? Reviewing Two Decades of Debt Relief, World Development, Vol. 30, No. 10, pp. 1677-96]. However, beyond a certain threshold, there is also evidence of reverse causality of a negative impact of high debt on growth [Catherine Pattillo, Helene Poirson and Luca Ricci (2004), What Are the Channels Through Which External Debt Affects Growth?, IMF Working Paper, WP/04/15].

14. Usually the foreign debt position of advanced markets does not involve a net foreign currency exposure.
I.1. INTRODUCTION TO ADVANCES IN RISK MANAGEMENT OF GOVERNMENT DEBT


16. See also Raghuram Rajan (2004), How Useful Are Clever Solutions? (Why fashionable proposals often don’t work, as in the case of a new approach to dollarized debt and “original sin”), Finance & Development, March 2004.

17. The complexities involved in eliminating these sources (or at least reducing their impact) has been underestimated or misjudged by many analysts and policy-makers. De la Torre and Schmukler (2004) make the important observation that many of these structural sources of risk are in fact the endogenous outcome of the interactions of rational agents (including debt managers) with the market environment. From this perspective these deep-seated structural weaknesses can even be interpreted as risk-coping devices. De la Torre and Schmukler (2004) argue that these risk-coping mechanisms are jointly determined and each of them involves trade-offs. The costs of their removal may even be prohibitive when undertaken without taking into account the overall macro-economic and structural situation. The introduction of new technical debt management procedures or instruments [called “clever solutions” by Raghuram Rajan (2004)] such as letting multilateral organisations like the IMF and World Bank issue bonds in the emerging market currency or as debt indexed to the local inflation rate or bonds in a synthetic unit of account (based on a weighted basket of emerging-market currencies), will then be counter-productive or even backfire. The execution of the debt strategy needs to be attuned to the underlying macro policy stance and the situation (including assessments by investors) in the global financial market environment. This is another illustration why debt management in emerging markets is in general a much greater challenge than in more advanced markets.

18. As noted in Section VI (this chapter), the specification of a benchmark portfolio represents the desired longer-term structure or composition of the government debt portfolio.

19. These pragmatic responses are another illustration of the insight that (some of) the structural weaknesses or features of a typical emerging market economy (a high degree of short-termism in the form of currency and maturity mismatches, financial dollarisation or euroisation, and illiquid domestic financial markets) are to an important degree the (endogenous) outcome of rational responses by debt managers and other market participants.

20. Jeffrey Frankel refers to this policy response as “gambling for resurrection”. [J. Frankel (2004), Contractionary Currency Crashes in Developing Countries, The Mundell-Fleming Lecture, IMF Annual Research Conference, Washington, D.C., November 5, 2004.] Buying time by running down reserves and shifting the composition of the debt toward foreign currencies is likely to wreak havoc with private balance sheets when a forced adjustment of the external balance finally takes place, “regardless of the combination of increases in interest rate and currency depreciation” (Frankel, ibid.).

ANNEX 1.A

Optimal Debt and Strategic Benchmark: 
the Risk Management Approach 
to Debt Sustainability

As noted in Section II (this chapter), the optimal debt composition is calculated by assessing the relative impact of the costs and risk of the different debt instruments on the debt ratio, $B$ (debt-to-GDP). In essence, the choice of debt instruments trades off the risk and expected costs of debt service. Reducing the variability in the primary surplus (or deficit) and the debt ratio (for any given expected cost of debt service) is desirable, because it reduces the probability of a fiscal crisis due to adverse shocks to the budget (that in turn might trigger a financial crisis).

Let's assume that the overall or wider debt management objective is to reduce the country's fiscal vulnerability by stabilising the debt ratio. We shall use the following debt management model to illustrate the trade-offs between expected cost of debt service and the risk in choosing different debt instruments. In order to stabilise the debt ratio, $B(0)$, the fiscal authority decides to implement a fiscal reform programme, taking into account the realisation of debt returns, output, $Y$, inflation, $\Pi(t+1)$, and the exchange rate, $e(t)$. Success of a stabilisation programme is by definition uncertain. As a result, a debt-cum-financial crisis cannot be prevented with certainty. When a debt crisis arises, the debt ratio increases rapidly:

$$B(t+1) - \hat{A}(t+1) + \varepsilon > B(t)$$  \hspace{1cm} (A-1)$$

where $B(t+1)$ is the trend debt ratio, $\hat{A}(t+1)$ is the expected fiscal adjustment; and $\varepsilon$ is a shock to the budget (external shocks such as oil price hikes or internal shocks such as the discovery of “hidden” contingent liabilities).
Debt accumulation $\Delta B_{(t+1)} = B_{(t+1)} - B_{(t)}$ is driven by:

$$\Delta B_{(t+1)} = I_{(t+1)}B_{(t)} + \Delta e_{(t+1)}b_2B_{(t)} - S_{(t+1)} - [\Delta \ln Y_{(t+1)} + \Pi_{(t+1)}]B_{(t)} \quad (A-2)$$

where $I_{(t+1)}B_{(t)}$ is total nominal interest payments on outstanding amount of debt; $e_{(t+1)}$ is the log of the nominal exchange rate; $b_2$ is the share of foreign currency-denominated debt; $S_{(t+1)}$ is the trend primary surplus; $\ln Y$ is log output; and $\Pi_{(t+1)}$ the rate of inflation.

Total interest payments are equal to:

$$I_{(t+1)}B_{(t)} = i_{(t+1)}b_1B_{(t)} + \tilde{R}_{(t)} \Pi_{(t+1)}(1 + \Delta e_{(t+1)}b_2B_{(t)} + [r_{(t)} + \Pi_{(t+1)}]b_3B_{(t)} + R_{(t)}[1-b_1-b_2-b_3]B_{(t)} \quad (A-3)$$

where $b_1$ is the share of debt indexed to the (average) domestic interest rate $i_{(t)}$; $\tilde{R}_{(t)}$ is the world (dollar) interest rate; $RP_{(t)}$ the risk premium; $r_{(t)}$ is the real interest rate; $b_3$ is the share of price-indexed debt; and $R_{(t)}$ is the nominal rate of return on nominal fixed-rate bonds.

The ratio of the trend surplus-to-GDP, $S_{(.)}$, depends on cyclical conditions and unanticipated inflation:

$$S_{(t+1)} = E[S_{(t+1)} - \eta_1 \Pi_{(t+1)} - \eta_2 \Pi_{(t+1)}]. \quad (A-4)$$

where $E_{(.)}$ denotes expectation conditional on the available information at time $t$; $\eta_1$ is the semi-elasticity of the government budget (relative to GDP or output); $\eta_2$ is the semi-elasticity with respect to the price level; and $y = \ln Y_{(t+1)}$. Hence, expression (A-4) captures the notion that $S_{(.)}$ can be higher than expected because of output surprises and/or inflation surprises.

The optimal debt portfolio (that is, the choice of debt denomination and indexation) is based on the minimisation of the probability that the expected fiscal adjustment programme fails:

$$\text{Min} E_{(.)} \text{Prob}[X > \tilde{A}_{(t+1)} + \tilde{B}_{(t+1)}] \quad (A-5)$$

subject to (A-2), (A-3) and (A-4). Solving (A-5) with respect to $b_1$, $b_2$ and $b_3$ yields the optimal debt structure. These first-order conditions show also the
trade-off between the risk and expected cost of debt service related to the choice of debt instruments. As noted in Section II (this chapter), the optimal debt composition constitutes the basis for the specification of the strategic benchmark.

The risk management approach to debt sustainability goes therefore beyond the traditional debt sustainability literature that focuses simply on determining the primary deficit (surplus) and/or growth rate of GDP that would keep the debt level at a certain level. The traditional approach analyses in essence debt sustainability in the absence of risk. The risk management approach, in contrast, shows that risk is minimised if a debt instrument provides insurance against variations in the primary budget and the debt ratio due to uncertainty about output and inflation.

The next step would be to use a structural macro-economic model to investigate how the optimal debt portfolio depends on the type of shocks (demand, supply, spreads). An alternative approach is to use a VAR methodology for modelling the links between macro variables.

Notes
1. See, for example, Giavazzi and Missale (2004), ibid.
2. This overall or wider debt management objective should be seen as encompassing the following conventional (more narrow) debt management objectives: a) undisturbed access to markets to finance the budget deficit at lowest possible borrowing cost, subject to b) an acceptable level of risk. This follows from the need, noted before, that debt and risk management (including the specification of a strategic benchmark) need to be integrated into a broader policy reform framework. The successful implementation of this policy reform framework is important for achieving debt management objectives a) and b).
3. This model is based on Giavazzi and Missale (2004), ibid.
4. This expression can also be interpreted as including the notion that the debt ratio must exceed a critical threshold for a crisis to arise, by interpreting \( A \) as the sum of expected adjustment and the difference between \( B(t) \) and its threshold; (cf. Giavazzi and Missale (2004), ibid.
5. This is the debt ratio that would materialise in the period \( t+1 \) in the absence of fiscal adjustments.
6. The debt increases when implicit or explicit contingent liabilities are transformed into actual liabilities. For example, a recent World Bank Study of public debt dynamics shows that the realisation of (implicit and explicit) contingent liabilities contributes nearly 50% to the increase in public debt in a sample of 21 emerging markets. [See Phillip Anderson (2004), Key challenges in the issuance and management of explicit contingent liabilities in emerging markets. Paper presented at the 14th OECD Global Forum on “Public Debt Management and Emerging Government Securities Markets”, held on December 7-8, 2004, in Budapest, Hungary.]
7. See expressions (15)-(17) in Giavazzi and Missale (2004), ibid.
8. See Giavazzi and Missale (2004), ibid.

References


PART I

Chapter 2

Overview of Risk Management Practices in OECD Countries*

by

Hans J. Blommestein
OECD

This chapter provides a summary overview of risk management practices by OECD debt managers. Although the overview shows that the extent of risk management varies widely across countries, the majority of OECD countries are actively engaged in risk management, with risk typically not managed on a consolidated basis across all government entities. Sources of risk exposure are tied to the domestic debt management activities of the central governments, which include management of the domestic treasury bill and bond programs, and associated asset cash management operations. Sources of risk exposure can also arise from management of the national foreign currency reserves in those countries where the reserves are not managed separately by the central bank. Derivative operations related to either the domestic or foreign reserve activities of the central government such as interest-rate and currency swaps, are used as part of the management of market risk. However, their use provides new sources of credit risk exposure.

* This chapter is in part based on a survey conducted by the Financial Markets Division of the Department of Finance of Canada for the OECD Working Party on Debt Management (published as Chapter 7 in: Public Debt Management and Government Securities Markets in the 21st Century, OECD). The section on credit risk is based in part on a 2003 survey undertaken by the Dutch Debt Agency for the same OECD Working Party, while the part on contingent liabilities is based on recent work by the OECD Working Party (reported as Chapter 6 in this volume).
I. Introduction

In general, risk management tolerances and policies are approved (and often set) by the Ministry of Finance (or appropriate Ministry). The actual risk management operation is often run at a separate agency responsible for management of the sovereign debt.

Market risk, credit risk, liquidity risk and refunding risk are the risks most likely to be managed on a rigorous basis (see Chapter 4 for details). Operational risk and legal risk are less likely to be formally managed (see Chapter 5 for details). The debate to what extent debt managers should be responsible for, or involved in, the management of the risks associated with contingent liabilities, has only just begun (see Chapter 6 for details).

Several different measures are typically used in combination to monitor market risk and credit risk. In general, OECD countries with active risk operations update market risk and credit risk positions on a daily basis. Risk management systems employed tend to be a combination of internally developed models, specialised purchased applications and general software.

II. Scope of risk management operations

Respondents' risk management operations typically include cash and domestic debt management activities of the government, and may include activities related to the foreign reserves as well. In a number of countries, foreign reserves are managed separately by the central bank. In all but a few cases, risk management is not run on a consolidated basis across the government (i.e. does not include government-owned entities or agencies). However, there is a growing interest in analysing and managing more liabilities, and even assets, of the government's balance sheet.

Currently, for most OECD countries, risks explicitly managed include credit risk, market risk, liquidity risk, refunding risk, operational risk and legal risk. In very few countries debt managers play a role in the management of risks associated with explicit contingent liabilities (guarantees), although there is a growing number of countries in which debt managers pay attention to contingent liabilities' risk. With respect to the specific risk management operations performed, countries generally conduct all operations (identification/assessment, measurement, monitoring, mitigation/control, and reporting) for each risk which they manage.
III. Risk management governance

The proper governance of risk management is essential. In most countries, overall risk tolerance levels are formally set by the Minister of Finance or the responsible Minister on behalf of the government. Practice varies as to who sets the risk management policies and procedures: in many cases, it is the Ministry of Finance or the appropriate Ministry; at other times, it is the (autonomous) debt management office; it may be the risk management unit itself; or, it may be a joint committee made up of some or all of the above organisations. Final approval of the risk management policies and procedures rests with the Minister of Finance or responsible Minister in most countries.

It is not common practice among respondents to formally consult with an external advisory body when developing risk management policies and procedures. In a few cases, an external advisory board composed of business and technical experts has been created to provide advice and review policies.

In terms of oversight of risk management activities, most countries do not rely on a formal risk management committee to perform this function. Where risk committees have been established, they generally are made up of representatives of the appropriate Ministry or debt management operation, and infrequently include independent members.

The majority of OECD debt managers have a risk management unit dedicated solely to day-to-day treasury risk management operations. In most cases, the unit is segregated from treasury operations, though it may be part of the overall debt management office. No country outsources its risk management operations, though some of the risk management work (e.g. computer support, development of appropriate benchmarks) is contracted out to external advisors.

The frequency of formal risk reporting is less frequent the further one is removed from day-to-day risk operations. Most countries report on risk operations to the Parliament or Legislature, and most do so annually. Most countries also report to the responsible Minister, generally on an annual or quarterly basis. Senior management of the appropriate Ministry receives risk reports on a monthly basis in most cases, as does the risk management committee. Treasury operations receive risk reports on a daily basis in many cases, though reports may also be weekly or monthly.

Internal reviews of risk management policies and procedures take place generally on an annual basis in countries where a policy in this regard has been established. Those responsible for the review process vary across countries, but often take the form of senior management of the appropriate Ministry or debt management operation.
The organisational structure governing treasury risk management varies across countries. However, there appear to be two more common generic models of organisational structure (although there are, of course, a number of variants on each of these generic models):

1. Risk management tolerances and policies are set/approved by the appropriate Ministry. The central bank, which manages the debt portfolio on behalf of the Ministry, runs the risk management operations.

2. Risk management tolerances and policies are set/approved by the appropriate Ministry. A separate agency/office, which has been created to manage the government’s debt portfolio and reports to the Ministry, runs the risk management operations. (In some cases, the debt office manages the domestic debt portfolio and its associated risk operations, while the central bank manages the foreign debt portfolio and its associated risk activities.)

IV. Market risk management

Among those countries which manage market risk, almost all monitor interest rate risk and the majority monitor currency risk. The most common technique for measuring and monitoring market risk is the use of duration, with most countries employing this measure. Other common techniques (in descending order of use) include average term-to-maturity, scenario analysis, value-at-risk, and cost-at-risk. Most countries use a combination of these measures to manage market risk. In general, measurement of market risk exposures through these techniques is updated on a daily basis; a number of countries have moved to real-time updates.

Other techniques for measuring and monitoring market risk include the use of the fixed/floating ratio and a benchmark portfolio. The most frequently identified measure under development is cost-at-risk; countries are also working on incorporating benchmarking and stress testing as ways for monitoring market risk.

Most countries impose market risk limits on treasury activities, although a not insignificant number do not. Limits on market risk are set generally in terms of the measures used to manage market risk (e.g. duration targets or limits). In a number of cases, a duration target is employed in combination with another measure(s) (e.g. a currency target, most commonly). Other countries look to VaR or cost-at-risk, sometimes with a view to their sensitivity relative to yield curve shifts.

Most countries employ some form of derivatives for risk management purposes, with swaps serving as the most common derivative type. A solid majority of the countries which manage market risk use swaps. Interest rate swaps are slightly more prevalent among respondents than cross-currency...
swaps. Forwards are used by relatively few countries, while futures and options are little used.

Relatively few countries use asset/liability matching as a means to manage market risk. Those which do, generally use this technique with respect to foreign currency debt.

V. Credit risk management

The majority of countries use models to monitor credit risk, with most of the models developed internally. Few models were purchased from external providers. Market value is the most commonly used measure to monitor credit risk, far more common than either book value or notional value. Most countries using market value as a measure of credit risk employ internal models to value positions. A majority of countries monitor potential exposure as well. Credit risk exposures are generally updated on at least a weekly basis, with the largest number of countries calculating exposure on a daily basis.

Credit exposure limits for individual counterparties are set almost universally as a single limit on a consolidated basis across all business lines. Some countries have additional separate limits by type of security (e.g. swaps), and for actual versus potential exposure. The counterparty's credit rating is the most common factor used in setting exposure limits, with almost all countries relying on external rating agencies. Several countries use internally developed ratings in combination with external ratings. While credit rating is the most common factor, many countries also use the counterparty's size (generally, capital) in setting exposure limits. Quite a number of countries look also to the type of entity in setting limits. Among those which do, several make a distinction between sovereigns, banks and corporates.

Before countries will transact with counterparties, there are eligibility criteria which must be satisfied. Given the factors involved in setting exposure limits, eligibility criteria include, not surprisingly, minimum credit ratings and size requirements. For swaps, countries require that the counterparty sign the ISDA master swap agreement and, in several cases, a collateral agreement must be in place as well. Circumstances which can trigger a review of exposure limits to counterparties include: change in credit rating; a merger/acquisition; change in capital size; concerns for the counterparty's financial strength which are not taken into account in the entity's rating; and, change in the counterparty's business strategy.

Most countries employ some form of credit mitigation. Netting agreements are the most common, followed closely by early termination clauses. Collateral is used by roughly half of respondents which use credit mitigation. Several countries indicated that they accept only cash as collateral; collateral in the form of securities typically involves government bonds.
A recent survey by the OECD Working Party on Public Debt Management highlighted the following credit risk policy issues.2

- **What is the scope of credit risk?** A distinction can be made between sovereigns who limit credit risk to non-compliance with timely and full payments of interest and redemption, and those sovereigns who also include loss of market value due to creditworthiness problems, irrespective of whether the loss has been realised. Some sovereigns consider counterparts’ credit rating downgrades in themselves to be a credit risk, irrespective of whether a direct loss or loss of market value has occurred. Exposure to a downgraded entity, even if no direct or market value loss has occurred, may result in substantial internal resources being devoted to the issue. In addition, a non-materialized credit risk could already lead to some reputational risk.

- **Is it desirable to avoid credit risk?** Taking credit risk is intrinsically linked to managing a portfolio and therefore to government debt management. Trying to avoid all credit risk would create distortions of its own. On the other hand, taking credit risk should comply with strict internal rules on risk management.

- **Does the trade in interest rate risk instruments with counterparts of lower ratings send signals to markets about acceptable spread levels?** Debt managers provide different answers to this question. Some note that every transaction, whether it be borrowing, lending, or involving a derivative, will send market signals, but that this is of no policy concern. Other sovereigns note that it is their explicit aim to limit this impact on the market; these concerns influence, among other things, the use of instruments. However, many debt managers note with regard to the interest rate swap market that it has developed to such an extent that it has no relevance (any longer) as an indicator of credit risk. Instead, swap spreads reflect supply and demand for paying and receiving interest.

- **How to limit taking credit risk in money market transactions?** Sovereigns use various strategies to limit taking credit risk in money market transactions. Quite a few sovereigns minimise the use of uncollateralised deposits in private banks. A number of countries prefer repos or other forms of collateralised lending to limit risk on their money market lending. A significant part of these countries have moved (or are planning to do so) from uncollateralised lending to collateralised transactions. A number of sovereigns does not limit lending or use collateral. With regard to money market lending, different approaches are being followed. Some sovereigns choose to avoid lending money, simply by being as much as possible on the borrowing side of the money market by not running a positive balance with the Central Bank. Some other sovereigns always carry a positive cash
balance, either by law or as a policy choice. Depending on the arrangement with their respective Central Banks, the money is either kept at the Central Bank, or lent on a short-term basis to other financial institutions. Sovereigns implicitly or explicitly consider exposure to their own Central Bank to be free of credit risk. On-lending to private sector parties creates of course exposure to credit risk. Credit rating thresholds, repos, and other forms of collateralisation are used to limit that source of credit risk.

- **How to limit credit risk exposure related to derivatives?** In the case of interest rate swaps, a number of approaches can be distinguished. Some sovereigns limit the use of derivative instruments to what they consider the bare minimum. Many sovereigns make use of derivative contracts that require posting collateral if certain market value thresholds are exceeded. In addition, most sovereigns use maximum exposure levels per counterparty. Some debt managers also use overall limits for certain categories of counterparty.

- **Who has the responsibility to set credit risk limits?** Risk limits are mainly the responsibility of middle offices, risk units or risk committees. In most OECD jurisdictions, the debt management office is organised in such a way that staff responsible for overall risk management issues also formulates credit risk guidelines. In a number of cases, setting credit risk limits is subject to pre-established external (to the debt office) general guidelines. For example, some debt management offices work within general guidelines set by other divisions of the ministry of Finance or the Central Bank. Against this backdrop, a clear distinction can be made between a majority of countries in which the head of the debt management office approves general credit risk guidelines and individual limits and countries in which the minister of finance ultimately reviews and approves proposals put forward by the debt manager.

- **What is the impact of counterparty ratings on setting credit risk limits?** Sovereigns that restrict their transactions to highly creditworthy institutions (AA) may have a tendency to set less clearly defined quantitative limits than sovereigns that also deal with lower rated counterparties (below AA). Most sovereigns set limits on exposure to individual counterparts, while they also have product limits in place. Very few sovereigns deduce these individual limits from a pre-set total maximum limit or from a total maximum acceptable loss. In most cases, adding a counterparty will, in theory, raise the overall potential limit. Some sovereigns determine their maximum overall limit on the basis of their need to invest in assets. Many sovereigns use 95% or 99% confidence intervals to measure maximum losses. Very few use worst case scenarios as a risk management tool. As a result, scenarios simulating systemic breakdowns are not taken into account. Many sovereigns report that they
restrict transactions to very creditworthy counterparties (measured by credit ratings). In some cases this gives the impression that this creditworthiness criterion is the single most important one, making quantitative limits less relevant. In contrast, debt managers that transact with counterparties with a wider variety of ratings, seem to have very precise quantitative limits for each creditworthiness category. But also in these cases the exact size of limits is always somewhat arbitrary as some sovereigns note that data on past defaults and rating records are to various degrees inadequate or even absent.

- **How many counterparties?** The number of counterparties varies considerably. A number of issuers limit their exposure to a very restricted number of institutions, typically their primary dealers. This makes it easier of course to maintain updated information on each counterparty. A possible downside of this could be the smaller diversification potential, although one could argue that 20 counterparties provide a sufficient degree of diversification for money market transactions and swaps. Debt managers that also manage longer-term asset portfolios usually will have much wider range of diversification possibilities.

- **How much disclosure on credit risk?** Information on credit risk is usually not made public and a public discussion is rare. Only a few sovereigns publish their exposure to credit risk. Most sovereigns are of the opinion that the topic is too technical for public consumption and that it is sufficient to provide a general assurance that strict guidelines are being followed.

**VI. Liquidity risk management**

Most countries define liquidity risk in terms of refunding risk (i.e. the inability to meet payment obligations related to the rolling over of the debt). In this regard, the guiding principle for countries is to spread maturities across the maturity spectrum to avoid bunching of maturity payments. Refunding risk is monitored through a number of measures, including duration, average term-to-maturity and fixed/floating ratio targets which can be set in relation to benchmark portfolios. Some countries target the total of redemptions over the near-term, often over the next 12-month period but this period can be as short as 12 weeks.

Maintaining an even maturity profile is achieved through a regular pattern of issuance and by setting a consistent maximum amount which can be issued for benchmarks across the curve. A number of countries actively manage refunding risk by means of debt repurchase and/or debt exchange operations.

Short-term cash management is also closely linked to liquidity risk management, with countries generally maintaining daily forecasts of
government cash balances, revenues and outlays. To reduce the carry cost, the level of government cash balances is typically set at the minimum level possible which is not expected to require access to overdraft facilities.

VII. Operational risk management

For most countries, operational risk encompasses settlement risk and fraud risk. Many have documented procedures pertaining to these risks (see Chapter 5 for details). Settlement risk may relate to both non-automated and automated activities; in a number of countries, the “four-eye” principle is applied to non-automated activities, while internal audit checks are applied to automated operations. It is not uncommon for external audits to complement internal audits. Fraud risk is addressed often by means of segregation of transaction execution and deal settlement functions through front/middle/back offices. Few countries have formal procedures to deal with violations or exceptions, although a number of countries noted that violations would be reported to the appropriate operational authority for review and possible action. Written procedures that clearly describe the individual tasks in the management of the government debt as well as the responsibilities and authorities, are an essential way of reducing operational risk and facilitating internal control procedures.

With respect to the risk management systems used, almost all countries employ a combination of internally developed models, specialised purchased applications and general software. In this regard, key challenges to risk management systems include: finding software packages which satisfy the business needs of the operation and for which support is available if (when) problems occur; learning how to use the purchased applications; acquiring, training and retaining skilled staff; and, the ever-present bane of risk managers, data integrity concerns.

The majority of countries surveyed have contingency plans in the event of disaster, with almost all of those with contingency plans having off-site installations where treasury operations could be resumed. Many could re-start operations within a matter of hours, with at least limited functionality. Relatively few countries surveyed have alternative on-site treasury management systems, however, in the event of a failure of the main system. Contingency procedures are tested at least annually, with a number of countries following semi-annual testing. In the wake of the 9/11 attacks, many countries report that contingency plans have been improved.

VIII. Legal risk management

Virtually all countries rely on in-house legal counsel in their legal risk management activities. A number of countries employ in-house counsel
primarily, with advice sought from external counsel when required. Few countries rely solely on external counsel.

Master agreements are employed by most countries, primarily for swap and repo operations. In general, master agreements take the form of the ISDA master swap agreement and credit support annex, and the ISMA master repurchase agreement.

**IX. Risks and policies related to contingent liabilities in debt management**

Contingent liabilities represent potential financial claims on the government. They have an option-like character whereby potential claims can be turned into actual liabilities (or financial obligations) when triggered by certain events. Explicit contingent liabilities are based on a contractual commitment, while implicit contingent liabilities arise even when the government does not have a contractual obligation. Recent discussions by the OECD Working Party on Debt Management (WPDM) have begun to focus on the issuance and management of explicit contingent liabilities. The principal objective of this activity is the development of a set of best practices for debt managers in managing explicit contingent liabilities (guarantees).

Contingent liabilities represent a significant balance sheet risk for governments. Studies have shown that contingent liabilities have played a major role in the build-up of public sector debt. Concerning the role of debt managers in the issuance and management of guarantees it was concluded by the OECD WPDM that debt managers have a key role in risk management involving guarantees, as contingent debt is effectively a latent form of government debt. This insight calls for defining measures of cost and risks that encompass both the guarantee portfolio and the conventional (or regular) debt portfolio. Debt managers are well positioned to manage this joint portfolio.

However, the case for involving debt managers in the issuance of guarantees is less clear-cut. On the one hand, useful knowledge follows directly from their general financial and economic expertise, while they are also likely to have the appropriate perspective on guarantee pricing. On the other hand, credit and project evaluation are not part and parcel of conventional debt management, while they are key elements in pricing guarantees. Guarantee programmes involving a large number of borrowers may also involve administrative burdens that are very different from those related to conventional debt management.

The main conclusions from the discussions by the WPDM can then be summarised as follows. First, it is essential to have a central risk management function, responsible for the entire government debt portfolio. Second, a basic
requirement of a sound governance system is that there are rules and procedures such that the costs of a guarantee are made explicit when it is issued. This can be achieved through the use of explicit fees. Moreover, a sound governance system requires adequate rules for reporting guarantees. Third, clear principles need to be developed for how guarantees are to be priced on a risk-adjusted basis, with fees based on market value being the rule.

These conclusions define the key functions in any well-designed system for guarantee management. The specific institutional set-up for executing these functions is of secondary importance. Institutional solutions may vary depending on the nature of the guarantees that are being issued and the institutional and administrative traditions in the different jurisdictions.

Notes

1. See Chapter 4, this volume, for details.

2. The Survey was designed and processed by the Rits de Boer of the Dutch Debt Agency. The results of the Survey are based on the responses of 10 OECD jurisdictions.


4. See Chapter 5, this volume, for details.

5. See Chapter 6, this volume, for details.

PART I

Chapter 3

Analytical Framework for Debt and Risk Management

by

Lars Risbjerg and Anders Holmlund

Danmarks Nationalbank and Swedish National Debt Office

The overall purpose of this chapter is to discuss the analytical framework for risk management, and how interest-rate risk management is implemented in practice. While there is agreement on the basic principles of sound and prudent risk management, various approaches exist for the assessment and management of interest-rate risk. However, although some common basic principles in the risk analysis should be respected in order to conduct a sound risk assessment of government debt, there is not a single “correct” approach in the management of market risk. The chosen approach will depend on country-specific circumstances such as the macroeconomic situation and the development of the domestic debt market as well as the size and composition of the debt. The chapter also aims at giving insight into the multi-faceted problem of interest-rate risk management of government debt and to shed light on limitations and future challenges.
I. Introduction

In many countries government borrowing costs are typically considerable and constitute a large share of government expenditures. Poorly structured debt has been an important factor in inducing or propagating economic crises throughout history. Thus, it is an important policy priority both to ensure the lowest possible borrowing costs and that the risks related to these costs are contained at an acceptable level of prudence.

Highly-indebted, less-diversified emerging market economies are more vulnerable to possible adverse shocks to the economy and to poorly structured debt portfolios than better diversified economies with low debt levels and well-developed financial markets. Even when risks incurred in respect of the government debt are relatively limited and considered acceptable, information about the risks associated with different government debt strategies is crucial for the decision making process. A proper assessment and analysis of the risks underpins the decision on the debt strategy, structure the discussions on the strategy, as well as strengthen the credibility of the executed strategy.

This chapter intends to address the key issues and problems at stake in the management of market risk and in particular interest-rate risk of government debt. The focus of the discussion is therefore on interest-rate risk management and the trade-offs between interest cost and interest-rate risk, although foreign-exchange risk is also considered.

This chapter is structured as follows. First, the concept of interest-rate risk in the context of government debt management will be discussed. This is followed by an overview of the different approaches used by debt managers in the analysis and modelling of the risk and cost trade-offs entailed in their debt management strategies. The final part discusses the different cost and risk measures. Annex 3.A contains a description of the general structure of debt simulation models used by government debt managers for risk analysis.

II. Market risk in a broader context

The central role of risk in government debt management is reflected in the main objective of government debt management. Although phrased in many different ways, the main objective of government debt management to ensure that the government’s financing requirements and its payment
obligations are met at the lowest possible cost over the medium to long run, consistent with a prudent degree of risk, is widely shared among government debt managers. This main objective implies that government debt managers need to assess the trade-offs between cost and risk when determining how to finance the government's borrowing requirements; that is, assessing these trade-offs are at the core of the government debt strategy.

The central-government debt entails interest-rate risk because future debt financing and debt costs are subject to future unknown interest rates; e.g. due to redemptions and refinancing of fixed-rate debt and re-setting of floating-rate debt. Short-duration debt (short-term or floating) means that within a short period new interest rates must be fixed for a large proportion of the debt portfolio and is usually considered more risky than long duration (long-term, fixed-rate) debt. On the other hand, the interest rate tends to increase with longer time-to-maturity and duration. Therefore, there is a cost-risk trade-off in the choice between short- and long duration debt.

A related risk is refinancing risk, i.e., the risk that the debt need to be refinanced at very high rates or, in the extreme case, cannot be rolled over at all. This risk is related to country specific circumstances and not only to the general development in market rates. In particular refinancing risk is important for countries with a high debt level and unstable macroeconomic and financial market conditions. The distinction between interest-rate risk and refinancing risk may be less pronounced in countries with stable macroeconomic conditions and well-developed markets.

The assessment of risk implies capturing the uncertainty about future debt costs. In order to assess and quantify the interest-rate risk, it is necessary to form a view of, and model, the future development in the debt, financing requirements, and interest rates at which the future debt financing takes place. The government's financing requirement is derived from the refinancing requirements of the existing debt and the government's budget balance.

Fiscal policy is responsible for the primary budget balance (the budget balance excluding debt costs). Thus, the effect on the debt and financing requirements coming from the primary budget balance is exogenous to the debt management problem. The same holds true for market rates. However, the development in future primary budget balances and interest rates should still be taken into account in the analysis of risk in order to conduct a proper assessment of the interest-rate risks entailed in the government debt and strategy. This is a common practice among OECD government debt managers. The inclusion of the budget balance in the government debt risk analysis is linked to Asset and Liability Management (ALM) procedures.
Debt sustainability

Government debt is sustainable if the government will be able to continue servicing it, without the need to make an unrealistically large future correction to the balance of income and expenditure.\(^4\) Clearly, the assessment of debt sustainability is a broader exercise than the analysis of costs and risk by the debt manager. It involves also fiscal policy, so as to ensure prudent debt levels via government expenditures and taxes. However, the risk analysis of debt management has many conceptual similarities with the analysis of debt sustainability, and the tools applied by government debt managers provide information about many of the same key variables as in a debt sustainability assessment as described in “Assessing Sustainability” (2002) by the IMF:

“Assessing sustainability in the first instance means forming a view of how outstanding stocks of liabilities are likely to evolve over time. This requires projecting the flows of revenues and expenditures – including those for servicing debt – as well as exchange rate changes (given the currency denomination of the debt). Projections of the debt dynamics thus depend, in turn, on macroeconomic and financial market developments, which are intrinsically uncertain and highly variable. Here, a key factor is the markets willingness to provide financing, which determines the costs of rolling over debt.”

In other words, the analysis of the cost and risk of the debt portfolio contains useful information for debt sustainability analysis and vice versa.\(^5\)

Asset and liability management

Asset and liability management (ALM) captures the idea that, as far as possible, the entire balance sheet (i.e., both assets and liabilities), should be included in the risk analysis so as to assess the overall risk exposure. This makes it possible in principle to limit the risk by matching the risk characteristics of respectively assets and liabilities. In this way, one side of the balance sheet hedges the other.

A fundamental issue is which assets and liabilities to include in the government’s balance sheet and how to take them into account in the risk analysis of the government debt. This issue is related to the fact that the government’s balance sheet is characterised by items outside the category of conventional financial assets and liabilities.

ALM comes in different flavours. A first approach consists of matching the risk characteristics of the various financial assets and liabilities on the government’s balance sheet. This approach implies risk management of the government’s net financial positions.
A second approach is an extension of the financial ALM approach with real physical assets included in the government’s balance sheet (for example, public infrastructure). This approach is rarely used by debt managers.\(^6\)

A third ALM approach is to relate the future debt-service costs to the government’s ability to serve them, i.e., to the government’s budget balance. The government has the ability to pay down the principal of government debt if, and only if, it runs future budget surpluses. The inclusion of the government’s future budget balance (the future revenues and expenditures) in the analysis of the interest-rate risk conceptually captures the idea of ALM. The government’s financial liabilities (the government debt) are in principle analysed jointly with its assets in the form of the future government budget balances, although in practice the focus is on cost and budget flows rather than assets and liabilities.

“IMF/WB Guidelines for Public Debt Management”\(^7\) point to the usefulness of a wider scope for risk management of government debt than considering the interest cost and risk of the debt. “In order to help guide borrowing decisions and reduce the government’s risk, debt managers should consider the financial and other risk characteristics of the government’s cash flows. Rather than simply examining the debt structure in isolation, several governments have found it valuable to consider debt management within a broader framework of the government’s balance sheet and the nature of its revenues and cash flows.” Within the asset and liability framework it can be examined whether the structure of the government’s debt is consistent with the revenues and cash flows available to the government to service the debt (in most countries, these mainly comprise tax revenue).

**Taking into account the effect on the budget balance**

In the economic literature, smoothing of tax rates is often mentioned as the relevant objective for government debt management. The reason is that fluctuations in tax rates magnify the welfare losses related to the adverse economic incentive effects of taxation. The overall implication for debt management is that the debt strategy should aim at a debt structure that minimises the risk that tax rates will have to be changed in response to economic developments.\(^8\)

However, since tax smoothing is more difficult to implement in a direct way, government debt managers focus in practice on the impact of the variability in debt-service costs on the variability in the overall budget balance.\(^9\) Budget-smoothing is related to tax smoothing. For this reason, the likelihood of future changes in tax rates in response to economic disturbances is reduced when the debt strategy reduces the variability of the government’s budget balance. A budget-smoothing objective for government debt managers may in particular be
pursued in an environment where governments operate with a legal or political constraint on the size of budget deficits, as is the case for EMU countries.\footnote{10}

Debt-service costs contribute to the variability of the budget balance via the debt-service costs’ own variability and the covariance of the debt-service costs and the primary budget balance. A reduction in the volatility of debt-service costs would – all other things being equal – dampen or reduce budget variability. Likewise, a positive covariance (e.g. a situation where a deterioration of the primary budget balance is associated with falling debt-service costs), would – all other things being equal – dampen or reduce budget balance volatility.\footnote{11}

Most debt managers focus on the modelling of the variability of the debt-service costs themselves, while some government debt managers also explicitly take into account the covariance between the primary budget balance and the debt-service costs in their models (see Section III).

**Debt structure and risk**

The debt structure concerns the distribution of the debt over the various instruments in terms of indexation, maturity, currency composition, etc. A debt structure that entails a positive correlation between debt-service costs and economic activity may be less risky in the sense that it provides better insulation of the government’s budget balance (while it also contributes to tax smoothing) as the debt-service costs typically are low when the government’s finances are weak.\footnote{12}

There is typically a positive correlation between the debt-service costs of floating-rate or indexed\footnote{13} debt and economic output in an economy where demand shocks are prevalent or where short-term interest rates are procyclical (e.g. due to monetary policy reactions to economic cycles). On the other hand, fixed-rate nominal debt may provide a better hedge of the government’s budget balance against supply shocks to the economy or where monetary policy rates are raised in response to inflationary pressure while economic growth remain subdued.

The cost of foreign currency debt may be negatively correlated with government income, as the domestic currency is more likely to depreciate in periods of weak (domestic) economic development. There is thus a risk that foreign-exchange debt will have high costs in periods when government income is lower.\footnote{14}

A number of considerations must be taken into account when structuring the debt and assessing the risk of different debt structures. Firstly, there may be restrictions on the debt structure. Instruments like GDP-contingent bonds, that from at theoretical point of view would insulate the government budget by implying low debt-service costs during recessions, may be highly illiquid or
not available/marketable at all. In less developed markets it may be necessary to issue short-term debt indexed to foreign currency to attract investors and borrow at reasonable rates.

Secondly, it is not a straightforward exercise to assess the future correlation between the budget balance and debt-service cost of different financial instruments. The correlation structure based on historical observations may be unstable, and it is uncertain whether it will prevail in the future. In addition, domestic interest rates may to some extent be detached from the domestic business cycle – and thus the government-budget balance – in an increasingly integrated world.

III. Debt simulation models

Quantitative modelling and simulation of the risk-cost trade-offs associated with different strategies are useful in supporting the formulation of the government debt strategy. The empirical results may show that some strategies dominate others with respect to both costs and risk. However, it should be noted that the models do not offer a definite answer to the optimal strategy. Ultimately, the choice of strategy is determined by the cost-risk preferences of the debt policy decision makers.

In formulating the government debt strategy and assessing the associated risks, the government debt manager faces a complex dynamic inter-temporal problem. The future cost and risk of the government debt depend on the size and structure of the existing debt, future government budget balances, the evolution of interest-, foreign currency- and inflation rates, as well as the financing strategy adopted by the debt manager.

This complex and dynamic, inter-temporal nature of the debt strategy problem, requires the use of a structural model to analyse the different debt strategies and associated debt paths. To that end, a number of simplifying assumptions have to be made. In addition, the results of the model depend on assumptions about the future development in, for example, interest rates and budget balance. A methodological advantage of the use of structural models is that it is possible to keep track of the different assumptions and to assess their implications.

In addition to calculating potential costs, simulation models are useful in ensuring consistency of the government debt strategy over different time horizons. The simulations provide valuable insight into the dynamics of the government debt portfolio and the implications of alternative government debt strategies. For each year in the simulation horizon, the model may calculate key characteristics for the government debt portfolio such as costs, outstanding amounts for each issue, and redemption profile. The results of the model can then be compared to possible objectives for these
characteristics. If the objectives are not fulfilled, the strategy may be adjusted, and the model is run again. Thus, the models can provide a basis for making informed decisions about the choice of government debt policy strategies.


**Different types of models**

Some countries use so-called scenario models, which only consider a limited number of scenarios. As only a limited number of scenarios are generated, it is not possible to achieve a direct quantification of the risk by relating potential outcomes to their likelihood. However, new models are under development in many countries. More advanced models use stochastic simulation. By simulating a large number of scenarios, it is possible to form a distribution of future costs of government debt. Based on the cost distribution, expected costs and risks can be determined.

A widely used approach is to conduct stochastic simulation of interest rates for different deterministic scenarios of the primary budget balance. By running the model for different scenarios of government budget balances, the sensitivity and robustness of the results to changes in the government's budget balance can be assessed.

Another class of models is based on models of the economy. In this type of models, the budget balance and interest rates are modelled jointly within a macroeconomic model framework that links relevant financial and macroeconomic variables such as interest rates and GDP. The reason for taking this approach is to take consistently into account the relationship between the primary budget balance and debt-service cost.16

There are two main ways to construct a model for the development in financial and macroeconomic variables. The first alternative is based on a statistical analysis of relationship between macroeconomic and financial variables on the basis of a correlation matrix. The second alternative is to use structural equations for the relationships between different variables. In the former case, one merely determines the average correlations between different variables. In the latter case, one determines a behavioural link between economic and financial variables. For example, an equation could describe the link between economic growth and the yield curve, while another could specify the link between the budget balance and economic growth. The structural relationship between the yield curve and the budget balance would then be derived on the basis of these two structural equations. (This is the basic idea underlying the simulation model used by the Swedish Debt Office.)

Macroeconomic models can be used to relate debt-service costs to the government’s primary budget situation so as to assess the budget smoothing
effects of the debt strategy. In practice, budget smoothing effects are examined by simulating debt-service costs-to-GDP. GDP can be interpreted as a measure of the government's budget situation, since the budget normally co-varies with GDP via both taxes and expenditures. A smooth cost-to-GDP ratio indicates that the debt portfolio reduces the risks to the budget by typically having low costs when GDP is low and government finances are strained.

**Time horizon for the simulation and initial portfolio**

Government debt management is a long-term business. Theoretically, there are arguments for considering a very long time horizon in the simulations assuming that the government is rolling over its debt forever. A common choice, however, is to work with a ten-year horizon and to aggregate debt-service costs on an annual basis. The annual frequency corresponds to the fact that the government produces annual budgets, and that the government budget is a key concern in government debt management.

Debt managers consider both short-term and long-term simulation results in order to get a better insight into the debt portfolio and associated costs over different time periods. Often the political focus will be on the following year's budget, while also considering that interest costs and the simulation results are more reliable for a short simulation horizon than for a long horizon. However, the debt management horizon is long-term (several years) and long-term simulations also allow for a consistency check of the different strategies.

The difference in simulation horizon may also reflect different objectives for the simulation. In simulations over a relative short horizon the focus may be on estimation of the cost and risk of the actual portfolio. In simulations over a long horizon, say 30 years, the focus may be on the examination of the long-term characteristics of “steady state” portfolios.

The choice of simulation horizon is related to the question of the initial debt composition in the simulation. In case the focus is on estimating cost and risk of the actual portfolio over both long and short time horizons, it is appropriate to start with an initial debt composition corresponding exactly to the actual debt.17

If, on the other hand, the focus is on the long-term characteristics of various portfolio structures, the simulations may start with a “steady state” portfolio (that is in accordance with the duration and allocation targets of the strategy) as the cost and risk differences between strategies are due to different debt structures rather than transition of the initial portfolio to the “steady state”.18
Implications of assumptions and complexity of simulation model

It is important to consider carefully the degree of detail needed in the simulation model. First, the more complex the simulation model, the more resource intensive the development of the model. One should always ask oneself whether more complexity improves the reliability of the results and serves the purposes of the model. Second, there is a trade-off between complexity and transparency of results. The more complex the model, the harder it is to track and interpret the results.

A general lesson from building simulation models is to start out simple and gradually expand the model. A first step is to develop a model for financing requirements and government debt portfolio based on deterministic scenarios for interest rates and government-budget balance. When this is achieved, more sophisticated features such as interest-rate and government-budget-balance could be considered next.

Another general modelling point is that the output results are not better than the model’s underlying assumptions and input. In order to get a tractable model, it is necessary to base the model on a number of simplifying assumptions. The output results obtained are sensitive to these assumptions and also to the model’s estimated parameters. It is therefore important to examine and describe the underlying assumptions and their influence on the results.

A footnote in the IMF/WB Guidelines for Public Debt Management states that: “Complex simulations models should be used with caution. Data constrains may significantly impair the usefulness of the models, and the results obtained may be strongly model-dependent and sensitive to the parameters used. For example, some parameters may behave differently in extreme situations or be influenced by policy responses.” These considerations explain why stress tests are useful.

As noted above, macroeconomic models have the advantage that they model the relationship between interest rates, economic growth and budget balance in a consistent way. This relationship is at the heart of ALM management used for government debt. On the other hand, structural macroeconomic models may impose too rigid and stylised relations between macroeconomic and financial variables. For instance, often a demand-driven macro model is used and it is important to note that this demand feature has an important impact on the output results. In a demand-driven economy, with a strong positive link between GDP and inflation, portfolios with large shares of inflation-linked debt will appear as a low-risk financing strategy when costs are measured relative to GDP. In contrast, in a supply-driven model this would not be true.
One way of dealing with this problem is to use stress tests by applying different sets of parameters to the stochastic equations. The model is then run again and the impact on the results can be studied. The probability of experiencing such a shock can then be altered and the resilience of certain issuance rules to supply-side events can be estimated.

In practice there are relatively few examples of the use of macroeconomic models by debt managers. The key reason is that it is a very demanding and complex task to develop the tools needed formally to carry out this analysis. It may therefore be difficult to reach meaningful operational conclusions. But even if the link between the budget balance and interest rates is not explicitly modelled, it may still be used; for example, via an ad hoc analysis outside the model and via stress tests.

**Internal or external development of simulation models**

Thus far, most countries have developed their models internally. This has certain advantages. It ensures transparency and internal understanding of the functioning of the model. Building a simulation model is also a learning process providing insight into the debt management problem. It gives more flexibility than when existing models from, for example, investment banks are used. Finally, as it is a demanding and stimulating task, it is likely to attract and retain skilled people.

On the other hand, internal development is resource-intensive. Moreover outside peers, primarily the Ministry of Finance, may view the model less credible if it is completely an internal creation.

A possible intermediate solution is to develop the model in-house, while making use of an external peer group. The peer group could consist of investment bank specialists, but even more valuable is to discuss the development results with colleagues in other countries who have done similar work. Over the past few years, many countries have posted descriptions of their work on web sites.

**IV. Cost measures**

The assessment of risk implies capturing the uncertainty about future costs. Thus, the applied cost measure in simulation models goes straight to the heart of measurement and assessment of risk.

The main distinction is between nominal financial costs and real costs. Nominal costs are measured in money terms, whereas real costs typically are derived by dividing nominal financial costs by (nominal) GDP or deducting the rate of inflation from nominal costs. (See Section III for a discussion on the implications of measuring debt-service costs relative to GDP.)
Another distinction is between costs based on the actual nominal debt-service payments and cost measure where unrealised changes in the market value of the debt are taken into account.

Cash-flow-based costs refer to costs based on the cash payments executed during a period. Cash-flow costs are relevant in particular when the distribution of payments is of importance. Accrual-based costs imply that cash-flow costs are spread out over the life of the security (e.g. accrued interest and initial capital losses when issuing government securities below par). This measure is relevant when interest costs are officially calculated on an accrual basis.

In most countries, unrealised changes in the market value of the debt are not taken into account in the measurement of debt-service costs. The reason for this is that since debt is often kept to maturity and redeemed at par, swings in the market value are not materialised. Furthermore, the government’s debt portfolio is typically of a considerable size and cannot be liquidated over a short time horizon. Therefore, unrealised price changes due to changes in interest rates do not affect the official definition of the government debt and budget balances. Market-value-based costs would exaggerate the changes in annual debt-service costs. Excluding marked-to-market effects from the cost measure maintains symmetry between cost and budget balance measures.

Nevertheless, market valuation provides useful additional information. It is a transparent principle widely used in financial portfolio management that can reveal exposures to, for example, derivatives.

In addition, the “opportunity cost” of government debt strategies can be assessed via market value evaluation. The change in market value (e.g. when the debt is financed by long-term borrowing and interest rates fall), measures the effect of the interest being fixed and the central government therefore being unable to benefit from lower market interest rates. If the fall in interest rates is permanent, the budgetary effect will be seen every year until maturity of the bond, whereas the market value would show immediately the discounted effect over the remaining life of the bond. Hence, market value indicates the value of the future burden for the taxpayers as a result of the structure of the existing portfolio.

Finally note that when debt is managed actively around a benchmark, based on short-term interest rate views, marked-to-market costs should be used. In those situations, the debt manager operates like an asset manager.

V. Risk measures

Risk measures for the central government debt provide quantitative information about uncertainty of future annual debt-service costs. Many
countries use scenario models based on a limited number of deterministic scenarios. Stress testing the model, that is, running the model using different (extreme) input values, is a common approach for assessing market risk in the debt portfolio.

If instead a stochastic simulation model is used, it is possible to calculate cost distributions and apply statistical measures to assess the risk. Based on cost distributions, the expected and maximum cost in a given future year can be calculated. Risk may be expressed as the n-percentile of the cost distribution (e.g. the maximum cost with n = 95 per cent likelihood), sometimes called Cost-at-Risk. In addition, it is relevant to assess the risk associated with higher costs than the expected cost outcome by subtracting expected cost from Cost-at-Risk. This measure is termed Relative Cost-at-Risk.24

Cost-at-Risk for a given future year depends on the time horizon, since it is more difficult to predict the level of interest rates 10-years ahead than 1-year ahead. In other words, Cost-at-Risk is horizon dependent.

The simulated cost in a given future year also depends on the simulated path leading up to that year. For instance, the simulated cost in a given year depends on the size and composition of the debt resulting from the simulation up to that year. New risk measures called Conditional Cost-at-Risk or time-series risk have been developed to filter out time horizon dependency in the measurement of annual risks, and to take into account the notion that risk in a given future year is conditional on the simulated development in the period up to that year.25

Notes

1. Prepared by Lars Risbjerg, Government Debt Management at Danmarks Nationalbank and Anders Holmlund, Swedish National Debt Office. Large parts of this chapter are based on “Report on interest-rate risk management of government debt”, prepared for the OECD Working Party on Government Debt Management in 2002 by government debt offices from Austria, Belgium, Denmark, Finland, Italy, the Netherlands, Portugal, Sweden, and United Kingdom.


4. See “Assessing Sustainability” (2002) by the International Monetary Fund. See also Annex A in Chapter 1, this volume.


17. This is the case for the simulation models applied in the management of the Danish government debt.

18. This is the case for simulations in Sweden.


20. Realised changes in market value due to buy-backs are taken into account.
21. Unrealised price effects due to changes in foreign exchange rates will affect the level of the foreign debt and costs when the foreign debt is measured in terms of the domestic currency.

22. When considering the cumulated costs over a long horizon (and not the annual costs) the distinction between nominal and market-to-market based cost measures vanish.

23. John Y. Campbell (1995) “Some Lessons from the Yield Curve”, *Journal of Economic Perspectives*, Volume 9, Number 3, pp. 129-152, considers a situation where interest-rates change due to a permanent change in the inflation rate. Although this does not affect the nominal value of fixed rate long-term debt but the real value of future payments changes, which is reflected in a change of the market value of the debt.


ANNEX 3.A

Structure of Debt Simulation Model

A.1. Overview of simulation model

The general structure of a government debt simulation model is illustrated in the figure.

Figure 3.A1. Structure of government debt simulation model
A.2. Input

The input to the model is information on the existing debt portfolio, the central government’s expected future primary budget balance, the government debt strategy, and market conditions (e.g. developments in interest rates).

**Budget balance**

The relationship between the primary budget balance input and the market condition input is often not modelled explicitly within the model. The government's (primary) budget balance is typically formulated in the form of deterministic scenarios. Different budget scenarios can be used to test the robustness of the model and the sensitivity to developments in the budget balance.

Some countries have models with an endogenous stochastic formulation of the budget balance. This is illustrated in the Chart with a link between the budget balance and a macroeconomic/business cycle model input. In these models, budget balance and market conditions are linked via the macroeconomic model. These models describe the joint evolution of the economic business cycle, the government’s budget, and the term structure of interest rates.

**Market conditions**

Market conditions cover developments in interest rates and foreign-exchange rates that influence the debt costs. Expected interest costs can be calculated on the basis of stylised assumptions about future rates; for example, based on forward rates, today's rate or a historical average.

Government debt managers should test the reactions of different strategies to different yield-curve scenarios that could be built with different methodologies. For example, simulation could be undertaken for extreme historical interest-rate developments.

In stochastic simulation models, interest-rate models (as developed in the finance literature) are commonly used to generate the interest input. However, the estimation of parameters is sensitive to the estimation period. Alternative estimation periods can be used to assess the robustness of the results.

**Debt strategy**

The instruments and operations used by the debt manager should be included in the model. In addition, the modelling of the debt strategy would
reflect other key characteristics such as the distribution of future borrowing operations over various maturity segments and the frequency with which new securities series are opened. (It is common to assume that the strategy is fixed over the simulation horizon.)

In emerging market economies the current (actual) debt strategy may be further away from the desired (long-term) strategy compared to countries with well-developed markets (see also Chapter 1, this volume). This means that more fundamental (or structural) changes to the current debt management strategy may have to be taken into account when modelling the debt strategy, while more attention needs to be paid to the transition to the desired (long-term) strategy.

**A.3. Calculation engine**

Based on the input, the “calculation engine” determines the financing requirements and issuance of government securities. Also new debt and costs of the debt can then be calculated, and so on.

**A.4. Output**

For each year in the simulation horizon the model can calculate key characteristics for the government debt portfolio in addition to costs such as outstanding amounts in each issue, duration and redemption profile. The results of the model can then be compared to the targets or objectives for these characteristics. If the targets are not met, the strategy may have to be adjusted, and the model is run again. In this way, the model can provide a quantitative basis for decisions on government debt strategies in line with debt management objectives.

**A.5. Links and dynamics that are usually not considered**

The model should capture the basic dynamics from input regarding interest rates, strategy, and primary budget balance to development in the financing requirements, cost and debt. In addition, the following more complex dynamics and links could be analysed.

*Link between market conditions and strategy*

There are no arrows drawn between the inputs regarding market conditions and strategy in the Chart above. This illustrates a simplifying modelling assumption usually made in government debt simulation models. This is a simplification as the government debt strategy has in practice implications for the functioning of the government debt market and
therefore also the rates at which the government is able to borrow. For example, the creation of large benchmark issues normally generates a liquidity premium.

In Canada’s simulation model, this idea that liquidity and government yields depend on the amount issued, has been formalised. Specifically it is assumed that debt instruments are issued at par, provided that the amount issued falls within a specified interval. Both issuance above the upper bound and below the lower bound imply higher interest rates and issuance costs. The lower bound reflects the notion that a certain critical issuance mass is needed to ensure adequate liquidity, while the upper bound captures the situation of excess supply in a given segment. Shifts in relative supplies of short-term and long-term bonds could also influence government yields. For example, a shift from long- to short-term government debt financing could drive down the price of short-term government securities thereby reducing the cost savings from this change in strategy.

The strategy may also be influenced by market interest rates. This is evident in the case of opportunistic borrowing. However, also with a long-term strategy, the strategy may have to be adjusted in response to market developments. For example, a low yield level may lead to the issuance of a relative larger share of the total issuance in fixed-rate longer bonds.

These situations can be examined by simulating different fixed strategies that are invariant to different market conditions. The objective is to find a strategy that is fairly robust in the face of a range of market conditions.

The link between market conditions and debt strategy could in principle be formulated within an optimal control framework where for each period expected debt-service costs are minimised, subjected to various constraints with respect to implied risk and liquidity. This would require the explicit modelling of a strategy-reaction function describing the change in strategy for all possible market conditions. However, given the complex nature of the problem and the difficulties to formulate an explicit reaction function, this is done very seldom.

*Link from debt and financing requirements (calculation engine) to strategy*

The strategy may depend on the level of debt and financing requirements. For instance, a large financing requirement may lead to issuance of government securities in additional maturity segments in order to absorb increased volume without disturbing the market in the segments where issuance already is taking place. Conversely, a decrease in financing requirements may lead to issuance of fewer debt instruments in order to support liquidity in the remaining securities.
This link is usually explored via an iterative procedure where the output from the model (e.g. issue size of the individual securities) is compared to targets for these outputs. If the targets are not met, the strategy is adjusted, and the model is run again. This iterative process will continue until all targets are met and a desirable strategy is found.

**Link from debt and financing requirements (calculation engine) to market conditions**

The level of debt may influence the interest rates. For instance, if investors perceive a risk to debt sustainability they would demand a risk premium on their investment i.e. higher interest rates. This effect is generally not modelled explicitly in the simulation models applied by government debt managers.

**Notes**

PART II

Recent Developments in Managing Market Risk, Operational Risk and Contingent Liability Risk
PART II

Chapter 4

Recent Developments in the Management of Market Risk

by

Ove Sten Jensen and Lars Risbjerg

DANEMARKS NATIONALBANK

Until recently, the focus of OECD government debt managers was on developing the domestic market, while debt management was in general confined to ensuring suitable on-the-run issues. However, in recent years the importance of risk management has increased among OECD members. Risk management considerations are now systematically taken into account in the management of the government debt alongside considerations of costs, domestic market developments and build-up of liquid benchmark issues.
I. The development of the market and scope for risk management

Risk management is interrelated with the development of the domestic market. An efficient domestic government debt market underpins the scope for structuring the debt and containing the risks inherited in the government debt structure.

As noted in Chapter 1 (this volume), the scope for risk management is to an important degree dependent on the stage of market development and overall macroeconomic stability. For example, in emerging market economies it may be necessary to issue short-term debt indexed to foreign currencies to attract investors. Implementation of an overall objective to reduce vulnerability by lengthening the average maturity of the debt and issuing more domestic currency debt at reasonable rates, may only be achieved over a long horizon when fundamental confidence in fiscal sustainability has been established.2

In well-developed markets with a stable macroeconomic environment there is a larger scope for implementing debt management strategies and applying instruments with the aim to limit risk; for example, by issuing long-term instruments in domestic currency. In addition, availability of liquid government debt instruments such as swaps may enhance the possibility for structuring the risk exposure of the debt and contribute to better risk management. Interest-rate swaps make it possible to separate issuance and the build-up of liquid benchmark issues from interest-rate exposure and risk in government debt management. Interest-rate swaps are increasingly used, especially by government debt managers in the EMU, as an instrument for government debt interest-rate risk management. The use of swaps is associated with credit risk since the government is exposed to the swap counterparty’s ability to pay.3 It is therefore important that appropriate credit risk management arrangements are in place before entering into swap transactions.4

The presence of well-developed capital markets also diminishes the need for financing domestic budget deficits via foreign borrowing. In this context, a special situation was created by the introduction of the euro. For participating countries, the proportion of foreign government debt that was denominated in the currencies of other participating countries was redefined as domestic debt as of 1 January 1999. Moreover, the EMU countries’ need for foreign-exchange reserve has been reduced. In addition, there is a tendency towards closer integration of the management of domestic and foreign government debt as the boundary between domestic and foreign government debt policy
II.4. RECENT DEVELOPMENTS IN THE MANAGEMENT OF MARKET RISK

has been gradually eliminated. Many debt managers seek now to control risk of the entire debt portfolio (that is, including domestic and foreign debt and swaps) as opposed to managing separately the risk of the various parts of the portfolio.

II. Asset and liability management

The increased focus on risk management and the increased integration of risk management across the government’s financial debt and asset portfolios can be seen in the context of the trend of paying more attention to Asset and Liability Management (ALM); i.e., by taking into account (increasing parts of) the overall “balance sheet” of the government when designing and executing the government’s debt strategy. Some countries have incorporated into the overall debt strategy the coordination of currency exposure of both foreign government debt and foreign-exchange reserves. The larger focus on ALM considerations is also having increasingly an influence on how to analyse and model the government debt strategy and its associated risks.

In order to assess and quantify interest-rate risk, it is necessary to model the future development of interest costs. To that end, we need to model the future development of debt, financing requirements, as well as interest rates at which the future debt financing takes place. Risk measures for central government typically focus on fluctuations in debt-service costs. This reflects the general concern of debt managers for the impact of the government debt on the government budget. In this sense, the use of debt-service costs in debt models is conceptually in accordance with an ALM approach.5

III. Modelling of risk

Many countries use scenario models based on a limited number of deterministic scenarios. Stress testing the model (i.e., running the model under different assumptions about extreme developments) is a common approach for assessing market risk in the debt portfolio. In recent years, more advanced stochastic simulation models have been implemented or are under development. By simulating a large number of scenarios, it is possible to create statistical cost distributions, thereby achieving a direct quantification of the risk by relating potential cost outcomes to their likelihood of occurrence. Typical risk measures express the maximum increase in the annual costs with a given probability (e.g. 95 per cent), and are called Cost-at-Risk, Cash-flow-at-Risk or Budget-at-Risk.

In addition, there is a tendency of paying more attention to debt-service cost in a broader macroeconomic context including the government budget.
The term *Budget-at-Risk* reflects the notion that the link between the debt-service costs and the government budget has been taken into account.

Usually, the simulation models are run for a limited number of different deterministic scenarios of the government’s primary budget balance (i.e., the government-budget balance excluding government debt costs) to assess the link between debt-service costs and budget balance. Thus, the government budget balance is exogenous to the simulation models. However, some countries are addressing the challenge to endogenously model the government’s primary budget balance together with relevant macroeconomic variables such as GDP, in their simulation models. This allows for an explicit assessment of the inter-linkages between debt-service cost and budget balance.

**IV. Cost measures and risk**

Nominal debt-service costs are typically used in most models. However, in some cases Cost-to-GDP is also considered explicitly. The underlying idea is again to examine the joint co-movements between debt-service costs and the government budget. The government budget normally co-varies with GDP via both taxes and government expenditures. It is thus possible to examine whether the (composition of the) debt portfolio reduces the risks to the budget by typically having lower costs when government finances are strained. Thus, this cost measure takes the smoothing of the budget (and taxes) directly into account.

Unrealised changes in the market value of the debt due to changes in interest rates are usually not taken into account in the debt-service cost measure, because of the long horizon applied to government debt and the fact that government debt often is kept until maturity and redeemed at par. However, the market value of the government debt is increasingly receiving attention from debt managers, because it may provide supplementary information about the cost and risk of the debt portfolio.

Some countries take changes in the market value of the debt into account in their risk management by applying so-called *Value-at-Risk* methodologies. Value-at-Risk calculations (used as a supplement to other risk measures) can be an important element in managing currency risk on foreign government debt. If the portfolio has a given amount denominated in foreign currency, the realised as well as unrealised losses due to an appreciation of the foreign currency will affect the level of the foreign debt and debt service costs when the foreign debt is measured in terms of the domestic currency.

**V. Measuring interest rate exposure**

*Duration* is the most commonly applied measure for the interest rate exposure of government debt portfolios among OECD countries. Some countries apply similar measures such as *average time to maturity*. Measuring
the duration of the debt portfolio can be seen as a summary measure of both the cost-risk characteristics of the government debt strategy and the effects of government debt operations. In many cases, government debt managers have a duration target for the debt portfolio. Some debt management offices have chosen to publish this target. Duration targets are typically expressed as intervals. One reason for using an interval is that changes in duration track changes in the yield curve. Higher interest rates lead to a lower duration, which could then lead to the undesirable need to lengthen the debt portfolio so as to reach the duration target. Accordingly, in some countries yields are kept at a constant level when calculating duration.

It is widely recognised that the debt strategy and the interest-rate risk cannot be characterised by a duration measure only. Duration is a measure of the average fixed-interest period of the portfolio. As an average measure, the duration contains by definition no information about the dispersion of the portfolio’s interest-rate exposure over time and the associated refinancing risk. Duration is therefore usually supplemented with information about other measures of risk such as redemptions, as well as the amount of the floating-rate debt and the swap portfolio for which a new rate of interest is to be re-fixed within the following years. In addition, simulation models are used to analyse and quantify the risk associated with a given duration level of the debt portfolio.

VI. Benchmarks

A benchmark can be seen as a formalisation of the high level (strategic) objectives of the debt portfolio manager. In general terms, a benchmark defines the cost-risk preferences and can serve as a reference for evaluating the costs and risks of the actual debt portfolio. There is in general a tendency to establish a more formal set-up for evaluating government borrowing operations. The creation of separate debt management offices may also lead to a greater focus on the establishment of benchmarks in order to support accountability and transparency.

Benchmarks could be either counter-factual (virtual) portfolios following certain financing rules that are used to evaluate the actual portfolio management, or key portfolio figures or targets that summarise the desired cost and risk profile and are used as guiding points in ongoing management. Various simulations models can support the setting of benchmarks.

Most common is to set-up benchmarks as certain key ratios, primarily duration combined with some measure capturing annual interest-rate re-fixing. Some countries have virtual benchmark portfolios for domestic government debt.

As regards tactical position-taking and performance measurement relative to the benchmark, there are at least two fundamental prerequisites that often
are problematic. First, there is the requirement that the government portfolio manager is a small player in a large market, and thus is (close to being) a price taker. Otherwise the government portfolio manager may potentially affect market prices and the benchmark. Second, it must be ensured that market participants do not suspect the government of taking positions against the (strategic) benchmark based on privileged information.

With the launch of the euro and the creation of a pan-European capital market, the potential influence of the local, domestic capital market on government debt transactions of the euro-zone countries has diminished. This has given debt managers in the euro-zone more scope for developing benchmark portfolios and engaging in active management vis-à-vis the benchmark.

Notes

1. Prepared by Ove Sten Jensen and Lars Risbjerg, Government Debt Management at Danmarks Nationalbank. Large parts of this chapter are based on “Report on interest-rate risk management of government debt” prepared for the OECD Working Party on Government Debt Management in 2002 by government debt offices from Austria, Belgium, Denmark, Finland, Italy, the Netherlands, Portugal, Sweden, and United Kingdom. Chapter 3 (this volume), “Analytical framework for debt and risk management”, contains a more detailed description of various approaches to the management of market risk.


3. In case the market value of the swap is positive for the government.

4. See Chapter 3, this volume.

PART II

Chapter 5

Management of Operational Risk by Sovereign Debt Management Agencies*

by
Peter McCray

This chapter outlines the main issues and themes to emerge from responses by selected OECD sovereign debt managers to a questionnaire regarding operational risk. With a view to limiting the administrative burden, seven working group members were asked to provide answers to the questionnaire. Six of the seven countries to which the questionnaire was sent have responded. These countries are Australia, Netherlands, New Zealand, Portugal, Sweden and the UK.

The primary purpose of the questionnaire was as a benchmarking exercise on operational systems, structures, and resources in sovereign debt management agencies, rather than a theoretical discussion of operational risk management. A detailed summary of the responses to the questionnaire, and a copy of the questionnaire, are at Annexes 5.A and 5.B respectively.

As a benchmarking survey, there is only limited analysis that can be undertaken, however a number of discussion issues for the working group are highlighted.

* This chapter has been prepared by an ad hoc Expert group on Operational Risk Management of Government Debt for the OECD Working Party on Public Debt Management. The work was co-ordinated by Peter McCray of the Australian Office of Financial Management.
I. Overview and key points from survey responses

Introduction

All sovereign debt managers are subject to operational risk. The scope and scale of operational risks faced by sovereign debt managers vary according to their institutional setting, and with the types and frequency of transactions they undertake. Fundamental differences in these parameters could lead to different perspectives on the relative importance of particular operational risks.

For example, a sovereign debt management agency that does not use many portfolio management techniques after primary issuance will not face the same operational risks as compared to one that has a highly active, transaction intensive approach to portfolio management. Likewise, the level of independence from the central Ministry of Finance, and the extent to which functions are outsourced also influences the range of operational risks to be managed.

As such, while the set of operational risks that any sovereign debt manager faces may be similar, the relative importance of the different risks may vary from sovereign to sovereign.

Key points

Institutional setting and governance arrangements

Over the past decade or so, a number of sovereign debt management agencies have been set up with varying degrees of independence from their central Ministry of Finance, ranging from operating as a section still within the Ministry of Finance, to complete independence. As part of this process, sovereign debt management agencies, in addition to their traditional transaction-based operations, have taken on a range of new responsibilities ranging from implementing a new human resource management framework, developing and managing their IT systems, and reporting to and managing an Advisory Board. In addition, more recently there has been an increased focus in both financial markets and government agencies on issues such as corporate governance, audit and compliance, and business continuity planning. All these changes have implications for the range of operational risks faced by sovereign debt managers, and the relative importance placed on particular operational risks at a given point in time.
Debt transactions

Whereas a number of issues relating to debt transactions such as the use of derivatives will affect the range of operational risks that need to be managed, the major issues currently facing sovereign debt managers in this regard relate more to market risk (and even political risk) as opposed to operational risk issues.

For the six sovereign debt management agencies surveyed, a number of the issues canvassed relating to debt management transactions (including the types of transactions undertaken, comparative frequency and size of different types of transactions, and settlement techniques) were similar. However, in terms of primary debt issuance, there are a range of techniques used, even within the one debt office for different instruments. For example, long-term debt may be issued using a different mechanism than short-term debt.

From the six sovereign debt management agencies surveyed, the most common primary debt issuance mechanisms used are competitive auctions using dealer panels, and reverse inquiry. In two cases, underwriters are also used. One debt management office uses direct dealing with the secondary market, and one debt management office uses uniform price auctions. Moreover, whereas four of the sovereigns surveyed conducted primary issuance activities in-house, whereas the other two used their Central Bank, which would affect the range and level of operational risk exposure.

These responses tend to indicate that for the sovereign debt offices surveyed, there is no “international best practice” for primary debt issuance. The background to this may be historical (in terms of not wanting to change the technique that the particular market is used to). It may also point to the fact that there are differences between the short-term and long-term debt markets that tend to promote the use of different issuance techniques.

In broad terms, for the sovereign debt managers surveyed, the level of activity in the secondary market (as measured by the value of transactions) is much less (<20 per cent) than the value of primary debt issuance. However, for two sovereigns with high levels of OTC derivative activity, the ratios are around 1:1. This would be expected to be dependent on the scope of the government’s financing requirements. A government achieving budget surpluses could be expected to require less debt issuance, and at the same time, the debt management agency could be expected to be required to undertake an increasing number of secondary market transactions to maintain liquidity in a government bond market that is likely to be decreasing in overall size.

Business continuity

Whilst the terrorist attacks in the United States in 2001 highlighted the importance of managing operational risk, and in particular disaster recovery
planning, the majority of sovereign debt managers surveyed have still to finalise the development of properly functioning business continuity plans, disaster recovery plans, and back-up sites, and little if any budget allocated to these items. However, some of the sovereigns surveyed do have significant arrangements in place to address these issues.

**Compliance and audit**

All debt management offices surveyed have strong audit systems in place, including internal audit functions as well as being subject to external audit by their government audit office.

The majority of respondents indicated that the percentage of operational budget attributed to audit functions is 1-2 per cent. Another indicated 5 per cent of the operational budget is attributable to audit. Given the increased focus on audit related functions in the international financial markets, it could be expected that more attention will be placed on audit-related functions within sovereign debt management agencies going forward.

**Human resources**

The debt management agencies surveyed indicated that in general, key personnel departures have proved to be less of a problem than originally feared, but continues to be a very important issue. The average length of service for employees in the six debt management agencies surveyed is 6 years, and ranges between 2.5 and 13 years. (although this figure may be distorted due to the fact that many debt management agencies have only been formed during the past five years). The turnover ratio for staff (calculated as departures per year divided by total staff) for the six respondents averages 12 per cent per year, and ranges between 5 per cent and 22 per cent.

Consultants are used sparingly in the majority of the debt management agencies surveyed. The most common areas they are used in is IT (particularly for defined projects), and for the provision of legal advice. A number of the debt management agencies have used consultants for other short-term projects.

**Information technology and systems**

As would be expected, IT now constitutes a major portion of agency operational budgets. For the six sovereign debt agencies surveyed, the amount of the agency budget spent on IT (including salaries) averages 21 per cent of operational expenditure and ranges between 13 per cent and 30 per cent.

Five of the six debt offices surveyed have a fully integrated debt management treasury system incorporating front, middle and back office
functions, although in one case, this is still being implemented. For one of the sovereign debt management agencies surveyed, the accounting system that is fully integrated with the Treasury system. Three other sovereigns indicated the accounting system interfaces with the Treasury system.

The following points are suggested as an initial basis for discussion.

II. Issues for discussion

- Corporate governance has been a key theme in international financial markets during the past twelve months as a result of a number of high-profile corporate collapses, and the more recent focus on audit and accounting irregularities.
  ❖ Have the resources and focus you have placed on audit functions changed during the past twelve months? What aspects of your agency’s operations receive/require the most audit attention?
  ❖ To what extent has corporate governance received an increased focus within sovereign debt management agencies during the past twelve months? Has this resulted in any changes to the structure or functions of your debt management agency’s Board?
  ❖ There were two respondents who indicated their Board played a strong role in the operations of the Debt Management Office. Have other sovereigns noticed their Board wishing to play a stronger role? What sort of operational risks/other challenges would such a move present?

- The techniques for primary debt issuance was highly variable for those sovereign debt agencies surveyed.
  ❖ What are the underlying causes for this? Are sovereign debt agencies reluctant to change their primary debt issuance techniques, and if so why?
  ❖ Is it related to the fact that a number of sovereigns conduct their primary issuance in-house, whereas many still rely on their Central Bank or another agency?

- Are sovereign debt agencies finding they are able to attract and maintain the necessary expertise? Does more attention need to be given to maintaining key resources within sovereign debt management agencies? [The average length of service for employees in the six debt management agencies surveyed is 6 years, and ranges between 2.5 and 13 years. The turnover ratio for staff (calculated as departures per year divided by total staff) for the six respondents averages 12 per cent per year, and ranges between 5 per cent and 22 per cent.]

- From the responses received, the level of outsourcing within debt management offices seems to be less than that in other government agencies. What may be the reasons for this? Is this likely to change?
ANNEX 5.A

Sovereign Debt Management Operational Risk Survey: Summary of Responses

Section 1: Institutional setting and governance arrangements

This section of the survey provided an indication as to the institutional setting and the scale of operations of the six debt management offices surveyed. Fundamental differences in these parameters could lead to different perspectives on the relative importance of particular operational risks.

Debt management objective

The recurring theme from respondents, and consistent with the “Guidelines for Public Debt Management” by the IMF and the World Bank, was for the debt management objective to focus on achieving the government's financing needs at the lowest possible cost over the medium to long term, consistent with a prudent degree of risk.

Relationship with central Ministry of Finance

Over the past decade or so, a number of sovereign debt management agencies have been set up with varying degrees of independence from their central Ministry of Finance, ranging from operating as a section still within the Ministry of Finance, to complete independence. Most debt management agencies maintain some sort of relationship with the Ministry of Finance.

The responses indicated that a common model is for risk parameters to be developed within the debt management agency (in two cases in conjunction with the debt management agency advisory board), but to be approved by the Ministry of Finance/Government Minister (and in one case by the debt management agency’s Board). Likewise, the debt management office advises on its remit, but it is the central Ministry of Finance/Government Minister who approves the remit and decides on the overall debt management objectives for the debt management agency to implement.
All the debt offices surveyed have managerial and operational independence to meet their particular remit.

Existence/nature of agency board

All but one of the sovereign debt managers surveyed makes use of a small (usually 5-8 members) Advisory Board consisting of both public (including Parliamentarians in one case) and private sector members, and usually chaired by the Head of the Ministry of Finance. For one of the respondents, the Board consists of three private sector members only. The Board typically meets 4-6 times a year, although it meets more regularly (monthly) in two of the surveyed countries.

The roles of the Board do vary slightly, but most advise the senior management of the Ministry of Finance on strategic, operational and management issues relating to the debt management office. Most tend to have an advisory rather than a formal decision-making role.

In one case, the Board has a stronger role to propose guidelines for the debt management agency to the government, to issue more precise guidelines for the debt management agency’s operations based on the government guidelines, and to issue limits and guidelines for risk management.

Scale of operations

The sovereigns surveyed varied in the scope of functions for which they are accountable, which affects the range of operational risks to which they are exposed. All six respondents manage long-term debt, five also have a cash management function, and three have responsibility for asset management, particularly short-term debt management associated with within-year cash flows. Three of those sovereigns surveyed also have some intermediation functions such as on-lending to other agencies, and other functions such as issuing guarantees.

In terms of staff members, the debt management offices surveyed have between 24 and 77 full time staff working in the front, middle and back offices as defined in the survey, with an average of 51 staff.

The split of the annual operational budget (excluding debt service/interest costs) is:

<table>
<thead>
<tr>
<th></th>
<th>Average (per cent)</th>
<th>Minimum/Maximum (per cent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment expenses</td>
<td>50</td>
<td>36-68</td>
</tr>
<tr>
<td>Outsourced activities</td>
<td>12</td>
<td>2-29</td>
</tr>
<tr>
<td>Information technology</td>
<td>17</td>
<td>10-35</td>
</tr>
<tr>
<td>Administration/Rent</td>
<td>21</td>
<td>15-32</td>
</tr>
</tbody>
</table>

The central government gross debt on issue for the six countries surveyed ranges from USD 17 billion to USD 450 billion and averages USD 146 billion.
The central government net debt/GDP ratios of the surveyed countries ranges from 5 per cent to 59 per cent and averages 28 per cent.

Section 2: Operational benchmarks

This section of the survey was designed as a benchmarking exercise on operational systems, structures and resources in sovereign debt management agencies. For the purposes of the survey, we assumed a typical sovereign debt office is divided into three broad areas that we titled “front office”, “middle office” and “back office”. Furthermore, we assumed the functions of each of these areas consists broadly of the following:

Front office: primary market debt issue, debt repurchase and retirement, portfolio management/yield curve management transactions in the market, market liaison and promotion, cash management.

Middle office: portfolio management strategy, communication strategy, risk management policy, compliance and audit, public policy and public stakeholder management.

Back office: accounting and settlements activities, information technology, human resources, legal, general administration.

The split of resources between the 3 areas of the sovereign debt offices surveyed is:

<table>
<thead>
<tr>
<th></th>
<th>Average (per cent)</th>
<th>Minimum/Maximum (per cent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front office</td>
<td>23</td>
<td>12-41</td>
</tr>
<tr>
<td>Middle office</td>
<td>28</td>
<td>17-42</td>
</tr>
<tr>
<td>Back office</td>
<td>49</td>
<td>36-59</td>
</tr>
</tbody>
</table>

Front office

Type of transactions undertaken

This question required participants to indicate the range and frequency of transactions undertaken including long-term security issuance, security buybacks, the use of switches, short-term debt instruments, cash management, and a range of derivative transactions including OTC derivatives and foreign exchange derivatives.

The responses were in line with the scope of the major functions for each debt management agency. The six sovereigns surveyed are involved with debt issuance, debt buybacks and short-term debt management transactions, five with OTC derivatives, security switches, and cash management transactions, four with FX transactions, three with indexed securities, repo facilities and investments, and two use exchange traded derivatives.
In terms of the nature of the transactions, those involving short term debt instruments, cash management, and OTC derivatives tend to be frequent and of high value. Long term security issuance is also high value, but less frequent. Switches and debt buybacks and repo transactions are relatively infrequent by comparison.

**Debt issuance**

A full range of primary debt issuance mechanisms are used, even within the one debt office for different instruments. For example, long term debt may be issued using a different mechanism than short-term debt. From the six sovereign debt management agencies surveyed, the most common primary debt issuance mechanisms used are competitive auctions using dealer panels, and reverse inquiry. In two cases, underwriters are also used. One debt management office uses direct dealing with the secondary market, and one debt management office uses uniform price auctions.

Four of the sovereigns surveyed conducted primary issuance activities in-house, whereas the other two used their Central Bank.

**Secondary market transactions**

All sovereign debt agencies surveyed are involved in their secondary markets. The most common secondary market activities undertaken by the sovereign debt market agencies surveyed are outright buying and selling associated with switches and debt buy-backs (undertaken by all six respondents), five use OTC derivatives and three use repos. Exchange traded derivatives are used by two of the sovereign debt agencies surveyed.

In broad terms, for the sovereign debt managers surveyed, the level of activity in the secondary market (as measured by the value of transactions) is much less (<20 per cent) than the value of primary debt issuance. However, for two sovereigns with high levels of OTC derivative activity, the ratios are around 1:1. In addition, for two sovereigns involved with FX derivatives, the level of their involvement in foreign secondary markets is many times greater than primary issuance into foreign markets.

**Middle office**

**Break-up of Staff involved with middle office functions**

<table>
<thead>
<tr>
<th></th>
<th>Average (per cent)</th>
<th>Minimum/Maximum (per cent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portfolio management</td>
<td>24</td>
<td>10^\textsuperscript{-36}</td>
</tr>
<tr>
<td>Risk management policy</td>
<td>31</td>
<td>19-44</td>
</tr>
<tr>
<td>Compliance and audit</td>
<td>27</td>
<td>14-47</td>
</tr>
<tr>
<td>Other e.g. public policy</td>
<td>18</td>
<td>6-29</td>
</tr>
</tbody>
</table>

* This debt agency outsourced the majority of this function.
Portfolio management

Of the 6 sovereigns surveyed, all but one judge their agency’s philosophical and operational approach in terms of how actively they manage their debt portfolio after primary issuance, as between 5 and 8 (on a scale of 1-10, where 1 = no portfolio management after issuance, and 10 = highly active, transaction intensive portfolio management). The other sovereign rate their approach as a 2. However, two of the sovereigns surveyed have far different approaches with their domestic portfolio (judged below 5) as compared to their foreign portfolio (judged around 8).

Risk management

The debt management agencies surveyed actively manage a full range of both financial and operational risks. Most of the sovereign debt agencies surveyed have a separate section dedicated to risk management. If not, specific personnel have responsibility for risk policy modelling and development.

Disaster recovery

Whilst the terrorist attacks in the United States in 2001 highlighted the importance of managing operational risk, and in particular disaster recovery planning, half of the sovereign debt managers surveyed have still to finalise the development of properly functioning business continuity plans, disaster recovery plans, and back-up sites, and the majority of respondents have little if any budget allocated to these items. However, half of the sovereigns surveyed do have arrangements in place including a business continuity plan, a disaster recovery plan, and a back-up site.

Compliance and audit

All debt management offices surveyed have strong audit systems in place, including internal audit functions as well as being subject to external audit by their government audit office. Two respondents have outsourced their internal audit function. One sovereign debt agency has an audit committee comprising external experts.

The majority of respondents indicated that the percentage of operational budget attributed to audit functions is 1-2 per cent (including one where the risk control and internal audit together was 7 per cent). Another indicated 5 per cent of the operational budget is attributable to audit.

All of the debt management offices surveyed have comprehensive fraud control policies and procedures in place.
Back office

Accounting

Five of the six respondents indicate they use commercial accounting packages, with the other using a combination of a commercial system and an internally developed system.

One of the sovereign debt management agencies surveyed is in the process of implementing a new debt management accounting system that is fully integrated with the Treasury system for front, middle and back office operations. Three other sovereigns indicated that although the accounting system is not fully integrated or part of the Treasury system, the accounting system does interface with the Treasury system.

All but one of the debt agencies is required to produce its own financial statements, and all but one of the agencies is required to report on both a cash and accrual basis. One agency only reports on an accrual basis.

Settlements

In line with the scope of the activities of the six sovereigns surveyed, six are involved with settlements in debt transactions, six with OTC derivatives, two with exchange-traded derivatives, three with investments, and three with other instruments such as repos.

The number of settlements per month ranges from 50 to 1100 and averages 560.

The number of settlement failures from counterparties per year averages 18, and ranges between 6 and 39. However, some respondents answered this question as a percentage of settlements turnover.

The most common techniques used to limit settlements risk are netting of payments, settlements confirmation and use of electronic settlements systems. In addition, a number of sovereigns surveyed use telephone confirmation, and follow a checking process to limit settlement failures.

There are a range of different agents used to settle debt instruments. One debt management office manages settlements in-house, one uses a fiscal agent, two use a combination of fiscal agents and their Central Bank, one uses only the Central Bank, and one uses their Ministry of Finance.

Information technology

IT now constitutes a major portion of agency operational budgets. For the six sovereign debt agencies surveyed, the amount of the agency budget spent on IT (including salaries) averages 21 per cent of operational expenditure and ranges between 13 per cent and 30 per cent.
All the debt management offices surveyed have sophisticated IT environments. One respondent had a different IT environment for their “front office” as compared to the rest of their debt management office.

Apart from one debt management office that had many contractors in IT positions, only a small amount of IT personnel (0-2) are contractors in the debt management offices surveyed.

However, all debt management agencies surveyed outsourced some of their IT functions. This varied between agencies, and includes aspects such as network and support services, retail debt operations, support and development of specific applications, and website maintenance.

Five of the six debt offices surveyed have a fully integrated debt management treasury system incorporating front, middle and back office functions, although in one case, this is still being implemented. The other debt management office uses separate in-house systems for different functions, with minimal integration.

All debt offices surveyed make use of market information systems, particularly Reuters and Bloomberg (although there were substantially less Bloomberg terminals than Reuters licences in each of the debt management offices surveyed). Other market systems used are Datastream, Telerate, and Ecowin.

**Human resource management**

A number of sovereign debt management agencies have been split away from their respective Ministries of Finance in the past five years, usually with the concurrent introduction of a new human resources framework. This has influenced the average time that employees have been working for the agency (even though in some cases they may have been employed in a similar role in the Ministry of Finance). The average length of service for employees in the six debt management agencies surveyed is 6 years, and ranges between 2.5 and 13 years.

Five of the six respondents indicated that HR services are provided in-house, although some HR services are partially outsourced in two of these agencies. In one case, HR services are provided by the central Ministry of Finance.

Training provided to agency staff is most frequently on-the-job training, followed by external courses and in-house training. Formal training expenditure for the six respondents averages 4 per cent of the salary budget, and varies between 2 per cent and 7 per cent.

The turnover ratio for staff (calculated as departures per year divided by total staff) for the six respondents averages 12 per cent per year, and ranges between 5 per cent and 22 per cent.
In general, key personnel departures have proved to be less of a problem than originally feared for most of the debt management agencies surveyed, but continues to be a very important issue.

Respondents use a range of techniques to try to manage key personnel departure risk. Four of the respondents indicated that they are able to provide remuneration packages at least comparable to those in the financial markets. Five of the respondents provide flexible, outcomes-based performance remuneration, and five of the respondents include succession planning, at least to some extent. None of the debt management agencies surveyed offer golden handshake arrangements to try to attract key staff.

Five of the six debt management agencies surveyed use a formal performance management appraisal process to assess staff performance. Four of the agencies link staff performance to salary outcomes, at least to a limited extent. In three of these four agencies, the “at-risk” component is available to all staff, and in one agency, it is only used for “front-office” functions.

**Use of consultants**

Consultants are used sparingly in the majority of the debt management agencies surveyed. The most common areas they are used in is IT (particularly for defined projects), and for the provision of legal advice. A number of the debt management agencies have used consultants for other short-term projects such as developing a HR framework, or developing accounting systems, or for change management-type consultancies.

In one of the debt management agencies surveyed, consultants are used more commonly, and are also involved in providing portfolio management advice, and in undertaking operational reviews from time to time.

**Legal advice**

Four respondents indicated legal resources are split between internal and external resources depending on the nature of the issue. One agency uses only external legal resources, and one agency indicated they use only in-house legal advice.

**Corporate services and administration**

All six debt management agencies surveyed indicated these services (e.g. secretarial, office services) are undertaken in-house, however in one case, all the corporate services and administration functions are in the process of being outsourced to an external contractor. Two respondents indicated some of these services e.g. invoice payment, procurement advice, are still undertaken by the central Ministry of Finance.
ANNEX 5.B


The 2001 meeting of the Working Party on Government Debt Management discussed a survey paper on sovereign risk management and agreed upon three priority risk areas that warranted further consideration at the 2002 meeting. The three priority risk management areas identified were market risk, credit risk and operational risk. It is operational risk that is the subject of this survey.

The primary function of this survey is as a benchmarking exercise on operational systems, structures and resources in sovereign debt management agencies, rather than a theoretical discussion of operational risk management. The survey is structured accordingly.

The survey is divided into two main sections: governance arrangements and scale of operations; and operational benchmarks.

To minimise the resources required to complete the survey, wherever possible we have employed a closed-question, tick-box approach to the design of the survey questions. However, if there are any areas where you wish to provide more information, this would be most welcome.

In any questions that seek information on agency expenditures or budgets, or the value of transactions, size of debt portfolio etc, please quote data in your domestic currency.

Section 1: Institutional/governance arrangements and scale of operations

The purpose of this section is to gain an understanding of the institutional setting for your agency’s operations and the types and scale of activities that your agency undertakes.
II.5. MANAGEMENT OF OPERATIONAL RISK BY SOVEREIGN DEBT MANAGEMENT AGENCIES

**Institutional setting/governance arrangements**

a. What is your agency's formal debt management objective?

b. Briefly describe the role/relationship between the central Ministry of Finance/Treasury agency in your country and your agency. (e.g. any split between policy and operational accountabilities).

c. Does your agency report to some sort of Board? If so:
   i. what is the broad scope of the Board's mandate? e.g. does it have a purely advisory or a broader decision-making accountability; does it focus on debt management questions only or more broadly on the corporate administration of the agency – audit, HR, IT, etc;
   ii. please outline the composition of the Board in terms of public sector and private sector representation; and
   iii. how often does the Board meet?

d. By placing a mark in the appropriate box/es, please indicate where risk parameters (e.g. portfolio benchmarks, credit risk limits) are:
   i. developed/determined; and
   ii. approved.

   ☐ Debt management agency  ☐ Board
   ☐ Ministry of Finance  ☐ Central bank
   ☐ Government Minister  ☐ Other. Please specify

**Scale of operations**

e. Please indicate the scope of the major functions for which your agency is accountable.

   ☐ Long-term debt management  ☐ Cash management
   ☐ Asset management  ☐ Intermediation functions (e.g. funding and on-lending to other agencies)
   ☐ Other. Please specify

f. Please indicate the number of staff working in your agency (full-time equivalents).

g. What is the indicative size of your agency's annual operational budget? (this excludes contractual debt service/interest costs).

h. Please indicate the approximate percentage of the annual operational budget spent on:
   i. employment expenses;
ii. outsourced activities to external contractors;

iii. information Technology;

iv. administration and other expenses (e.g. rent).

i. What is the current volume of gross debt and gross assets outstanding under management by your agency?

j. What is your country’s current central government net debt/GDP ratio?

Section 2: Operational benchmarks

For the purposes of this survey, we have assumed a typical sovereign debt office is divided into three broad areas that we have titled “front office”, “middle office” and “back office”. Furthermore, we have assumed the functions of each of these areas consists broadly of the following:

Front office: primary market debt issue, debt repurchase and retirement, portfolio management/yield curve management transactions in the market, market liaison and promotion, cash management.

Middle office: portfolio management strategy, communication strategy, risk management policy, compliance and audit, public policy and public stakeholder management.

Back office: accounting and settlements activities, information technology, human resources, legal, general administration.

This section endeavours to determine the range of functions that your agency undertakes in each of these broad areas, which should provide an indication as to the scope of operational risks that may arise. Even if your agency is not formally structured along these lines, a very broad indication of staff and budget allocation by these broad functions would be useful.

A. General

a. Please indicate how many of your agency’s staff work in:

i. Front office?

ii. Middle office?

iii. Back office?

b. Please indicate the approximate percentage of the annual operational budget spent on:

i. Front office?

ii. Middle office?

iii. Back office?
B. **Front office**

a. By placing the appropriate letter/s in the boxes below, please indicate the range and volume (excluding any retail elements) of transactions undertaken and instruments used by your agency.

[usage – frequent (F), moderate (M), infrequent (I), not used (N)].

[value – high (H), low (L)]. *e.g.* if you issue long-term securities only a few times a year but in large amounts each time, place IH in that box.

- Long-term security issuance
- Security switches/conversions
- Foreign currency debt issue/management
- Indexed securities
- Exchanged traded derivatives
- Secondary market repo facility
- Investments

b. Please indicate what sorts of primary debt issue mechanisms you use.

- Competitive auctions
- Direct dealing with secondary market
- Loans
- Other. Please specify

<table>
<thead>
<tr>
<th>Mechanism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dealer panels</td>
</tr>
<tr>
<td>Reverse inquiry</td>
</tr>
<tr>
<td>Underwriters</td>
</tr>
</tbody>
</table>

c. Do you conduct these primary issuance activities in-house, or are they conducted by another agency on your behalf? (*e.g.* central bank).

d. What sort of execution processes do you use in relation to derivatives? (if applicable).

e. Are these conducted through clearing houses or over the counter (OTC)?

f. Is your agency involved in secondary market transactions? If so, please indicate what sort of transactions this includes.

- Repos
- Outright buying/selling
- Exchange traded derivatives

<table>
<thead>
<tr>
<th>Transaction Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stock lending</td>
</tr>
<tr>
<td>OTC derivatives</td>
</tr>
<tr>
<td>Other. Please specify</td>
</tr>
</tbody>
</table>

g. In broad terms, how does the overall level (in volume terms) of your involvement in the secondary market compare to your level of bond issuance related activity?
C. **Middle office**

a. Please indicate the approximate number of staff resources allocated to the various middle office functions.
   i. Portfolio Management.
   ii. Risk Management Policy.
   iii. Compliance and Audit.
   iv. Other – e.g. public policy/public sector stakeholder management.

Please specify details of other.

**Portfolio management**

b. Do you pro-actively manage your portfolio structure to meet explicit portfolio targets? If so, please provide a brief description of these targets – duration, fixed-floating share, etc.

c. On the diagram below please scale your agency’s philosophical and operational approach in terms of how actively you manage your debt portfolio after primary debt issuance to achieve any portfolio goals/benchmarks you may have set.

**Risk management**

d. Please indicate the range of risks that are actively managed by your agency.

**Financial Risks**

- Interest rate risk
- Liquidity risk
- Credit risk
- Funding risk
- Other. Please specify

- Foreign exchange risk
- Basis risk
- Investment risk
- Execution risk

**Operational risks**

- Accounting risk
- Legal risk
- Segregation of duties
- Audit risk
- Settlements risk
- Other. Please specify

e. Is there a separate area of your agency dedicated to risk policy modelling and development?
Disaster recovery

f. Please indicate your agency's position on business continuity and disaster recovery arrangements.

<table>
<thead>
<tr>
<th>Item</th>
<th>Yes</th>
<th>In development</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business continuity plan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disaster recovery plan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Back up site</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

g. What percentage of annual operational expenses is attributable to these and related functions?

Compliance and audit

h. Do you have a separate area of your agency dedicated to monitoring compliance with risk policies and risk limits.

i. Please outline the audit framework used by your agency. Do you have an independent internal audit function? If so, to whom does it report? What is the interface between the Government auditor and your agency? If relevant, what is the demarcation of responsibilities between the Government auditor and your agency's internal audit function?

j. What percentage of your operational expenses would be allocated to audit functions?

k. Does your agency have a fraud control plan?

D Back office

a. Please indicate the approximate number of staff resources allocated to the various back office functions.

   i. Accounting
   
   ii. Settlements
   
   iii. Information technology
   
   iv. Human resource management
   
   v. Legal
   
   vi. Corporate services and administration
   
   vii. Other. Please specify.

Accounting

b. Please indicate the type of accounting system/s you use

   - Function is outsourced
   - Internally developed
   - Spreadsheet system
   - Other. Please specify

   - Commercial package. Please name it.
   - Custom system
   - Paper-based system
II.5. MANAGEMENT OF OPERATIONAL RISK BY SOVEREIGN DEBT MANAGEMENT AGENCIES

c. If you use an accounting system, is it part of the broader treasury / debt management transaction system you may use?
d. Is your agency required to produce its own financial statements?
e. Is Parliamentary and Budget reporting of debt management outcomes required on a cash or accruals basis, or both?
f. Please indicate what accounting bases your agency reports against.

- IMF government finance
- National accounting standard statistics
- Other. Please specify

Settlements

g. Please indicate the types of settlements your agency is involved with.

- Debt transactions
- Exchange traded derivatives
- OTC derivatives
- Investment
- Other. Please specify

h. Approximately how many settlement transactions does your agency undertake per month on average?
i. In relation to transactions with counterparties, how many failures (if any) do you receive from counterparties each year?
j. Please indicate techniques you use to reduce settlement risk.

- Netting of payments
- Use of electronic settlements systems
- Settlement confirmation
- Use of settlements exchanges
- Other. Please specify

k. Do you physically transact actual settlement payments in relation to your debt instruments, or is this function carried out by another agency on your behalf? (e.g. fiscal agent, commercial bank, central bank).

Information technology (IT)
l. Please describe your IT environment.
m. How much does your agency spend (as a percentage of the annual operational budget) on IT functions and systems (including staff costs)?
n. How many of your IT positions are filled by contractors/consultants?
o. Do you outsource any aspects of your IT systems? If so, please specify.
p. Do you use a specific “Treasury system” to facilitate your debt management transactions? Was this bought “off the shelf” or developed “in-
house”? How well is it integrated throughout the office in terms of meeting the requirements of dealing/treasury/risk management/settlements and accounting functions?

q. If you have purchased a specific “Treasury system” to facilitate your debt management transactions, please indicate when this occurred, and provide an indicative cost for the initial purchase and implementation.

r. Which market information systems does your agency use? How many user registrations/licences do you have for each of these systems?

**Human resource (HR) management**

s. Please indicate how HR services are provided.

- In-house
- Outsource
- Partially outsourced
- Other. Please specify

**t.** By placing a number in the boxes below, please indicate what sort of training is provided to agency staff. (1 = most frequently used, 6 = least frequently used.)

- On-the-job
- Secondments
- In-house
- Financial markets
- External courses
- Academic

u. Aside from on-the-job and other forms of in-house training, what is your expenditure on staff training as a percentage of salaries for the organisation as a whole?

v. What is the average length of service for current employees?

w. What has been the average turnover ratio for staff each year? (e.g. over the past five years) (number of employees departing per year compared to the total number of employees).

x. Have you found key personnel departures to be a significant risk? What techniques do you use to try to manage key personnel departure risk?

- Remuneration packages competitive with financial markets
- Golden handcuff arrangements (e.g. time-based bonuses)
- Other. Please specify

**y.** Do you use a **formal** performance management/appraisal process to assess staff performance?
z. Do you link staff salary outcomes to performance? If so:
   i. How much of the aggregate salary budget is “at risk”?
   ii. Is this applied to all staff, or to limited areas? e.g. key staff only?

aa. Please indicate what type of roles consultants typically undertake in your agency. Are consultants used on an ongoing basis, or only for short-term/defined period projects?
   - IT
   - Portfolio management advice
   - Legal advice
   - Other. Please specify

bb. In a typical year, what is the approximate level of expenditure on consultant’s fees versus the total salary budget for employees?

Legal

cc. Do you have any dedicated internal legal resources, or do you use external resources to provide legal advice?

Corporate services and administration

dd. Please describe in very broad terms the range of functions that your corporate services/administration section undertakes.

ee. Are any aspects of this function outsourced? If so, please list which functions are outsourced.

   Thank you for taking the time to fill out this survey.
Explicit Contingent Liabilities in Debt Management*

This chapter, prepared by an ad hoc experts’ group of the OECD Working Party on Debt Management, deals with best practices for the issuance and management of explicit contingent liabilities. Contingent debts are in many ways similar to conventional government debt instruments. Typically, there are other ways to achieve a given end than to issue guarantees. We compare credit guarantees to direct lending from the government and conclude that credit guarantees have two drawbacks. The chapter focuses on how to devise a sound governance system for government guarantees. Such a system should ensure appropriate use of guarantees and limit the opportunities and incentives to use guarantees in cases where better instruments – as seen from the taxpayers’ perspective – are available. A sound governance system must also have adequate rules for reporting of guarantees. Public accounting systems generally do not treat guarantees as liabilities. The next set of best practices concerns valuation principles for guarantees. Different quantitative methods can be applied to price guarantees. The final part of the chapter discusses the role of debt managers in the issuance and management of guarantees. The case for involving debt managers in the issuance of guarantees is less clear-cut. The main conclusion is thus that it is essential to have a central risk management function, responsible for the entire government debt portfolio.

* This report was drafted by an ad hoc experts’ group of the OECD Working Party on Debt Management. The report was discussed during the annual meeting of the OECD Working Party on 14-15 September 2004. Members of the ad hoc experts group: Lars Hörgren, Swedish National Debt Office, Sweden (chairman). Jan Holmberg, State Treasury, Finland. Morten Kjærgaard, Government Debt Management, Danmarks Nationalbank, Denmark. Wojciech Rzasiecki, Ministry of Finance, Poland. Jacek Skrzynski, Ministry of Finance, Poland. Marek Szczerbak, Ministry of Finance, Poland. Magnus Thor, Swedish National Debt Office, Sweden. The views expressed in this report are those of the members of the group and do not necessarily reflect the views of the institutions for which they work.
I. Background

Contingent liabilities make up a significant part of many governments’ debts. It is useful to distinguish between explicit and implicit contingent liabilities. The dividing line between explicit and implicit contingent liabilities is based on the nature and the source of the obligation. Implicit contingent liabilities are political or moral obligations. These may be the result of, for example, previous expenditure commitments made by the parliament or the public's expectation of what the government will do in the event of a crisis or disaster. Implicit commitments are difficult to assess, let alone manage in a consistent manner, precisely because they are implicit.

Explicit contingent liabilities, on the other hand, are liabilities recognised by law or written into an explicit contract. Governments issue contingent liabilities in order to subsidise certain activities, (e.g. housing production, exports, student loans) or to fill gaps in markets that private solutions are unable to cover (e.g. risks that are too large for markets to bear). Typical examples include state credit guarantees for non-sovereign borrowers (often linked to infrastructure investments), export trade guarantees and state insurance schemes such as deposit insurances, flood insurances and airline disaster insurances, indemnities and letters of comfort.

This report deals with the issuance and management of such explicit contingent liabilities. They are identifiable and, in this sense, manageable. Moreover, contingent debts are in many ways similar to conventional government debt instruments, not least in how they affect the government’s overall financial position. For example, they are typically based on contracts under civil law, just like conventional bonds, and they are claims on the same balance sheet, i.e., they have to be serviced using taxpayers’ money. In these respects, there are immediate and strong links to the responsibilities of debt managers.

It is generally acknowledged that there is a need for strategic decisions on how to manage conventional debt in terms of the choice of instrument for financing new deficits and refinancing old debts. The main objective is to achieve a sensible balance between expected costs and risks. There is less agreement and analysis on how explicit contingent debts should be managed, and how they should be integrated in an overall framework for government debt management and financial management more generally. In view of the similarities between conventional and contingent debts, the need to develop
an integrated debt management approach can hardly be questioned. The real question is how such integration is to be achieved and, more generally, how the overall management of explicit contingent liabilities can be improved.

In addition, the issuance of contingent debt merits attention. Again, there are useful parallels to conventional debt. Conventional debt is the result of decisions on government expenditures, taxes, etc., that result in a budget deficit and a net borrowing requirement. Similarly, a contingent debt is like a contingent expenditure. The actual consequences will be determined by the occurrence (or non-occurrence) of some future events, but by issuing the contingent liability, the government effectively commits resources that cannot freely be used for other purposes. In particular when a contingent debt has to be honoured, the government has to raise money to cover the cost, adding to the borrowing requirement in the current period as well as to the future level of conventional debt (unless other expenditures are reduced).

Expenditure decisions are typically taken by the parliament in a framework set by budget rules. Consistency therefore requires that decisions to issue government guarantees should be linked to conventional expenditure decisions in the budget process, ideally in such a way that conventional and contingent expenditures are presented, and can be decided upon in a comparable manner. In particular, policy makers have to be aware of the costs and risks of outstanding guarantees in order to take informed decisions on new guarantees, taxes and expenditures, just like they have to be aware of outstanding conventional debt.

Debt managers are not involved in expenditure decisions and, on similar grounds, they should not take decisions which guarantees to issue, although they can play a role in the actual issuance of government guarantees (see section V for details). They can help structure the analysis of the joint debt portfolio based on their expertise in conventional debt management.

Against this background, two important objectives of the work of the OECD experts’ group were to undertake a further analysis of i) explicit contingent liabilities from the perspective of debt managers; and ii) how explicit contingent debts should be managed and how they should be integrated into the overall debt management framework. Our mandate was to shed light on these questions by trying to find a set of best practices in managing explicit contingent liabilities. For the sake of simplicity, we use the term guarantee when discussing explicit contingent liabilities, although not in all cases where these best practices can be applied are they also legally defined as guarantees. Note also that we discuss guarantees in this report solely as technical tools to reach given (political) ends. Consequently, the report only addresses issues related to the choice between guarantees and other instruments.
The report is structured as follows. In section II, we discuss guarantees as a financial instrument and the circumstances in which a guarantee can be expected to be the best instrument for a particular policy objective. Comparisons are made primarily between credit guarantees and on-lending from the government. Section III covers rules and procedures for issuing guarantees, emphasizing the links to regular expenditure decisions. A key issue is how to set-up rules that ensure that guarantees are used because they are the best means to a given end, and not a means to reduce transparency in decision making and reporting of the government’s financial position. A key conclusion is that fees should be charged for government guarantees. In Section IV, we discuss therefore principles and practical approaches for valuation and pricing of guarantees. Section V is devoted to a discussion of how to organise contingent debt management and, in particular, the role of debt managers in this process. Section VI summarises concluding comments.

II. Guarantees as a financial instrument for the government

Introduction

The government may decide to use guarantees for many reasons, as illustrated by the examples given in section I. It is not the role of debt managers to take decisions about the purposes and objectives for which guarantees are issued. These decisions are often inherently political. However, it is usually possible to achieve a certain (political) objective using several different instruments. In the analysis of the choice among different instruments, debt managers can play a constructive part, especially in view of their financial expertise. For example, they can address the technical question whether a guarantee is the most efficient solution in a given situation.

In this section, we compare guarantees to other financial instruments that can be used to achieve similar (or even identical) objectives. Special emphasis is given to credit guarantees as a simple and common form of government guarantee, with clear links to conventional debt management. A credit guarantee is a contract through which the government assumes the credit risk for a loan extended by someone else. In case the borrower fails to fulfil its obligations, the lender can turn to the government as guarantor and claim payment of interest and/or principal.

The primary alternative to a credit guarantee is for the government to extend the loan directly. In that case the government also takes care of the financing, typically raising the funds as part of central government debt management. Note that the government’s credit risk exposure is the same irrespective of whether it extends a loan directly or issues a credit guarantee for such a loan. This follows from the fact that, fundamentally, a loan with
credit risk can be seen as a package of an otherwise identical risk-free loan and a credit guarantee issued by the lender.

One implication of the on-lending alternative is that the reported government gross debt is higher than in the case of a credit guarantee. However, this is more of an optical than a real effect. First, in case of on-lending, the government obtains an asset in the form of a claim on the borrower. However, net debt will increase if the loan is given on subsidised terms, for example, by charging an artificially low interest rate. Net debt will also increase in case of a default, because the loan has to be written down. However, this is precisely the same effect that would occur when a guarantee has to be honoured. Second, a guaranteed creditor borrows de facto in the government’s name. This fact will be revealed when a guarantee has to be honoured. The government has then to pay the beneficiaries of the guarantee – the lenders – with money raised through government borrowing, or take over the loans and continue paying interest. As a result, government gross debt will increase correspondingly. The resulting debt position of the government after a default is thus the same irrespective of whether on-lending or a guarantee is used. The different effects on initially reported gross debt is therefore not a sound (financial) reason to prefer guarantees over on-lending.

A comparison between credit guarantees and direct lending has to consider the relative financing costs and how they are divided between the borrower and the government. But there are other differences between guaranteed debt and on-lending that may be equally important. Some of these differences are related to the fact that the government allows an external party to borrow against the government’s balance sheet. Others have to do with the fact that a guarantee involves three parties – the borrower, the lender, and the guarantor – whereas a credit only has two – the borrower and the lender. The parties may have different incentives, as well as different comparative advantages. These additional features are likely to affect the relative costs and risks of guarantees and direct lending. We discuss each of them below.

However, first note that the focus in this report on guarantees and direct loans is not to argue that either is always the best available option. In particular, it may be that the government’s objectives can best be achieved by using regular funds from the state budget. For example, in the case of a government-owned company in economic difficulties, it may be better to give it a capital injection (funded with budgetary means) than to provide credit (guaranteed or provided by the government). Similarly, infrastructure projects can often be funded more efficiently using budgetary means. Using conventional budget resources permits comparison in the budget process between, for example, investment projects and other uses of the government’s resources. Guarantees and on-lending outside of the budget, on the other hand, make such comparisons more difficult. This may result in a situation where too many resources are allocated
to activities that use non-budgetary funds. However, limitations of space and the focus of this report on the links to debt management, prevent an analysis of all available alternatives.

**Financing costs**

From the lenders’ point of view the credit risk of a loan guaranteed by the government is the same as for loans issued directly by the government. They should therefore have the same interest rate, assuming that there is no uncertainty about the validity of the guarantee. However, lenders typically require a higher rate of return on guaranteed debt, for example, to offset higher liquidity risk due to the fact that the loans are issued in smaller volumes and more difficult to trade than conventional government bonds.

Since the funds used for lending from the government would be raised by conventional borrowing (using the government’s regular debt management entity), there is a strong presumption that the financing costs of guaranteed debt are higher than for direct lending, other things being equal. In general, the government cannot lower its funding costs by having someone else borrow against its own balance sheet. This is especially clear when guaranteed funds are raised by an entity fully owned by the government. In that case the extra cost of borrowing is borne by the government as owner. In addition, such an entity essentially becomes a secondary government debt agency, which requires financial expertise, systems, etc., that add further to the cost. In these cases, it is not likely that a solution involving credit guarantees can be justified solely in terms of its effect on financing costs. On the contrary, there must be other advantages that outweigh the extra borrowing costs to make a guarantee a more efficient method (seen from the taxpayers’ point of view) relative to direct lending.

In sum, the conclusion of this section is that if the government’s purpose is solely to finance a certain activity, then credit guarantees will typically be inferior to direct lending by the government. For guarantees to be an economically and financially useful instrument, considerations beyond pure fund raising must be relevant.

**Incentive effects**

Next, we consider the effects of guarantees and loans, respectively, on the behaviour of the guaranteed lender and the borrower. The behavioural implications of contingent contracts are often quite complex. In the context of this report it is only possible to highlight a few aspects to illustrate the importance of how guarantees – and associated financing solutions – are structured.
The guaranteed lender

Banks whose lending is fully insured by the government have no incentives to be selective when giving loans or to monitor the borrowers once the loans are issued. In order to mitigate credit losses, and thus the costs of the guarantees, the government will have to fulfil these tasks. Under direct lending the government has the same responsibility, but at least it is clear that it cannot expect help from the outside. Moreover, when a guarantee has been issued, the bank may have incentives to terminate loans prematurely; for example, in situations where a reconstruction of the company would have been possible. Contracts can be designed so as to counteract such incentives, but contracts are costly to write and never complete. These factors tend to raise the government’s cost.

These unfavourable incentive mechanisms of full guarantees point to the need for risk-sharing arrangements that ensure that the guaranteed lender also bears part of the credit risk. This forces the lender to be more careful, both when granting loans and in the monitoring of the borrower. Risk sharing thus tends to align the lender’s interests and incentives with the guarantor’s.

Risk sharing can be achieved in a number of ways. One approach is to limit the government’s guarantee to a certain percentage of each loan. For example, EU state aid rules prohibit the government from guaranteeing more than 80 per cent of any loan. Each guarantee must also be tied to a particular financial obligation. Although the purpose in the context of EU state aid rules is not primarily to protect the government, but to ensure that guarantees are not given to borrowers that cannot get any funds from private lenders, these rules limit the government’s risk exposure.

Risk sharing can also be achieved with direct lending, for example, by ensuring that the government is not the sole lender. Whether risk sharing is easier with guarantees or direct lending may vary from case to case, depending on the specific circumstances, including the details of the contracts involved. It is therefore hard to make a general case for either instrument on the basis of this factor. The key conclusion of this section is instead that risk sharing is essential no matter which instrument the government uses.¹

The borrower

There is a general conflict of interest between lenders and owners in a leveraged corporation. For example, the owners may have incentives to take increased risks in an attempt to raise the value of the shares. Extra profits go to the owners while the lenders face an increased likelihood of default, lowering the value of the loan. This mechanism applies also to credit guarantees, with the guarantor taking the role of the lender. Consequently, the
behaviour of the borrower is not necessarily affected by the choice between guaranteed debt and on-lending. This implies that the government will have to monitor the company carefully to restrain its opportunities to take risks.

However, in some cases the choice between guaranteed debt and on-lending may affect the need for monitoring. A guaranteed entity allowed to arrange its own financing may be tempted to take big financial gambles. These risks are transferred to the government. [The deleted sentence is obviously hard to understand, but also not essential for the overall conclusion.] The guarantor may try to limit the freedom of choice by specifying permissible types of loans and derivative contracts. But in addition resources have to be allocated to controlling and monitoring the guaranteed entity, thereby raising the cost of using guarantees.

If, on the other hand, the company is restricted to borrow directly from the government, its financing risks can be monitored directly and excessive risk taking avoided. In some cases, this may argue in favour of using on-lending rather than guarantees. A possible counter-argument is that a guaranteed borrower, thanks to relatively smaller borrowing needs, may be able to exploit niches in financial markets that are difficult to access for governments, thereby achieving lower financing costs. Direct borrowing in financial markets may also give the borrower access to instruments tailored to the borrower’s specific needs that are not readily offered by the central government as part of its on-lending activities. Whether these opportunities are significant enough to outweigh the government’s lower funding costs in conventional instruments is ultimately an empirical issue. However, a drawback of niche products and other specialised instruments is that they are often illiquid, non-transparent and complex. This makes it hard to evaluate the actual costs and may also result in unexpected costs, to the extent that the riskiness of the loan cannot be properly assessed.

**Administrative aspects**

In the previous section, we emphasised that risk sharing between the government and lenders is essential in order to bring private lenders into the picture in a constructive way. Private agents may also be able to provide services in addition to lending that can help the government achieve its objectives. One case is guarantees issued as part of a program aimed at a broad group of firms or households. For example, many governments issue export credit guarantees to promote exports. Also, guarantees are sometimes used as a part of programs targeted to subsidise housing or to help students finance their time at university. In such programs, there are often many borrowers and many transactions. This means that administrative aspects take on more weight than, for example, in the case of funding of a corporation through wholesale borrowing. This implies that the government’s ability to raise funds
at lower costs than the private lenders may be of smaller importance. Private lenders, e.g. banks with established networks for distributing credit, may be able to establish direct contacts with potential borrowers efficiently. This means that by involving banks in a guarantee program in a way that cuts distribution costs the government may be able to reduce the total costs of providing a given level of subsidies.

Another potential advantage of using private intermediaries is that it may introduce an element of competition in a state-run system. If members of the group to which the subsidies are targeted can choose between several banks, banks will have incentives to attract customers, which in turn is likely to improve their services. In contrast, a state-run lender with a de facto monopoly may become petrified, leading to high administrative costs and a low level of customer service.

Cases where the government buys services from private sector agents are common, of course. A parallel from the debt management area is the use of primary dealers and underwriters. Here the government uses private intermediaries to distribute its loan instruments. In the cases discussed above, the government uses private banks to help distribute and administer subsidies in the form of guaranteed loans. The government can be said to buy financing and administrative services from the private sector lenders. If the total costs for providing a particular subsidy can be cut by bringing private lenders into the picture, use of guarantees is warranted on efficiency grounds.

Note that also in such programs it is essential to have risk sharing between the government and the guaranteed lenders, so that the latter have the right incentives. The ease with which risk sharing can be arranged should therefore affect the choice between guarantees and direct lending.

Other reasons to use guarantees

The preceding review of the merits of guarantees as a financial instrument for the government is not exhaustive, of course. Even so, looking at current practices it is clear that credit guarantees are quite common also in circumstances where it is hard to see any of the benefits pointed to above or, indeed, any real benefits at all. This indicates that governments sometimes use credit guarantees even in the absence of sound reasons to do so. One explanation may be that there are unsound reasons and incentives to issue credit guarantees rather than to choose the straightforward direct lending alternative. Let us point to some possible explanations.

Tendencies to use guarantees more often than warranted may be created by rules that treat guarantees and direct lending differently even in cases where they have identical implications. Budget rules may allow guarantees to be issued in ways that avoid regular procedures for deciding on transfers and
II.6. EXPLICIT CONTINGENT LIABILITIES IN DEBT MANAGEMENT

subsidies. For example, it may be possible for the Government to issue guarantees without explicit consent by the parliament. Or guarantees can be issued without acknowledging that the state commits future budget means.

Incentives to use guarantees may also be due to reporting rules that do not properly identify the economic consequences of guarantees. For example, they may allow guaranteed debt to be reported in ways that make it harder to see how much resources the government puts into a particular activity. Quantitative limits that do not treat guarantees appropriately are especially onerous. One example is the Excessive Deficit Procedure in the European Union. It sets limits for debt figures and current deficits based on measures that do not acknowledge outstanding or newly issued guarantees.

Another set of circumstances affecting the use of guarantees is the rules regarding pricing of and fees for guarantees. If guarantees to companies working in competitive markets can be awarded free of charge (or on otherwise subsidised terms), they can be used as an instrument for state aid that may be harder to discover than direct transfers or loans. Or rules may allow that fees are treated as receipts in the current budget without an offset for the fact that the government has incurred an expected liability. Then underwriting new guarantees will improve the reported budget balance despite there being no improvement in the fiscal position.

Rational policy makers can be expected to act based on the logic of the rules in place. The rules governing guarantee issuance should therefore be derived from sound principles for the government’s role and behaviour. Otherwise, guarantees may be used too often as an expedient method to hide the amount of resources the government commits to certain activities or even in total. In such circumstances, both budget efficiency and long-term fiscal stability are in jeopardy.

These observations indicate that several aspects need to be considered to ensure that guarantees are used to solve problems that cannot be solved more efficiently using other instruments. They also explain why our analyses in subsequent sections of what constitutes best practice in the management of government guarantees cover budget rules, reporting practices, and pricing of guarantees.

**Conclusions**

The reasoning in this section indicates that credit guarantees have two drawbacks relative to direct lending. First and foremost, guaranteed debt has higher funding costs. For a guarantee to a government-owned entity or for a subsidised guarantee, this additional cost is borne by the government. Second, guarantees may entail higher financial risks, in particular if the borrower is able to set and implement its own financing policy. Such risks are transferred
to the government as guarantor. To counteract such behaviour, the guaranteed borrowers must be subjected to monitoring, an activity which in itself is costly.

For credit guarantees to be economically justified, they must bring advantages that outweigh these drawbacks. We point to two sets of potential benefits.

First, it may be possible to use guarantees in a way that allows the government to share the credit risks with the lenders. Risk sharing gives the lenders incentives to monitor the borrower, reducing the government’s responsibility. It also limits the lenders’ ability to take undue advantage of the guarantee. Risk sharing is possible also using direct lending, however, so this factor does not in itself help discriminate between the two alternatives.

Second, there may be administrative benefits from involving outside lenders in a government-sponsored program. The lenders can take care of the granting and distribution of credit, under the protection of a government guarantee. Such advantages are more likely in programs involving a large number of borrowers than in cases where guarantees are issued to a specific borrower with sizable funding needs. Risk sharing is essential also in such programs to prevent lenders from being careless in their handling of credit risks.

Whether these potential advantages are sufficient to outweigh the higher financing cost will vary from case to case. Each proposed guarantee (or program) has to be evaluated on its own merits, including a careful evaluation of alternative solutions.

Our subsequent analyses focus on how to devise a sound governance system for government guarantees. Such a system should ensure appropriate use of guarantees and limit the opportunities and incentives to use guarantees in cases where better instruments – as seen from the taxpayers’ perspective – are available.

III. Rules and procedures for issuing government guarantees

Introduction

In this section, we discuss how rules for issuing new guarantees should be structured. We also comment on some operative aspects of guarantee issuance. As point of departure, we take the observations in Section 2 on sound and unsound reasons for using guarantees. A carefully designed rule system should thus ensure that decision makers give adequate attention to i) financing costs, ii) incentive effects, and iii) administrative aspects. Moreover, the rules should consider that unless specific measures are taken guarantees are often not adequately reported and only surface when the guarantees fall due. The rules and procedures for issuing guarantees should
therefore be such that they foster transparency and avoid situations where guarantees are used despite there being more efficient instruments for achieving policy objectives.

**Budget treatment of government guarantees**

The starting point is that a guarantee is a commitment of government resources. Consistency therefore requires that guarantees are issued under the same rules and procedures that govern other uses of government resources. This means, in particular, that guarantee issuance should be integrated into the budget process.

The potentially hidden nature of guarantees may cause serious fiscal problems for governments. If the inherent risks of guarantees have not been recognized according to their economic value, they may require use of public resources well above the amount the government has expected to provide. Unless checked by appropriate procedures, guarantees can cause big holes in public finances. In order to support unbiased decision-making, decisions relating to guarantees should follow the same pattern as decisions relating to direct use of resources (state aid, loans and subsidies). Issuing procedures should ensure that guarantees are handled in a transparent way. Part of this objective of transparency can be achieved by an unbiased and systematic valuation of guarantees, and by accurate reporting of the measured values.

Another part is the enforcement of fees reflecting the costs of guarantees in the budget process. The expected amount of public resources that the guarantee uses should be disclosed and set aside ex ante. One way of meeting these demands is to stipulate that a government guarantee can only be issued if an ex ante fee is paid. For a subsidised guarantee the fee should be taken out of the current budget to ensure that the guarantee is acknowledged in the budget process. This puts a price tag on the decision and allows comparisons to other uses of government funds and to other ways of financing the guaranteed activity. Moreover, fees covered by budget means increase the likelihood that other expenditures are reduced, thus improving the government’s ability to meet any realized payments under the guarantee. For a guarantee issued to a company active in a competitive market, the recipient should pay the fee. This compensates the government for the resources committed by issuing the guarantee and avoids hidden state aid.

The guarantee fees paid by the recipient of the guarantee or from the budget can be put into a reserve fund. By establishing a reserve fund, the government can make the inherent risks and values of guarantees more transparent. A fund can include also a margin amount, over and above the expected costs, to act as a buffer in a worse than average scenario. In a country with a weak fiscal position, this may be a necessary precaution to take.
In some cases, the reserve fund can be a notional fund, in the sense that it is a reporting item rather than an actual fund invested in specific financial assets. With a notional fund, the fees reduce the outstanding conventional debt, assuming that subsidised guarantees actually crowd out other expenditures and that fees paid from outside the government are not used for other purposes. A smaller initial debt implies that there is more room for the government to borrow if and when a guarantee has to be honoured.

An actual reserve fund held within the government raises the reported gross debt compared to a notional fund. It also raises questions concerning in what assets to invest the fund and how to manage those assets. For example, a fund made up entirely of government bonds is easy to manage, but is also not much different from a notional fund. If other assets are included, credit risks must be managed so as to assure that the fund is available when guarantee payments have to be made. But if an actual fund is considered helpful in restricting the use of the resources actually committed to guarantees, it may be an effective means to reduce the fiscal risk that the government faces.

The choice between actual and notional funds will vary from country to country, depending on, for example, the rules governing the state’s budget and debt, in particular, whether payments of budget means into a notional fund can be expected to lead to actual cutbacks in other expenditures. The strength of the government’s overall balance sheet is also relevant.

A fund combined with reporting of the current value of the outstanding guarantees makes the latent costs of contingent liabilities transparent. If payments under guarantees are charged against the fund, one also gets an indication of whether fees are set in line with actual costs, at least on average, which permits ex post evaluation of the system. A shortfall between the fund and the current liabilities is a signal that the guarantee system is not in balance and that policy measures may be required.

**Procedures for issuing government guarantees**

Guarantees should generally be used only if other means of support or finance are considered more expensive and/or more risky than guarantees. As part of the process of justifying guarantees, the procedures should thus require an analysis showing that a guarantee is more efficient than direct support in the form of subsidies or loans. Ensuring that identical fees are charged for solutions that have the same implications for cost and risks is one important element in such a framework.

Moreover, all existing guarantee programs should be reviewed regularly and analysed against program goals. For example, the government should from time to time consider transferring the program to a separate guarantee company with limited liability. Even though existing government guarantees
cannot be transferred, this kind of exercise can be used as an acid test for evaluating the need for government participation and as a basis for decisions regarding the continuation of the guarantee program.\textsuperscript{3}

Guarantees should only be issued on terms that ensure that the risks of the guarantee can be identified. For example, all guarantees should be limited in time and cover a limited amount. This is crucial to facilitate an analytical approach to the issuance and risk management of guarantees.

At the operational level there are important questions relating to contract design that must be solved. Often these questions affect the risk position of both the guarantor and the borrower. As noted in Section 2, using partial guarantees as a tool for risk sharing can reduce incentive conflicts. This leaves part of the risk with the lender and thereby increases the lender’s interest in controlling the project in a sound way. Therefore full guarantees should be used only in exceptional cases, where it is not feasible to transfer any credit risk to the lenders. In such cases, careful consideration of whether a guarantee is the best instrument to use is typically warranted. In particular, if the project is considered highly risky, it may be more appropriate to use regular budget funds instead.

Many other aspects must be considered in order to formulate contracts that limit the government’s risk exposure to what is justified given the policy objectives involved. The limited scope of this report prevents us from going into a detailed discussion of contract design, however.

Finally, to support systematic decision-making and a setting of fees the government should establish procedures for cost estimation and pricing of guarantees, including clear guidelines regarding what part of the government that should be responsible for setting fees. We return to the pricing issues in section 4 and to the organisational aspects in Section 5.

Reporting of guarantees

A sound governance system must also have adequate rules for reporting of guarantees. The value of guarantee commitments should be acknowledged in the government’s budget reports and accounts and steps should be taken to ensure that actual resources are available if and when the guarantee is triggered.

As noted above, budget transparency and budget stability can be improved by requiring that an explicit fee is charged for all government guarantees and that the fee is included as a budget expenditure item in cases where the recipient of the guarantee does not have to pay the fee. However, circumstances will change over time so that the \textit{ex ante} fees assembled no longer cover the risks of the guarantee portfolio. Consequently, the government must consistently monitor the expected losses and risks in the outstanding guarantees and be prepared to take adequate steps in case the
expected losses increase. In some cases it may be possible to raise the fees, but in general the government must be prepared to shoulder the costs of an outcome worse than expected. It is thus essential that information about the status of the guarantee portfolio is brought to the attention of policy makers so that necessary adjustment in other expenditures or revenues can be made.

It may also be the case that the reservations made for future losses turn out to be too big. If so, money should be transferred from the guarantee reserves to the general budget. However, a potential problem in this case is that an improvement that turns out to be temporary is used as an excuse to take money out of the fund. Reserve funds should thus be managed with a long-term perspective to avoid misuse.

Public accounting systems generally treat guarantees as off balance sheet items, which are not recognized as liabilities.\(^4\) However, information about the nominal value, expected value and nature of guarantees should be published, for example, as notes to financial statements or as a separate report, ultimately to the parliament. Reports should capture all government guarantees in order to give as complete a picture of the government's risk position as possible, to support informed decisions and efficient risk management.

Because it is sometimes extremely difficult to accurately measure the value of guarantees, it is informative to describe also the terms and recipients of the guarantees and not just give figures on estimated present values. This allows external parties to make qualitative assessments of the government's commitments. In particular if there is great uncertainty about the extent of the government's guarantee commitments, investors will require risk premiums on the government's regular borrowing in excess of what is fundamentally justified. Then, accurate and trustworthy reporting may reduce the government's borrowing costs by dispelling this uncertainty. Improved information standards can therefore be seen as an opportunity for the government, not as a burden.

**Conclusions**

A guarantee is a commitment of government resources. Consistency therefore requires that guarantees are issued under the same rules and procedures that govern other uses of government resources. This means, in particular, that guarantee issuance should be integrated into the budget process. The cost of the guarantee should be disclosed. A corresponding fee should be charged ex ante and resources should be set aside to cover future costs. The fee can be charged from the recipient or as an intra-government budget item in cases where the guarantee is to be subsidised. Guidelines should state accepted situations where guarantees can be used and require a comparison between guarantees, direct lending and other forms of support.
The current value and nature of guarantees should be reported publicly. Such a system supports transparency and sound decision-making and encourages use of guarantees only in situations where other forms of support are less efficient.

**IV. Valuation and pricing of government guarantees**

**Introduction**

A valuation methodology for government guarantees must be put in place in order to assess the fiscal burden of the guarantee portfolio and to calculate any collected or budget funded fees for provision of guarantees. Guarantee valuation first raises the question of which overall principle to apply, i.e. should the expected value or the market value of the guarantee be the point of departure? This question is discussed in Section 4.2. In practice, pricing guarantees is often complicated due to the uncertainty of the financial obligations under the guarantee, and the procedure to follow will vary from case to case. Section 4.3 provides a brief description of different approaches to guarantee pricing.

**Expected value vs. market value**

The expected value of a government guarantee is calculated as the present value of government payments under the guarantee times their respective probabilities. The expected value thus expresses a risk neutral valuation of the guarantee. Box 6.1 provides an illustration of the potential government obligations under a loan guarantee.

In return for issuing a guarantee, private agents require a risk premium in excess of compensation for the expected loss. This is due to the need to have capital reserves to meet the uncertainty concerning the financial obligations under the guarantee and to provide a positive rate of return (ex ante) on this buffer capital. The market value of a guarantee thus exceeds the expected value.

Valuation of government guarantees according to their expected cost provides an assessment of the (expected) fiscal burden of the guarantee portfolio. If a fee, paid by the recipient of the guarantee or funded through budget means, is set on the basis of expected costs, this should on average ensure protection of the government’s net position. This assumes a well-diversified portfolio, as the government outlays under any single guarantee may deviate substantially from its expected value; cf. Box 6.1.

However, issuing a guarantee for a fee less than its market value amounts to a state subsidy. Thus for certain guarantees the valuation principle applied to fees must be in conformity with any prevailing state-aid rules. For example, as regards guarantees of importance to the European Union’s single market, EU state aid rules require that a market-related fee be charged to the company receiving the guarantee. The principle of market-based fees ensures that competition is not distorted. In line with sound principles for the
government’s role in the economy, market-related fees should thus be the point of departure whenever government guarantees might otherwise put companies at an unequal footing.

**Box 6.1. Illustration of the risk of a loan guarantee**

Figure 6.1 below shows a hypothetical probability distribution of the net assets of a given company. Net assets are defined as the market value of the underlying assets of the company (equal to the market value of equity and debt) less the face value of debt. The face value of debt is assumed to be 100.

**Figure 6.1. Probability distribution of net assets**

If the company is profitable and net assets are positive, the creditors will receive the full amount of 100, while the excess asset value accrues to shareholders (pink part of distribution). On the other hand, if equity has become worthless, the company will only be able to service the debt in amounts equal to the liquidation value of assets, i.e. the market value of debt will fall short of the face value (blue part of distribution). In the worst case, the market value of underlying assets is zero and the company defaults on the full debt obligation of 100.

If the debt is covered by a government guarantee, the lenders will receive 100 regardless of the performance of the company, and the credit risk is transferred to the government, i.e. the potential losses in the red part of the distribution must be borne by the government. In the case of positive net assets, the government does not stand to gain apart from any fees received for issuing the guarantee if the government is not a shareholder. If the government is a shareholder, both potential losses and gains should be part of an overall risk assessment.
Application of market-related fees by the government raises the question of why the government should issue guarantees at terms identical to the private market in the first place. The reason may be that private agents are in fact not willing to provide certain guarantees, which would constitute a market failure that legitimises government intervention. Of course, in this case a market-related fee will be a hypothetical concept. Irrespective of the possibility of market failures, it is appropriate to establish the principles and the context for application of market-related fees in a budget act to prevent illicit state aid and ensure disclosure.

If state aid is not an issue, the calculation of collected or budget-funded fees needs not be based on market values. Indeed, the expected cost is the “best” assessment in average terms of the fiscal burden from the guarantee portfolio and thus provides a sensible yardstick for fiscal/budgetary planning.

It should be pointed out, however, that government guarantees are an attractive form of subsidy relative to, for example, comparable direct money transfers when expected values are applied – both from the perspective of the recipient of the subsidy and the decision makers in the government. This points to the possibility of excessive guarantee issuance, raising the risk exposure of the government, if the guarantee portfolio is not subject to prudent risk management.

For example, assume that the government issues a loan guarantee with an expected value of 100 and a market value of 120. The recipient will prefer a guarantee to a direct appropriation of 100, since the real value to the recipient of a guarantee is 120. Also, by issuing a loan guarantee the government can provide more support for a given amount of budget appropriations. The actual costs of the individual guarantee are the same irrespective of the rule used to set aside budget means. But since a given budget will permit issuance of more guarantees under expected cost pricing, the government may end up with more guarantees and higher risks in its overall balance sheet in this case.
Given the size of government balance sheets, risk neutrality may apply to the assessment of any single guarantee. However, depending on the magnitude of risk in the overall guarantee portfolio, and the risk tolerance in general, it might be appropriate for the government to set a mark-up on the expected costs to protect against unexpected outcomes even if state aid is not a concern.

**Pricing methods**

Pricing government guarantees requires an assessment of the contingencies where the asset value of the guaranteed company will fall short of the government guaranteed obligations. A number of factors thus may come into play, including project or company specific risks, the course of the general macro economy, the initial equity/debt ratio, and the actions of the management. In some cases relevant information may be readily available. In other cases a fundamental analysis of the risk characteristics of the guarantee may be required.

**Implicit guarantee pricing**

Bond prices reflect the credit risk of the borrower. If the potential recipient of a guarantee has issued actively traded bonds, the bond price thus contains information on the value of a guarantee.

If the government issues a guarantee, the guaranteed debt should trade at a price equivalent to risk-free bonds. Therefore, the implicit market value of a guarantee can be calculated as the difference between the market value of a risk-free government bond and the market value of bonds issued by the potential recipient of the guarantee. A larger credit risk decreases the bond price and increases the value of the guarantee.

If the potential recipient of the guarantee has not issued traded bonds, bond price information from comparable companies may serve as a substitute. Similarly, if it is possible to attach a specific rating to the recipient, the yield spread of that rating category to government bonds could be used to price the guarantee.

This implicit valuation methodology provides the market value of the guarantee and can be used to set market-related fees. The market value comprises the expected or risk-neutral value of the guarantee. But in addition, it will most likely include a risk premium, which reflects the market's required premium for being exposed to unexpected contingencies. If fees are set on the basis of the expected value of the guarantee, it is therefore necessary to estimate the size of the risk premium and subtract this amount from the market-related fee.
It is possible to obtain estimates of the risk premium attached to various rating categories. Different rating agencies compile historical default and recovery rates, which can be used to obtain an (historical) estimate of the expected loss on rated issues. By comparing this information to the actual yield spread, comprising both the expected loss and the risk premium, it is thus possible to infer the estimated size of the risk premium. This may serve as a reference for fixing the market value of a guarantee on the basis of the expected value and vice versa.

Option models

Information needed to apply the implicit guarantee pricing approach may not be readily available. In that case, it may be necessary to apply more fundamental methods, trying to price the guarantee directly. One possibility is to use an option model.

Issuing a guarantee is like issuing a put option. A put option entitles but does not oblige the holder of the option to sell a particular asset at a price agreed in advance. A government guarantee can thus be compared to a put option because it effectively gives the lender the right to sell the loan at par value to the government if the lender so desires. The lender will choose to exercise this option if the guaranteed company is unable to service its debt, in which case the market value of the debt is below par. To the lender, the value of a put option thus equals the value of a government guarantee.

A key assumption when applying option-pricing models is the distributional assumption on the development in the underlying assets of the company. As illustrated in Figure 6.1 in Box 1, the distribution of possible negative net asset values is key for assessing the value of the guarantee, because the guarantee will be invoked when net assets are negative. Increasing volatility of the asset value of the company increases the probability of negative net assets thus increasing the value of the guarantee.

An advantage of applying option models is that they provide analytical solutions. The availability of analytical solutions, however, rests on somewhat restrictive model assumptions, that may not be applicable to specific guarantees. Furthermore, lack of suitable data may in practice impede the use of the option valuation approach. For example, obtaining accurate measures of the volatility of the value of the guaranteed project is often hard, unless the guarantee is given to a company with publicly traded shares.

Simulation models

A third approach is to build a simulation model. This method is fundamentally similar to option pricing. The purpose of a guarantee simulation model is to generate a distribution of losses from the guarantee to
the government. This distribution can be used to calculate the expected cost of the guarantee and to calculate risk measures compiled as the maximum loss that will occur with a given probability.

Building a simulation model applied to guarantees requires a specification of the processes that determine the evolution of the asset value of the guaranteed company. A simulation model can be designed to take many considerations into account compared with the more restrictive assumptions of option models. In this sense the simulation approach is more flexible but also more demanding.

Many debt management offices are well acquainted with simulation methodologies applied to risk analyses of regular debt. These stochastic simulation models are used to generate distributions of future interest costs on the government debt. A main risk factor to be simulated is thus the future course of interest rates.

Correspondingly, an analysis of the distribution of guarantee losses can be carried out by identifying the relevant risk factors underlying the guarantee and simulate their evolution. For example, if the government issues a guarantee on the funding of a bridge construction company, which earns revenues from user fees, future traffic scenarios will be a main risk factor when evaluating the guarantee. If the government guarantees mortgage loans, the future development in real estate prices will be a key risk factor, and so on.

**Conclusions**

Issuing guarantees for a fee less than its market value amounts to a state subsidy. For certain guarantees the valuation principle applied to fees must therefore be in conformity with any prevailing state aid rules. If state aid is not an issue, the calculation of collected or budget-funded fees need not be based on market values. Applying fees based on the expected cost of the guarantee should on average ensure protection of the government’s net position. This, however, assumes a well-diversified guarantee portfolio, as the uncertainty of government outlays under any single guarantee may be substantial.

Different quantitative methods can be applied to price guarantees. If the operations of the potential recipient of a guarantee are well established or comparable to other companies, readily available market information may exist from which the credit risk can be inferred. If the operations have a unique character, and such information does not exist, it may be necessary to apply a more fundamental analysis, e.g. simulation models. Quantitative approaches, preferably several different ones, can help the decision maker understand the risks and contingencies involved. In practice, however, considering the special nature of many projects guaranteed by the
government, guarantee pricing also has to be influenced by qualitative judgments.

Finally, note that the fact that it may be hard to set appropriate fees is not a valid argument against charging fees for government guarantees. A fee equal to zero would almost certainly be less likely to achieve the objectives of an efficient governance system than a fee derived from a careful analysis of the expected costs and risks involved.

V. The role of debt managers in the issuance and management of guarantees

Introduction

The discussion so far has dealt mainly with principles for how a sound governance system for government guarantees can be structured. We now come to questions concerning institutional arrangements for guarantee management and, in particular, what debt managers can and should do regarding management of guarantees.

A starting point is that it is not the role of debt managers to decide what guarantees the government should issue or what guarantee programs it should run. This follows from the observation that a guarantee is a contingent expenditure. Debt managers are not involved in such decisions. Their role is to manage the stock of debt that results from decisions on expenditures (and taxes) as efficiently as possible. A key question here is whether a similar role can be found in the area of contingent debt management. To approach that question it is useful to distinguish between overall risk management involving guarantees, on the one hand, and the actual issuance of guarantees (subject to decisions on the political level), on the other.

Management of risks in conventional and contingent debt

Guarantees constitute contingent liabilities, which economically means that they are potential public debt. The government commits itself to take over the liabilities that are subject to its guarantee in certain circumstances. This means that there is a positive probability that the contingent debt will turn into an unconditional one, i.e. that it will be transformed into an unconditional obligation to bear the cost of servicing the guaranteed debt. This makes contingent debt management a part of public debt management in a broader sense. If a guarantee has to be honoured, the liability becomes the state’s responsibility and needs to be financed just like other borrowing needs. Cost and risk management is crucial in both government guarantee management and government debt management and they need to be combined so as to give a coherent picture and ensure efficient decisions on how to handle the overall risks in the government’s balance sheet.
One difference between contingent and conventional public debt lies in the uncertainty whether servicing the liability becomes the responsibility of the state. The uncertainty, however, can be assessed and expressed in quantitative terms and therefore managed. Even if assessing the risk connected with a particular guarantee can be hard, it can be estimated. Moreover, the estimates tend to become more accurate on the portfolio level, provided that the portfolio is diversified.

At the operative level, guarantees have an impact on cash flows in the state budget when executed, as the resulting liabilities require new borrowing, which increases the debt and increase debt-servicing costs. This justifies coordination with state liquidity management and borrowing. The information provided should contain forecasts of anticipated flows under guarantees, and be updated as soon as new information is available. This enables the authorities on the liquidity and debt management side to respond efficiently in case of execution of a guarantee. The very same coordination with liquidity management is required in the case of conventional debt. In many countries, the solution to this coordination problem is to make the debt management entity also responsible for liquidity management.

Integration of conventional and contingent debt management is warranted also for more strategic reasons. As emphasised above, both types of debt are ultimately claims on the same balance sheet and have to be serviced with funds from the same source. This calls for defining measures of cost and risks that encompass both the guarantee portfolio and the regular debt portfolio and setting quantitative targets for them. This allows integration of risk management at the central level, where information about the government's fiscal position is most readily available.

However, guarantees are usually closely tied to a specific project and therefore relatively inflexible. It is often impossible for the government to sell a guarantee to a third party. And a decision to recall a guarantee can harm the guaranteed entity and undo the original purpose of the guarantee. Conventional debt instruments, on the other hand, can be managed flexibly. To gradually change the risk level, debt managers can simply modify their issuance strategy. To affect the debt composition in the short run, outstanding instruments can be bought back using funds raised from instruments with different risk characteristics. Or the government’s risk position can be adjusted using standard financial derivatives. It is thus the conventional debt side that would play a key role in adjusting the overall debt structure to the desired position. For this very reason, it is essential that both parts of the debt portfolio are considered in the risk management process.

Such integration of decisions on conventional and guaranteed debt in turn makes it reasonable to set a single institution responsible for both parts
of the debt portfolio, possibly in a separate agency. The agency should work within guidelines covering the whole debt portfolio set by the Government. The justification for taking such decisions at the political level is that strategic decisions on the risk level may affect taxpayers in a significant way. The powers delegated to the agency should be related to the instruments to use to achieve an overall debt position, in line with the risk preferences expressed at the political level, as efficiently as possible.

In such an organisational set up, debt managers should also be responsible for providing information on the expected costs and risks of the guarantee portfolio. The information should be made available to the general public in basically the same way that reports on the conventional debt are published.

**Debt managers as issuers of guarantees**

The preceding discussion identified a role for debt managers as the government’s debt portfolio managers at the overall level. The next question is what role, if any, debt managers should have regarding the actual issuance of guarantees, involving decisions on matters such as the fee to charge for individual guarantees and the detailed financial and legal format of the guarantee. Here several aspects come into play.

First, issuance of conventional debt and issuance of guarantees require similar financial and legal expertise. Concentrating both in one agency may thus make better use of limited resources in the form of staff, information systems, etc.

Second, it is important that decisions on fees are based on careful analyses. Preferably, fees should be set by an entity that is not directly involved in the projects receiving the guarantees. This helps to avoid temptations to set fees too low to economise on budget funds or to increase the real value of the subsidy. Separation between decisions on what guarantees to issue (or what guarantee programs to have) and what fees to charge for those guarantees improves transparency and accountability.

For major individual guarantees, debt managers may have a useful role to play in this regard. Debt managers tend to have a broad perspective on government finances and may thus be expected to make unbiased assessments of the costs and risks. A side effect is that in this way the debt managers get an understanding of the risks involved in major guarantees, helping them provide the necessary assessments of the status of the overall debt portfolio at each point in time. Their general financial and economic expertise may also be helpful in making the analyses necessary to determine an appropriate fee. On the other hand, credit and project evaluation, key aspects in guarantee pricing, are not important in conventional debt
management. To do a good job in this field, special expertise may have to be acquired.

For guarantees issued within programs authorised by the parliament and involving many borrowers additional aspects should be considered. The program should have clearly stated objectives and a set of rules or a code of conduct for granting specific types of guarantees. This provides the framework in which the unit responsible for issuance of the guarantees operates. It will have to assess particular ventures in relation to the criteria for eligibility to the program and evaluate the financial and real risks to set appropriate fees. The latter requires expertise on assessing credit risks, an activity similar to credit decisions in commercial lending institutions.

Assessment of credit risks of large numbers of borrowers is an activity that has limited similarities to conventional debt management. It is thus not obvious that debt managers should be issuers of guarantees within the central government. An argument analogous to the administrative efficiency aspect noted in Section 2 comes into play. It may be more efficient to make one or several separate agencies responsible for issuance of program guarantees to allow for specialisation. These agencies could then be instructed to report to the debt management agency about the status of their guarantee portfolios. Debt managers could then take the expected costs and risks of all government guarantees into account in its overall risk assessment, without having to get involved in the detailed management of the guarantee programs.

An intermediate solution is also possible. Specialised guarantee agencies can be instructed to consult debt managers on financial and legal matters, including the evaluation of the financial risks in a guarantee and how they should be reflected in the fee. This enables the government to make efficient use of scarce financial expertise, without having to involve debt managers in the analysis of other risk elements in the guarantee or the administration.

The distinction between major individual guarantees and guarantee programs involving large numbers of guarantees is not clear-cut. Neither is it obvious at what point specialisation in credit risk assessment becomes important enough to justify creation of entities separate from debt management agencies. The case for involving debt managers in guarantee issuance is thus ambiguous.

The same applies to programs involving lending with credit risk, as the costs and risks this generates are similar to guarantees. Also in this case it is possible to see two clear alternatives. Either the debt managers engage in on lending directly or they provide funds through regular government borrowing to specialised agencies that extend the loans.

However, note that even if several agencies are allowed to issue guarantees (or lend with credit risk), it should be the responsibility of debt
managers to take (or initiate, to the extent that the Government needs to be involved) measures to manage risks. Changes in the risks in a certain guarantee portfolio may be significant when seen from the point of view of the agency in charge of a particular program. This may lead to costly attempts to reinsure parts of the portfolio. However, these risks may be small when seen from the perspective of the government as a whole, making reinsurance unnecessary. Or there may be more efficient methods to modify the total risk position of the government available to debt managers since they can use a broader array of instruments. Decentralisation of guarantee issuance should therefore not be combined with decentralisation of risk management.

**Conclusions**

Debt managers have a key role in risk management involving guarantees, as contingent debt is effectively a latent form of government debt. This calls for defining measures of cost and risks that encompass both the guarantee portfolio and the regular debt portfolio and setting quantitative targets for them. Debt managers are well positioned to take on this responsibility. This allows integration of risk management at the central level, where information about the government’s fiscal position is most readily available. The conventional debt side would play a key role in adjusting the overall debt structure to the desired position, not least due to the flexibility of financial derivatives. This makes it all the more important that both parts of the debt portfolio are considered in the risk management process and that risk management is centralised. Centralisation also allows for efficient use of expertise in risk management.

The case for involving debt managers in issuance of guarantees is more mixed. They have advantages from their general financial and economic expertise, and they are likely to have the appropriate perspective on guarantee pricing. However, credit and project evaluation, key aspects in guarantee pricing, are not important parts of conventional debt management. Guarantee programs involving a large number of borrowers may also involve administrative burdens that have few similarities to conventional debt management.

The main conclusion is thus that it is essential to have a central risk management function, responsible for the entire government debt portfolio. Of course, it is also essential to have appropriate rules and guidelines for guarantee issuance, including clear principles for how guarantees are to be priced. These are key functions in a well-designed system for guarantee management. The specific institutional setups in which these functions are executed are of secondary importance. Solutions may vary depending on the nature of the guarantees that are being issued and the institutional traditions of individual countries.
VI. Concluding comments

Governments frequently use explicit contingent debts, for example, in the form of guarantees. In the report, we identify sound reasons to do so. But we also point to the risk that guarantees are used for unsound reasons; for example, because they are given less transparent treatment in budgets and debt reporting than regular expenditures and on lending.

Our analysis identifies a set of best practices. They serve as key requirements of a governance system that encourages use of guarantees to solve problems that cannot be solved more efficiently using other instruments:

- Guarantees are contingent expenditure decisions and should be treated analogously to regular expenditure decisions in the budget process.
- Fees corresponding to at least the expected cost of each guarantee should be charged for all government guarantees. The fee should be paid either by the recipient of the guarantee or by budget funds, so as to ensure that guarantees are in line with sound principles on state aid and are fully accounted for in the state budget. If the recipient of the guarantee is a commercial enterprise, the fee should correspond to the market value of the guarantee to prevent competitive distortions.
- Fees should be used to build up actual or notional reserve funds so that the government has resources to cover future losses.
- Fees should be set based on careful analyses, preferably made by entities not directly involved in the decision to issue the guarantees. Debt managers are candidates for this task.
- Guarantees should be reported consistently based on their expected cost and in a way that gives a complete picture of the government's total debt position.

We also conclude that debt managers have a key role in risk management involving guarantees, as contingent debt is effectively a latent form of government debt. This calls for defining measures of cost and risks that encompass both the guarantee portfolio and the regular debt portfolio. Debt managers are well positioned to manage this joint portfolio, using their expertise in financial risk management and access to flexible financial instruments, including derivatives.

Notes

1. The risk-sharing argument may also affect the behaviour of the guarantor. For example, banks funding infrastructure projects often require credit guarantees from the government. This can be seen as a means to ensure that the government acts in a way that does not undermine the success of the project. Again, similar
effects can often be achieved by requiring that the government takes part in the financing of the project.

2. However, note that there are also examples of direct lending schemes in circumstances where guarantees could be expected to work at least as well.

3. The same applies to on-lending programs.

4. Reform may be under way. The international Task Force on Harmonization of Public Sector Accounting works at enhancing the harmonization between statistical guidelines and accounting standards, and at updating statistical guidelines for the public sector, including the System of National Accounts 1993. The task force includes national statisticians and public sector accountants, and international agencies (including the OECD). Using expected present value as the overriding principle for valuation of guarantees, as suggested here, is among the proposals, but other methods are also discussed. For information on the discussions, see documents published on www.imf.org/external/np/sta/tfhpsa/.

5. The parallels between guarantees and on lending emphasised above imply that the principles and methods for valuation discussed in this section should be applied also to on lending. In this case, a fee translates into a risk premium to be added to the government's own funding cost when setting the interest rate on the loan. The premium should be covered by the borrower or, if the loan is to be subsidised, by budget funds.

6. Apart from differences in credit risk, the difference between the market value of the bonds may, however, also reflect differences in liquidity. It should also be noticed that this implicit pricing method presupposes that the value of the bonds of the company is not already affected by expectations in the market of a future government guarantee.

7. Future developments in the markets for credit derivatives may allow credit risks to be modified in similar ways, but governments often guarantee projects with peculiar risk characteristics, making them costly to reinsure in private financial markets.
PART III

PART III

Chapter 7

Risk Management of Government Debt in Austria*

by

Paul A. Kocher and Gerald Nebenführ

* Paul A. Kocher (Managing Director) and Gerald Nebenführ (Controller). Cut-off date of manuscript is February 2005.
I. Introduction and framework

The principal objective of public debt management is the minimisation of costs subject to a given level of risk. Costs are measured overall as the total costs (interest payments plus/minus the change in Net Present Value – NPV), whereas the contributing interest payments are also reported and evaluated separately in the risk management framework.

The Austrian Federal Financing Agency (AFFA), incorporated as a limited company, is owned by the Republic of Austria. The agency has a supervisory board (board of directors) that approves the main limits and guidelines for debt and risk management. There are two managing directors who report monthly on financing policy (and related topics) as well as on measures of risk. Normally there are also quarterly meetings with the supervisory board. The responsibilities for risk management (a middle office function) and for front office operations are divided between the two managing directors.

Risk management doesn’t mean that all the risk have to be minimized. Risk management has to define procedures that would prevent (with high probability) financial losses having a disastrous or major impact on the financial solidity (or reputation) of the client in question (in this case the Republic of Austria). A management approach without taking any risk is only possible in theory and would (again in theory) result in infinite costs. Risk management is about balancing risks versus costs in a prudent and controlled manner.

II. Overall risks and risk management

The main risks in the debt portfolio are market price risk and credit risk. Risk is defined as an unexpected loss or a negative deviation from a planned (financial) path. The two essential strategic parameters when managing the debt in the portfolio management are duration and currency composition. Whereas general capital market policy and the selection of the financial market intermediaries are also essential for debt management, their direct influence on the performance of the portfolio is limited. Nonetheless, when derivatives are used, the financial soundness of counterparties (usually banks) is essential for the proper management of credit risk (see below).
III. Market risk – currency and interest rate risk

Currency risk

Since the 1970s, the Austrian state borrows in foreign currency. Before the entry into the euro-zone, foreign markets had to be tapped due to the limited capacity of the domestic market. Now, Austrian bonds can be sold in the common (euro) currency area and as a small sovereign borrower Austria’s financial transactions have only a limited impact on the European capital market. Therefore the continued use of foreign currency markets is based on arguments related to expected cost effectiveness. When we issue in foreign currency and subsequently swap the resulting exposure into euros, currency risk is replaced by credit risk associated with the cross currency swap. (The financial soundness of swap counterparties is therefore essential.)

Not all currency risk is swapped away. After our swap operations, 12 per cent of the total debt is still denominated in foreign currency, whereas the quota of the Swiss Franc currently is a little bit larger than the quota of the Japanese Yen. Obviously the speculative element of that business strategy is that we expect in the long term that the appreciation of the currency will be less than the savings in interest payments. Internal calculations show that until year end 2003, the accumulated cost savings are around 3 per cent of GDP on a net basis (after deducting appreciation losses). That means that the Austrian federal debt would have been higher by 3 per cent of GDP if debt management had used solely domestic currency instruments.

Although foreign currency financing has been quite successful in the past, we have defined prudent restrictions for carrying out this risky business. The risk is due to the appreciation of the foreign currency, because it increases the value of the Austrian debt portfolio and makes the interest payments on foreign currency debt more expensive. Whereas we normally impose limitations on foreign currency operations in terms of quotas of the total debt, the underlying risk is controlled in a more advanced way. The objective was to define a single number that would give a quantitative indication of the expected loss due to exchange rate movements. So we decided to adopt the Value at Risk concept for our portfolio by defining our exchange rate risk as the maximum expected loss over the next 12 months at a level of confidence of 95 per cent. This loss limit is linked to GDP, with our foreign currency position currently having a Currency Value at Risk number of not more than 1.2 per cent of GDP.

When this limit is reached, the forex position is not allowed to increase any further. At the same time it is stated that it may not be sensible to close positions with unrealised losses when the increase in the Value at Risk is due to a currency appreciation. In that situation further steps will have to be discussed with the supervisory board. In addition to exchange rate
movements, the Currency Value at Risk numbers are also influenced by volatilities, correlations and the amounts of foreign currency.

**Interest rate risk I (Interest Costs at Risk)**

The importance of the risk of rising interest costs stems from the fact that variations in interest expenses directly affect the federal budget balance and, as a result, can severely restrict the flexibility of fiscal policy, especially since the Republic of Austria has committed itself to stay within the deficit limit of the growth and stability pact of the European Union.

We have developed a fairly complex model to address the information needs of those responsible for the budget in the ministry of finance. In this model, interest costs are defined in accordance with Austrian accounting rules so that we can calculate the federal budget balance. Our model provides:

- an estimate of future interest costs under different economic scenarios, as well as
- the determination of the amount of interest costs that will not be exceeded with a certain probability (Interest Costs at Risk).

Interest costs are driven by three major factors:

1. The future path of primary budget balances.
2. The refinancing and portfolio management strategy.
3. Rates and prices in financial market.

The first factor is updated once a month in accordance with the projections made by the ministry of finance. The second factor is defined by...
AFFA and is only changed within the model if there is a fundamental shift in AFFA’s strategy. In order to generate projections of future financial market rates and prices, two financial market scenarios and a range of scenarios for determining statistical risk estimates are run. The two scenarios are the forward scenario and the steady state scenario. Steady state is defined as freezing all rates at their current levels for the entire time horizon of the analysis. Monte Carlo procedures are used to generate 1 000 possible future paths of rates and prices. The results of this set of future paths is used to determine statistically the total amount of interest costs that will not be exceeded in a certain period (a fiscal year) and confidence interval (95 per cent).

These three scenarios are computed at least once a month. For each computed scenario path (forward, steady state, risk) we look eight years into the future. This period was chosen because it represents two full legislative periods. In near future, the risk model will be enhanced to provide more flexibility in setting the refinancing and portfolio management strategy.²

**Interest rate risk II: (Value at Risk)**

The Value of Risk (VAR) of the entire position is perhaps of less direct concern for decision makers than interest costs at risk because the immediate political consequences are less visible. Nonetheless, from an economic point of view the VAR of the entire portfolio is an important number. An increase in the value of the debt portfolio reflects an increase in the future burden for taxpayers or it may boost the cost of switches or buybacks. Consequently, Value at Risk is calculated at least once a month as a fixed part of our monthly reporting routine.

![Figure 7.2. Interest expense 2004-2011](image)
In order to account for non-linear exposures related to a number of structured bonds, we decided to use a Monte Carlo simulation methodology instead of the simpler analytical methods for computing Value at Risk. We employ the same stochastic paths as was used for estimating interest rate risk. Once a month, the simulator generates a set of 1,000 stochastic paths which are then used for different risk management applications (market and credit risk), giving us a coherent picture of our risk profile.

For the monthly reports we set the time horizon to one year because we are more interested in longer-term effects. This fairly long VAR horizon is another reason why we prefer a simulation approach over an analytical model. However, this time feature also makes the assumption that the portfolio is not changing between now and the VAR horizon, quite questionable.3

A future enhancement of the model could be to have quick marginal and incremental analyses available, similar to correspondent functions of the long-term credit risk analysis tool (see below).

IV. Credit risk

We divide our Credit Risk framework into risk with a term of up to one year and long term risk with a term of more than one year. Short term risk is mainly caused by investments on money markets and the use of short term derivative instruments (e.g. forwards for our treasury bills in USD). Short term risk is relatively simple to control because on the one hand the time horizon is quite short and so we are not very concerned about possible downgrades and on the other hand the invested amounts are quite stable. This is completely different for the long term business, which are mainly swaps. First, the value

Figure 7.3. Value at Risk
of swaps can fluctuate significantly. Second, the credit standing of a financial partner can deteriorate significantly over the years.

**Short term risk**

During the year, a quite stable amount of cash is invested in the national and international money markets. These investments are restricted by the limits set by the supervisory board, with either individual limits for specific banks or general limits for potential partners in the commercial paper market. When Austrian Treasury Bills in a foreign currency are issued, we often hedge the short term forex risk by using a forward. As a result, the potential value of such a forward reduces the available limit of the counterparty in question. The reporting is done on a monthly basis and is controlled automatically by the treasury software. This means that the treasury trader has to check simultaneously whether or not the limit has been reached before negotiating with a counterparty bank.

**Long term risk**

The swap portfolio is the main source of long term credit risk created by debt management. In the second half of the 1990s, AFFA began to pay more attention to this type of risk, as it became clear that credit risk arising from swaps can lead to substantial losses. Fortunately we were never forced to realise losses caused by defaulted derivative partners. Nevertheless, in 2000 AFFA’s supervisory board imposed new guidelines for managing credit risk.

The guidelines distinguish the following three types of exposure:

- **Current Exposure.**
  
  This is the exposure on the valuation date. It is either the current non-negative value of the transaction or zero (i.e. when the value of the transaction is not positive).

- **Potential Exposure:**
  
  Current exposure is determined by market factors. These market factors change and therefore also the exposure. Potential exposure shows the maximum value exposure can reach on a certain date in the future with a well-defined probability.

- **Peak Exposure:**
  
  To obtain a full credit risk profile of the counterparty, the highest Potential Exposure over the whole lifetime of all long term transactions with the counterparty is calculated. This is called “Peak Exposure”. This risk measure forms the basis for all long term credit limits.
Peak exposures are calculated by generating the standard set of stochastic paths using Monte Carlo procedure. The exact methodology for determining peak exposures is dependent on the existence of a legally enforceable close-out netting agreement with a particular counter-party, or, even better, on the existence of a collateral agreement between AFFA and that counterparty. Both close-out netting and collateral agreements lower credit risk and are therefore taken into account in our credit risk management system by lowering peak exposures, but leaving the credit limits of the counterparties unchanged.

The guidelines establish two layers with credit limits. First, there is a limit for each individual counterparty, and second, there is also a limit for certain groups of counterparties. For individual counterparties, peak exposure and time to maturity have limits. For groups of counterparties, the guidelines limit the share of each group of counterparty in the sum of all counterparties’ peak exposure.⁴

When setting individual limits, we start with a maximum limit and then make deductions for smaller counterparties and for those with lower creditworthiness. The size of each deduction should reflect the credit risk which we assume can be estimated by taking counterparties’ ratings from Moody’s and Standard & Poor’s and by using shareholders’ equity as a measure of size. This means that large counterparties with high credit ratings will get the full limit, while the others receive lower limits. Front office dealers are required to check these limits before they enter into a swap. Determining the counterparty’s new peak exposure (that is, including the new swap) is a non-
trivial calculation because it depends not only on the characteristics of the new swap, but also on those of all the other swaps with that counterparty in the portfolio. A new swap can either increase the peak exposure, when it is positively correlated with the other swaps, or decrease the peak exposure when it is negatively correlated. A proper risk analysis would require to run the 1 000 simulation paths of the long term exposure analysis involving the whole portfolio of swaps with that counter-party in question. This could take hours if it is an important counterparty with many swaps in our books. Therefore, for intra-day business, we use a quicker approximation procedure and recalculate the whole portfolio overnight in the proper way. If the calculation shows that the actual use of the credit limit for a particular counterparty is low, then the approximation will not create a serious problem. But more caution must be exercised when actual use is close to the limit.

V. Final remarks

This article provides an overview of the Austrian statistical modelling approach for handling market and credit risks. Statistical models are not used for the control of operational risk (including legal risks) and liquidity risks. These risks are managed by using guidelines.

The focus was mainly on the methodology for measuring and managing risks. Much less attention was paid to the overall management system for limiting risks. The reason for this is the specific (idiosyncratic) nature of any suitable risk limit system. A suitable system requires not only an advanced software but is also very much dependent on the communication skills and to what extent senior management takes responsibility for the entire system for controlling risks. Clearly, it is senior management that has to approve and bear the responsibility for the soundness of the overall risk management system.

Notes

1. The effect of a possible appreciation on interest payments is included in the Interest Expense at Risk figure.

2. At present, the risk model works as follows: On each day between the start date (today) and the end date (eight years after today) the model calculates the cash balance. This cash balance starts at zero and is driven by the difference between future cash inflows and outflows. Normally, the cash balance is moving gradually more and more into the red, as our primary budget surplus is not big enough to cover both interest expense and principal repayments. When moving forward, the portfolio has to be refinanced and within the model this can be done by entering so-called long term planned transactions. These are the bonds that we are planning to issue in the coming 2-8 years. For these bonds, we define the issue date, the currency, the tenor, and whether the coupon is fixed or floating. On each issue date, the model checks the cash balance, and then issues the long term planned bond with a nominal amount equal to the negative cash balance, so that
the balance is brought back to zero. Clearly, when there is a budget deficit, a higher nominal of the planned bonds will be issued, leading to an increase in outstanding debt.

By defining the refinancing strategy in this way, we know what bond will be issued and when it will be issued, but not how much of it. This means we do not know the nominal amount because it depends on the interest rate scenario; nominal are high if we follow a high interest path and low in case of a low interest path. But even though we know the direction in which the portfolio goes as it moves forward in time, the exact structure of the model’s future portfolio is of course unknown. Already nominal currency composition is hard to track, but others drivers are (nearly) impossible to determine; for example, measures such as duration which are dependent on the market environment on that future date.

Against this backdrop we are working (together with our software supplier) on the following project in which we are expanding the features of our current model. As new input parameters we will introduce targets for both the currency composition and the duration of the portfolio. At the end of each time bucket, the model will evaluate the portfolio’s deviation from the targets and will refinance and/or swaps the portfolio in such a way that these targets are met. In this way we are increasing the realism of the model. Of course it also introduces more complexity and therefore model risk. However, provided the model is carefully tested and implemented and tested, the expanded model should increase the information value for decision makers.

3. That’s why our model features the option “allow portfolio to age”. During the modeling exercise the following steps are taken. First we choose a certain portfolio (normally including all our transactions that still have an impact as of today), load it into memory, then activate the “allow portfolio to age” option, and finally run the VaR analysis. The model jumps then to the end of the VaR horizon (one year into the future), excludes all the transactions which will mature at that time, and includes all transactions planned within the coming year.

4. For example, the limit for an A-rated counterparty may be euro 350 million. The limit for all A-rated counterparties is 10% of all counterparties’ peak exposure. So in addition to checking the compliance with the euro 350 million limit, we sum up all counterparties’ peak exposure, then sum up all A rated counterparties’ peak exposure. The ratio between the latter and the first must not exceed 10%.
PART III

Chapter 8

Risk Management of Government Debt in Belgium*

by

Jean Deboutte and Bruno Debergh

* Jean Deboutte (Director Strategy and Risk Management, Belgian Debt Agency), and Bruno Debergh (Deputy Director Strategy and Risk Management, Belgian Debt Agency).
I. Introduction and framework

Overall objectives and policy

The principal objective of government debt management in Belgium is to minimise the financial debt service cost, subject to certain constraints imposed by the management of related risks, as well as by the general objectives of budgetary and monetary policy.

The environment in which the Treasury has to achieve this goal is rather flexible, as Belgian law imposes few conditions on the use of the various funding instruments; for example, they can be issued in Belgium, abroad and denominated in any currency.

In addition, the Treasury has the mandate to undertake the following financial management operations:

● manage the daily cash balance;
● undertake all kinds of financial investments;
● exchange securities for other securities;
● buy back securities on the secondary market;
● set-up cession-retrocession transactions;
● enter into derivative transactions.

Funding instruments include fixed- and floating rate loans, treasury certificates (bills), and commercial paper. The Treasury uses the inter-bank market for its daily cash management. Index-linked debt has not yet been issued. Foreign currency issuance is limited to the commercial paper programme; it is fully hedged against foreign exchange risk, except in the case of refinancing non-hedged foreign currency debt. The medium-term objective is to reduce foreign currency exposure to zero.

Framework

The Minister of Finance has the mandate to perform the various debt management operations indicated above. He has also the competence to delegate this task to the leading civil servants of the Treasury and to the staff working in the Belgian Debt Agency (which is part of the Treasury).

The Minister of Finance is required by law to promulgate the yearly General Directives for Debt Management (after having received them as proposals by the
Strategic Committee of the Debt). These Directives contain guidelines for the structure of the debt portfolio and for the (maximum) level of related risks.

The Strategic Debt Committee takes decisions according to these Guidelines, which are then executed by the Belgian Debt Agency.

Analysis and monitoring of risks is done by the Belgian Debt Agency, where five people are responsible for risk management. Risk management staff are university graduates (usually in applied economics, mathematics, etc.); some are civil servants; others come from the private sector and are hired as employees.

Information on risks is regularly reported to the Strategic Debt Committee and to the Court of Auditors.²

II. Overall risks and risk management

Government debt risk management in a highly indebted country

With a consolidated debt-to-GDP ratio of 105.8 per cent and debt service costs amounting to 6.0 per cent of GDP in 2002, risk management of the Belgian government debt is crucial. On the one hand, the size of the debt and the high share of debt service costs in the government expenditures imply that adverse shocks such as higher interest rates have a significant impact on the budget. On the other hand, European Union rules stipulate that the Debt-to-GDP ratio has to decline at a satisfactory rate vis-à-vis the reference value of 60.0 per cent. For this reason, the Belgian Stability Programmes that are submitted to the European Authorities foresee a rapidly declining Debt-to-GDP ratio. This also means that interest- and other debt management risks (with a considerable potential impact on the budget) need to be carefully managed. These Stability Programmes serve therefore as a framework for an analysis of the various risks.

Main risks related to government debt

The Treasury monitors actively the risks related to the debt service cost (measured in accrual terms). Risks related to the outstanding debt, expressed in nominal terms, are also considered. In practice, four categories of risk are distinguished.

- Interest rate risk. Interest rate risk is the risk of a negative impact on debt service costs due to the adverse movements in market interest rates. This risk is measured in accrual terms and analysed over the short- and the medium term,

- Refinancing risk. Refinancing risk is defined as the risk of a negative impact on debt service costs due to the fact that the Belgian State may have to pay
III. Market risk

**Definition and overall policy**

The Treasury identifies two forms of market risks: interest rate risk and foreign currency risk. Simulations of debt service costs are conducted over a horizon of four or five years. This time frame coincides with the time frame of the multi-annual budget that the government puts together under the Stability Pact. Each simulation executes an issuance strategy, possibly together with the use of derivatives. It is important to note that a strategy always needs to respect the refinancing risk parameters (see below).

These simulations provide answers to such key questions as:

- What are the average annual interest expenditures of a given strategy?
- How does the Debt-to-GDP ratio evolve?
- What is the probability that a certain budgetary target will not be met and by how much?

Different strategies are compared with each other. The next step is to determine which (derivatives) strategy offers the best trade-off between expected interest expenditures and expected budgetary overshoot. The advantage of the simulation methodology is that it is easy to explain, while it provides a direct link between a certain debt management strategy and the budgetary policy of the government.

**Quantitative model for interest rate risk**

The interest rate model used by the Treasury is similar to the many financial models used to price financial instruments in general and derivatives in particular. Interest rate risk, including its appropriate level, is

---

a higher interest rate than the current market rate, in particular because of a peak in maturing debt or unexpected increase in borrowing requirements. Also this risk is measured in accrual terms and analysed over the short- and medium term.

- **Foreign currency risk.** Foreign currency risk is defined as the risk of an adverse deviation in debt service costs and/or in nominal debt (expressed in euro), due to adverse movements in exchange rates.

- **Credit risk.** Credit risk is defined as the risk to the budget as a result of a default by borrowers or counterparties in derivative transactions that fail to honour their financial obligations (redemptions, interest payments, swap payments, etc.).

The Belgian Debt Agency also manages operational risks.
determined via Monte Carlo simulations. At the heart of the simulation is an internally developed interest rate model that generates the present interest rate curve over a certain time frame. This curve is then perturbed by historical volatilities (they have been extracted from historical data by a multivariate technique called principal component analysis). Two types of shocks were found to be relevant: a parallel shift of the curve and a twisting of the curve. Other inputs into the model are economic projections of real GDP, inflation, and the primary surplus, as well as the current debt portfolio.

Interest costs and risks are measured in nominal terms. Relating them to GDP would result in a poor measure of “real” costs and risks, because GDP is held constant in the simulations. Indeed, the weakness of the current approach is that it is a pure (and very narrow) liability approach, whereby all economic important variables are frozen. Hence, the interplay of major economic factors such as inflation, real growth, budgetary policy, interest rates and debt, is currently ignored.

**Risk measures applied for assessing interest rate risk**

The interest rate profile of the debt is determined by the amount of debt maturing within a specific time frame (usually defined as one year) that has to be refunded, and by the amount of floating rate debt in the total debt portfolio. This amount, equal to the debt for which new interest rate conditions will be fixed, and divided by the total nominal debt, is called “refixing risk”. When interest rate risk is measured over the same time frame, it is almost entirely proportional to this refixing risk. Hence it is a well-behaving risk parameter, consistent with the definition of risk.

Interest rate risk is measured over the short-term (12 months) and medium-term (60 months); refixing risk is calculated over the same time frames. The current maxima for short-term- and medium-term refixing risks are 22.5 per cent and 65.0 per cent, respectively. Although these maximum percentages are communicated externally, they do not provide a direct indication of the applied strategy, which may in practice result in lower refixing risks.

Due to its sensitivity to the level of interest rates in the market, modified or effective duration are not considered useful risk measures or parameters. Instead, we calculate the “average time to refixing”; this is equal to the average time, weighted by the relative amounts of debt that will be subject to new interest rate conditions. The parameter is used internally to provide information about the overall interest rate sensitivity of the portfolio.

**Benchmarking**

The Treasury does not measure its performance with respect to a benchmark. Until now, priority has been given to determining the overall
debt strategy and related risk management policy. In addition, we have methodological doubts about using a benchmark by a debt manager. A benchmark should be objective but, in our view, it is unclear how to define an objective benchmark for debt management. In theory, such a benchmark could be established by using the economic concept of “utility”. In this case one would need, first, to measure the “utility” of the government and, second, how the government values the risks associated with managing public debt. A major difficulty is that the “natural” horizon of a government is shorter than what is necessary for managing the public debt as optimal as possible.

**Foreign currency risk**

The amount of unhedged foreign currency exposure has diminished strongly in recent years. The Treasury plans to eliminate all this exposure in the coming years; the increased risk from foreign currency exposure outweighs potential cost savings.

**IV. Rollover (refinancing) risk and liquidity risk**

**The importance of refinancing risk**

Management of the refinancing risk is considered to be very important, as Belgium’s high debt-to-GDP ratio could lead to a situation where funding requirements are considered by investors as being (too) high in relation to GDP. This could increase the cost of lending, and, in extreme cases, it could even lead to a situation in which it is completely impossible to obtain the required funding.

**Management of refinancing risk**

The Risk Management Department of the Belgian Debt Agency has never tried to quantify refinancing risk. Refinancing risk follows from the situation that the Kingdom of Belgium may have to pay interest rates above the “normal” market rate, in particular as a result of a peak in maturing debt or of an unexpected rise in borrowing requirements.

However, there are no indications of a likely increase in contractual interest rates relative to “normal” market interest rates. In our judgement Belgium’s current maturity schedule is of no great concern to investors or rating agencies. Conservative risk management would therefore require that in the future the yearly funding needs should not exceed current borrowing requirements by a too wide margin. The measures to control refinancing risk are straightforward. Debt coming to maturity within the 12 and 60 months periods is related to the total outstanding debt. The resulting percentages are not allowed to exceed the relevant stipulated maximum (22.5 per cent for 12 months, 60.0 per cent for 60 months).
Conceptually it would be better to measure the maturing debt relative to GDP. However, a measure based solely on the debt portfolio is easier to use. However, the debt-to-GDP ratio obviously plays an important role in the overall analysis. One important perspective is that an expected rapid decline of this ratio would normally lead to less stringent maximum percentages for refinancing in the future.

V. Credit risk

**Definition and origination of credit risk**

When credit risk materialises, the resulting default entails unexpected budgetary outlays. Consequently, deposits and lending operations are a source of credit risk. Derivative products are a second important source, since recreating an original transaction with a new counterparty (as a result of the bankruptcy of the original counterparty) will be done at extra cost (but this operation will only be carried out when the market value of the original transaction is positive for the Treasury).

**Overall policy and management**

There are a number of requirements that have to be met in order to qualify as a counterparty in debt management operations. For instance, counterparties have to sign an ISDA-agreement before entering into derivative transactions. These agreements have recently been renegotiated and, to a great extent, standardised. Maximum credit exposures per counterparty are set according to their financial health and resilience. The Treasury has not required the posting of collateral up to now, given the uncertainties related to the (legal) validity of close-out netting in cross-border transactions. The implementation of the 2002/47/EU guideline in the different countries of the European Union should resolve most of these problems. This may prompt the Treasury to change its position on the posting of collateral in the future (see Section VII).

**Methods for measuring credit risk**

For each transaction, the credit (risk) exposure to a counter-party is calculated as follows:

- 100 per cent of the nominal amount for a deposit, with an add-on factor in case of a deposit in foreign currencies;
- the MTM for a derivative transaction, increased by an add-on factor representing the possible future evolution of the derivative's market value.

These add-on factors depend on the type of transaction and on their maturity. In general, positive and negative exposures are not netted out with
each other. The total exposure for transactions with a particular counter-party is then compared to the maximum exposure for that (type of) counter-party. The calculation of the maximum exposure is based on the credit rating of that counterparty (which must in any case be minimum A-/A3/A-; the lowest rating of the three rating agencies prevailing), and on its equity position.

The present methodology is to a large extent very much an ad-hoc one. The add-on factors are supposed to give a reliable indication of how the current credit (risk) exposure with a particular counterparty could evolve. But the current methodology has some deficiencies. First, a time-frame in which credit risk could unfold is missing. Second, it is not clear whether the exposure is simply a snapshot at a specific point in time, an average, or a maximum credit exposure. Third, no assessment is made of the probability of default (PD) of the counter-party. These 3 deficiencies make it hard to have a reliable notion about the actual credit risk exposure of the Treasury. In more advanced credit risk management systems it should be possible to grade each credit risk and compare the exposures of the various counterparties (see section VII).

VI. Operational risk

Operational risks related to the management of government debt

The implementation of strategic decisions as well as the daily operations of the agency, are organised by the directors of the agency. They are supervised by senior representatives of the Treasury participating in the daily management meetings of the agency.

The operational processes of the agency are similar to those of a financial markets operator (with a front-, back- and middle offices structure), those of a debt issuer (that is, a team maintaining the relations with a pool of primary dealers, a product and market development unit, and a legal office). The internal control structure is organised accordingly.

Definition of operational market risk

Operational risks are defined as potential losses arising from various sources: human, systems, facilities, processes and procedures (the so-called four risk drivers). Losses from market operations can be financial (erroneous transfers, delay interests), administrative (legal weaknesses, unconfirmed trading over the phone), or harm to the Treasury’s reputation.

The frequency of treasury and debt management operations is very low, but each transaction is likely to be a high-value one. Transactions are often concluded in rather informal ways (e.g. phone trading by the front office) but the datawarehousing systems and tools for analysis can be quite complex, especially when the diversity of traded products increases.
**Importance of operational risk**

The low frequency of our transactions has thus far been the reason why we have not given a high priority to the development of a mathematical and financial risk model. Financial losses as well as irregular trading conditions or positions are usually discovered in a traditional way (i.e. individually and/or by traditional investigation procedures). Automated processing and datawarehousing, as well as the use of electronic databases for analysis purposes, are fairly recent and the employment of these systems is still evolving. Both automated and manual controls have been set-up (e.g. for the detection of unusual patterns).

**Organisational structure and procedures for controlling operational risk**

Senior management is well aware of the operational risks outlined above, and, in view of the small size of the debt agency (about 40 persons), in the position to follow closely the various transactions and its operational context on a daily basis. When needed, an independent investigation will be undertaken by the internal auditor.

Operational risk management is not organised as a line function. Instead, an internal auditor acts as an independent evaluator of operational risk (on behalf of senior management) and as an inspector of line managers. The risk control structure is similar to the one of a standard financial institution operating in financial markets; that is, the control structure is based on the rules and best practices of the financial sector (e.g. ECI, ISDA, IBRD, and CBFA – the Belgian financial sector watchdog). In addition, the general control structure of the agency increasingly integrates the widely spread generic control frameworks such as COSO, COBIT and IIA. It should also be noted that the Federal public authorities are currently encouraging the implementation of sound internal control practices for public agencies in general; also this development strengthens the operating environment of the debt agency.

In addition to the assurance of optimal funding conditions, the provision of funds to the government on a continuous basis is also an important strategic objective of the debt agency. For this reason, business continuity planning is a main issue of concern, focused on the proper organisation of the availability of data and systems. Also a physically remote recovery center is being maintained.

**VII. Future programme of work**

In addition to the management of contingency risk and the development of a more formalised approach for operational risk, the following three major issues are part of the future programme of work.
**Interest rate risk in an ALM-framework**

The Treasury will investigate whether it is useful to use a structural model with relationships between economic growth, interest rates, inflation and government budget, for the minimisation of the expected debt service cost, subject to a maximum boundary for budget volatility (instead of a maximum boundary for debt service cost volatility). This model would also give some guidance to which extent inflation-linked exposure would be useful.

**Measurement of credit risk**

The current approach will be changed to bring the current best practices into line with those used in the market and as suggested in the new draft Basel II Capital Accord. The general objective is to determine how the credit exposure with a specific counterparty will evolve over time, at what point in time the exposure reaches a maximum, and to calculate the loss-given-default (LGD). This new approach would be based on an interest rate model which generates interest rate curves over the required horizon (using either market- or historical volatilities), and which incorporates PDs (again either derived from historical series or market sources) necessary to calculate the LGD.

**The use of collateral in debt management**

New legislation will improve the validity of the use of close-out netting agreements and the enforceability of collateral agreements. It will therefore be interesting to examine the usefulness of collateral in debt management operations.

**Notes**

1. At the beginning of each year, the King determines formally the general framework for issuing public debt. Within this framework, he can then give the Minister of Finance the mandate to issue debt on behalf of the Kingdom of Belgium.

2. The Parliament delegates the daily control of the debt management operations to the Court of Auditors.

3. They have been derived from the current Basel Capital Accord of 1988. Agreement has recently been reached about a new Accord (the so-called Basel II agreement).
PART III

Chapter 9

Managing Risks in Canada’s Debt and Foreign Reserves*

by

Pierre Gilbert, Zar Chi Tin and Mark Zelmer

* Authors: Pierre Gilbert, Finance Canada; and Zar Chi Tin and Mark Zelmer, Bank of Canada.
I. Introduction

Risk management practices in Canada in recent years have developed in an environment characterised by a large but declining stock of debt and an increase in foreign reserves. After peaking at 68 per cent of GDP in 1995, federal government debt fell to 44 per cent by 2003. Associated debt service charges declined from 39 per cent of government revenue in 1990 to 21 per cent in 2003 but they continue to represent the largest single expense in the government’s budget. On the asset side, foreign reserves rose from US$12 billion in 1992 to more than US$36 billion in 2003, in order to bring the level of reserves more in line with increased flows in foreign exchange markets and the practices of comparable sovereigns. As a result, the government’s risk management policies are focused on the prudent management of risks based on leading practices.

Before discussing the comprehensive framework in place for identifying and managing risks, it is worth noting that the federal government funds its financial requirements through Canadian dollar borrowings in the domestic market, reflecting its preference to avoid taking on exchange rate risk. Foreign currency borrowings are raised only to finance foreign currency reserves. Consequently, the discussion of risk management practices below is divided into three sections. The next section summarises the governance framework for risk management; Section 3 focuses on the management of risks in the domestic debt program; and Section 4 describes the management of risks associated with funding and investing foreign reserves. Section 5 concludes.

II. Governance framework

There is a rather unique partnership between the Department of Finance and the Bank of Canada in funds management.1 In 2003, this partnership was formally articulated in a new governance framework. Figure 9.1 provides a schematic representation of this framework.

Under the new framework, a Funds Management Committee (FMC), comprised of senior officials from the Department of Finance and the Bank of Canada, meets semi-annually to provide direction and to advise the Minister of Finance on funds management policy. The FMC is supported by a Risk Committee (RC) comprised of officials from the Department of Finance and Bank of Canada, which also meets semi-annually. Its mandate is to oversee the development and implementation of risk management policy and
strategy. The Financial Risk Office (FRO) located at the Bank of Canada supports the RC in this role, and also monitors and reports on key risks (market, credit, liquidity, operational, and legal risks) in the foreign reserves and domestic cash balances. FRO was formerly a unit of the Bank's Financial Markets Department, but was transformed into an independent risk office in
III.9. MANAGING RISKS IN CANADA’S DEBT AND FOREIGN RESERVES

order to promote an appropriate separation of risk management from front and back-office activities. The structure, mandate, and operations of the RC and FRO are formally documented in a Memorandum of Understanding between the Department of Finance and the Bank of Canada on risk management issues.

III. Domestic debt program

The fundamental objective for the domestic debt program is to provide stable, low-cost funding to meet the federal government’s financial obligations and liquidity. Key strategic objectives are to maintain a prudent debt structure, maintain and enhance a well-functioning market for Government of Canada securities, and maintain a diversified investor base.

Maintaining a prudent debt structure

The primary focus of risk management in the context of domestic debt strategy has always been on the management of the structure of the domestic debt, which, due to its size and the potential impact of changing interest rates, is by far the most significant form of financial risk to which the government is exposed.

The structure of the debt is managed in a way to protect the fiscal position from unexpected increases in interest rates and to limit refinancing needs. A long-term strategic view is taken in choosing a target debt structure that balances prudence and cost savings under a range of potential interest rate developments. The decision is not based on a particular view on the future evolution of interest rates.

When determining the appropriate debt structure, the government generally faces a trade-off between keeping borrowing costs low and ensuring that the cost impact of unexpected increases in interest rates does not exceed its tolerance for risk. Specifically, long-term instruments such as bonds typically have higher debt-servicing costs than short-term instruments such as Treasury bills. On the other hand, interest costs for outstanding bonds are known with certainty over their entire life, while Treasury bills need to be refinanced several times throughout the year at new prevailing market interest rates.

The main operational measure of the debt structure is the fixed-rate share – the mix of fixed-rate and floating-rate debt instruments that make up the debt stock. The fixed-rate share is an attractive target because it is intuitive and easy to compute. It quickly presents the amount of debt exposed to interest rate risk over the following year. Debt-servicing costs increase (decrease) and interest rate risk decreases (increases) with a higher (lower) fixed-rate share. Canada also monitors other measures of the debt structure,
such as the average term to maturity and duration, to complement the information provided by the fixed-rate share.

**Analytical framework**

Canada has developed and enhanced in recent years a sophisticated simulation model to examine its debt structure. The model is intended to assist the government in the decision-making process for the selection of an appropriate debt structure that balances costs and risk. The main components of the model are illustrated in Figure 9.2.

Ten thousand random interest rate scenarios are first generated using a standard term structure model calibrated to be representative of the interest rate environment observed over the last ten-year period. Thus, it is assumed that the interest rate environment that prevailed over this period will continue going forward, and that the scenarios represent the full range of plausible evolutions of interest rates. The choice of the model and the historical period is critical, since the relevance of the analysis depends on the plausibility of the scenarios.

A financing strategy is then designed, taking into account existing debt and assumptions regarding future borrowing requirements. The financing strategy, which specifies the types and amounts of debt to issue, ultimately determines the debt structure.
With this information, it is possible to run the simulation model to generate cash flows and compute debt costs under every interest rate scenario. By combining the results for all the scenarios, a statistical distribution of future debt costs can be obtained from the model. Debt managers are then in position to examine the risk and cost profiles of a particular debt structure, and consider appropriate changes to the financing strategy, if necessary (see Box 9.1).

The average debt costs over the ten thousand scenarios provides a measure of expected debt costs for a given debt structure. While risk has several dimensions and can be expressed in a number of different ways, debt managers pay special attention to the risk that rising debt costs could disrupt the budget plan.

Cost-at-Risk, which allows for quantification of risk in terms of the maximum costs that could occur with a given probability in a particular year, is one the tools used to compare alternative debt structures. This measure is similar to the well-known Value-at-Risk measure used extensively by the financial community, but is based on the distribution of debt costs rather than marked-to-market values.

Relative Cost-at-Risk, defined as the difference between the 95th percentile of the debt cost distribution and their average level, expresses the maximum increase in debt costs that can be expected with a 95 per cent probability. This measure is particularly attractive for gauging risk in the debt portfolio because it can be directly compared to the level of prudence incorporated in the budget framework. In other words, in evaluating an appropriate debt structure, debt managers assess whether Relative Cost-at-Risk remains inside the risk tolerance limit.

Experience has shown that quantitative results of stochastic simulations are very sensitive to assumptions employed for the dynamics of interest rates, and thus need to be interpreted with caution. In addition, the technique may not capture adequately more extreme events.

Debt managers thus complement the stochastic analysis by examining scenarios to evaluate the impact of specific interest rate shocks on debt costs. While it is not possible to fully specify the characteristics of such shocks or their probability, stress testing allows one to consider the impact of worst-case scenarios (events that are highly unlikely but still possible), which provide useful insight on the risk of the debt portfolio.

Canada is continuing to enhance its modeling techniques, and has recently started to consider debt strategy from a broader fiscal planning perspective, examining the co-movements of debt costs with the other components of the budget. Given the typical interaction between interest rates and the business cycle in an economy, debt costs tend to fall in periods of economic slowdown when government revenues are weak. Debt costs could
Box 9.1. **Application of the model: finding a new balance**

In the 1990s, the fixed-rate share of the federal debt was raised from one-half to two-thirds to provide more cost stability in an environment of large fiscal and current account deficits, volatile interest rates and high debt levels. By establishing a more prudent fixed-rate debt structure and reducing the debt, the sensitivity of annual debt-services charges to changes in interest rates was reduced in a period where the fiscal capacity to absorb shocks was limited.

For the last few years until 2002-03, the fixed-rate portion of the debt was managed around a two-thirds target. Over the same period, Canada’s economic and fiscal position strengthened substantially. Low and stable inflation and interest rates, declining foreign indebtedness and a current account surplus also contributed to increased stability. The reduction in the debt level over this period provided Canada with greater financial stability, reduced vulnerability to events happening beyond our borders, and contributed to the restoration of Canada’s triple-A credit rating.

As a result of these positive economic and fiscal developments, analysis conducted in 2002 indicated that the government was in a position to adjust its debt structure to reduce future financing costs without exposing itself to significantly higher levels of risk.

The simulation model was used to evaluate different debt structure targets. The risk and cost profiles of the two-third fixed-rate debt structure were compared with alternative debt structures with five and ten percentage point lower fixed-rate shares. Results indicated cost savings could be expected over time by lowering the fixed-rate share while risk exposures would be kept within tolerable limits.

Compared to the two-thirds debt structure, a lower fixed-rate structure was more exposed to adverse movements in interest rates. However, the analysis also confirmed that it was unlikely that the additional debt costs stemming from a severe interest rate shock would be disruptive to the budget plan in a given fiscal year due to the cushion built in the budgetary framework and Canada’s lower debt level today. That is, relative Cost-at-Risk remains within the government’s risk tolerance. Over time, the additional costs resulting from an interest rate shock would be more than offset by the savings associated with a lower fixed-rate structure.

In light of these findings, the government announced a change in the debt structure target in the 2003 Budget. The fixed-rate portion of the debt will be lowered from the previous target of two-thirds to 60 per cent, over a five-year period.
thus be considered as a natural hedge that reduces the probability of a budget
deficit. The implications of these relations in the design of debt strategy are
just beginning to be explored.

**Maintaining a well-functioning market**

As the sovereign and largest borrower in the Canadian fixed-income
market, the federal government has a major interest in sustaining a liquid and
efficient market for its securities. A well-functioning market reduces borrowing
costs and funding risk for the government as it increases investor confidence
and reduces the likelihood of market disruptions. A liquid and efficient
government securities market also provides key pricing and hedging tools for
market participants and thereby contributes to the effective functioning of the
broader fixed-income market. As a result, debt managers have worked closely
with market participants in recent years to introduce initiatives, such as bond
buybacks, to manage the decline in borrowing requirements in a way that
contributes to a well functioning market for Government of Canada debt.

A diversified investor base is maintained by using a variety of instruments
(nominal bonds, real return bonds, Treasury bills, foreign-currency
instruments and retail products) and a range of maturities. The diversification
of the funding sources reduces the reliance on any one group of investors and
reduce the risk that unfavourable conditions in one market segment becomes
costly to the government.

**Operational risk**

Most domestic debt operations (Treasury bill and bond auctions,
buybacks, investment of cash balances) are conducted using auction
mechanisms, which ensures an effective distribution of securities and fair
treatment for all market participants. The auction processes are highly
automated, which facilitates quick efficient operations and reduces the risk of
human error. There are ongoing efforts to improve efficiency and to shorten
processing times prior to the release of auction results, which reduces market
risk for market participants.

Operational risk is also minimised through regular reviews and
documentation of procedures, employee training, and planned redundancy for
key systems and operations. Following 11 September 2001, the Bank of Canada,
like many organisations, reviewed its business-continuity plan and strengthened
its capacity to continue critical operations off-site. In August 2003, this plan
received a live test, when a major power failure in North America forced the Bank
to implement its business contingency plan and transfer key personnel to a
backup facility in Ottawa. The plan proved effective, although the incident
revealed areas for potential improvement that are being addressed.
**Management of Canadian dollar cash balances**

In addition to managing risks associated with domestic debt, the government must also manage risks related to the investment of domestic cash balances. In managing the cash position, the objective is to ensure that adequate liquidity is maintained at a reasonable cost.

Deposit auctions used to invest cash balances were conducted on an uncollateralised basis until 2002, and only a limited number of large Canadian financial institutions were allowed to participate. As a result, the unsecured credit exposure to individual institutions was occasionally quite significant.

A new collateralised framework for the investment of cash balances was implemented in 2002. The new framework strengthens the management of the credit risks involved in the investment of cash balances through the use of credit ratings, credit lines and collateral agreements, and increases competition in the auction of cash balances by opening auctions to a wider range of participants.

**IV. Exchange fund account**

In Canada, official international reserves are owned by the federal government. The Exchange Fund Account (EFA) is the main repository of official international reserves, and is managed by the Department of Finance and the Bank of Canada. The EFA totaled US$32.3 billion as at 31 December, 2003. Of that amount, about US$31.5 billion was held in liquid assets consisting of deposits and marketable securities denominated in US dollars, euro, and yen. Other components of the EFA include Special Drawing Rights (SDRs) and gold. In recent years, the EFA has been mainly funded through domestic currency borrowings that have been swapped into foreign currencies (due to the cost effectiveness of cross-currency swaps compared to other funding tools).

**Strategies for managing risks**

The EFA is exposed to various types of risk such as market risk, credit risk, liquidity risk, operational risk and legal risk. The government's risk management strategy is to recognise, measure and manage each of these risks individually as well as collectively.

**Market risk**

The EFA is managed on a portfolio basis. An asset-liability matching framework has been adopted, whereby assets and liabilities are matched (as closely as possible) in currency and duration, so that exposures to currency and interest rate risks are kept to a minimum. Matching is an integral means of managing market risk for the EFA.
In addition, two types of forward-looking techniques, namely “stress test scenario analysis” and “sensitivity stress testing”, are conducted. Stress test scenario analysis is based on a potential market event, such as a stock market crash. Sensitivity stress testing is based on standardised moves in closely-linked market risk factors, such as a parallel yield curve shift. These scenarios are explicitly defined and reported. This analysis helps reserve managers assess the performance of the EFA (i.e. potential market value loss) under different scenarios, and determine whether changes in the structure of the portfolio are necessary.

**Credit risk**

Credit risk is managed by diversifying the EFA asset portfolio, with appropriate use of credit ratings and counterparty limits imposed by investment and credit guidelines approved by the Minister of Finance and released publicly (Annex 9.A), as well as through other measures such as netting agreements and collateral support agreements. To control credit risk, FRO currently uses an approach based on the BIS 1998 Basel Accord and subsequent amendments, whereby all exposures are risk-weighted according to entity type. In addition, the BIS Accord “add on” approach has been adopted to calculate potential exposures for derivative transactions.

*The investment and credit guidelines*, which encompass all lines of business, limit the EFA’s credit exposure and call for diversification of assets and counterparties. The guidelines, which are reviewed regularly, impose tight limits on exposures to credit risk. For instance, there are tight individual and global limits on financial institution exposures based on the nature of transaction and the quality of credit ratings.

Furthermore, the guidelines allow the EFA to invest only in highly liquid, and high quality securities, such as bonds and bills issued by a sovereign, an agency of a sovereign or an international financial institution. It can also invest in US dollar deposits with eligible financial institutions or in US dollar repos. At the end of 2003, most of the EFA was invested in securities issued by sovereigns and agencies (Figure 9.3). To be eligible for investment, an entity must have a credit rating of at least A-. (See Annex 9.A for details.) Currently, most investments are in the AAA category (Figure 9.4).

In addition, there are rules governing the maximum maturity of reserve assets and concentration limits.

**Collateral management frameworks** have been recently introduced in reserve management operations to manage credit risk to financial institution counterparties associated with derivatives and US-dollar deposits (i.e. repos). Under the collateral framework for swaps, high-quality collateral (e.g. cash and high-grade securities) is posted to the EFA when credit risk to financial institutions arises.
institution counterparties exceeds specified limits. In addition, a large proportion of uncollateralised short-term US dollar deposit investments have also been shifted into tri-party collateralised repurchase agreements. Firms have been recruited to manage posted collateral. Formal agreements are signed between Canada and the external managers. The external managers must then follow the policies and guidelines provided by the government. To manage the risks, there are restrictions as to eligible collateral, minimum rating requirements, minimum outstanding amount requirements, etc. The external managers are required to submit daily reports on the collateral posted.

**Liquidity risk**

High liquidity standards have also been defined in the guidelines to limit refunding and liquidity risks. For example, to ensure that reserves are invested in liquid securities, the outstanding amount of securities must be at least US$500 million, and must be issued by eligible issuers. To limit liquidity risks, the
guidelines also require that securities issued by any one counterparty cannot exceed 10 per cent of EFA liquid assets, except for bonds issued by sovereign governments and their direct agencies issued in their domestic currency.

To limit rollover risk, EFA-related liabilities maturing within 12 months cannot exceed one third of EFA assets. Figure 9.5 summarises the instruments used to fund the EFA. Other means of raising liquidity also include a short-term US dollar commercial paper program (Canada Bills), and holdings of highly liquid Euro and Yen securities.

**Figure 9.5. EFA funding composition**

![EFA funding composition](image)

**Operational risk**

Sound operational risk management requires adequate management information systems and qualified staffs. In the case of the EFA, the FRO analyses operational processes and establishes controls that are regularly reviewed.

Operational risk associated with the management of the EFA was significantly reduced in 2003 following the introduction of a new integrated straight-through-processing trading system. This new system allows for a more integrated operating process for the front, middle, and back offices, and includes trading limits for individual counterparties. These trading limits have been hard-coded into the system so that they can be enforced on a real-time basis. In addition, operational risk issues associated with staffing are mitigated through human resource policies in each institution that clarify responsibilities for each position, and promote competitive compensation with abundant training and learning opportunities.

**Legal risk**

Canada’s foreign reserves are governed by the Currency Act, which serves as the legal framework for EFA asset management and investment operations.
The Minister of Finance approves policies for managing the EFA, mainly through a set of investment guidelines. The liabilities that fund the EFA are governed by the Financial Administration Act.

The federal government’s Department of Justice has the responsibility for advising on legal risk, and preparing (as required) a legal risk report for the Risk Committee. The report identifies any potential legal risk issues with respect to existing documentation. In addition, formal agreements such as ISDA (International Swap Dealers Association) Master Agreements and CSA (Collateral Support Agreements) are signed between the Government and swap counterparties to manage legal risk.

**Reporting on risk exposures**

Reporting on the EFA’s investment performance and risk exposures in a regular and timely manner is also a key element of risk management. The Minister of Finance provides an Annual Report to Parliament on the operations of the EFA for each calendar year within five months after the expiration of that calendar year, and this report is available publicly at www.fin.gc.ca. The EFA Annual Report also includes the result of annual audit of the EFA conducted by the Auditor General of Canada.

FRO provides daily reports on EFA counterparty exposures to trading staff. In addition, detailed reports on EFA market and credit risk exposures are prepared for the Risk Committee and other officials at the Bank of Canada and Department of Finance responsible for funds management activities.

**V. Conclusion**

The preceding discussion highlights some of the key initiatives that have been adopted by Canada to ensure its risk management practices keep pace with leading practices in the private sector and other sovereign borrowers. The institutional framework supporting risk management has been formalised, which has strengthened the partnership between the Department of Finance and the Bank of Canada in this area and facilitated an appropriate separation of middle office functions from front- and back-office activities. At the operating level, market and credit risk measurement techniques have become more sophisticated – indeed, a sophisticated simulation model has been developed to assist debt managers in choosing a debt structure that appropriately balances cost and risk. As risks become better measured, they are becoming easier to manage – witness the introduction of the asset-liability management (ALM) framework for foreign reserves and collateral support agreements to mitigate credit risk. Operational risk management has also received much attention, notably through the introduction of more automation in auctions and a new trading
system that facilitates integrated straight-through trade processing encompassing all three office functions.

In addition, the important role played by domestic debt market development in managing the risks associated with government debt has helped to ensure that public debt management does not become a source of economic or financial vulnerability for Canada. By promoting a deep and liquid market for its securities, not only has the federal government been able to achieve lower debt service costs over the medium to long term, it has also broadened the range of options available to it to achieve a debt structure that appropriately balances cost and risk considerations. Moreover, yields on Government of Canada securities have served as benchmarks in pricing other Canadian dollar financial assets, thereby serving as a catalyst for the development of deep and liquid money and bond markets generally. This has helped to buffer the effects of economic and financial shocks on the country as a whole by providing borrowers with readily accessible domestic financing in a wide range of market conditions.

Finally, a discussion of Canadian risk management practices would not be complete without mentioning the various mechanisms used to monitor trends in this field and obtain external feedback on how Canadian practices can be improved. Those involved in risk management regularly monitor trends in the private sector and internationally with an eye towards how they can be applied in the Canadian context. This is facilitated by attendance at risk management conferences; bilateral meetings with risk managers at major financial institutions; staff secondments to other central banks and international institutions; and participation in major international meetings, including those of the OECD’s Working Group on Debt Management, the World Bank’s Global Borrowers Forum, and BIS working groups on risk management issues.

There is also a formal external evaluation process for funds management, which is overseen by the Treasury Evaluation Committee (TEC) – a committee composed of senior officials from the Department of Finance, the Bank of Canada, and Treasury Board. This committee complements the regular internal audit process by engaging independent third parties, who undertake multi-year reviews of funding and investing policies and practices, including those pertaining to risk management. The aim is to ensure that key aspects of funds management are reviewed by external experts over the course of a 5-year cycle. Typically, two reviews are conducted each year. Reports on findings and the government’s response to the evaluations are tabled with a parliamentary committee by the Minister of Finance.
Notes

1. Canada’s foreign reserves are not held by the central bank, but are instead owned by the government.

2. In addition, the Department of Finance publishes an annual Debt Management Report and Debt Management Strategy Report which provide an overview of foreign reserve management operations.

3. The EFA’s financial statements are audited annually by the Auditor General of Canada, and the Bank of Canada’s funds management activities are independently assessed on a regular basis by the Bank’s own Audit Department as part of the Bank’s management reporting framework.
ANNEX 9.A

Investment and Credit Guidelines for the Exchange Fund Account

I. Eligible issuers

To be eligible for EFA investments, an entity must have a credit rating in the top seven long-term categories from at least two of the following four rating agencies, at least one of which must be either Moody’s or S&P:

<table>
<thead>
<tr>
<th>Ratings agency</th>
<th>Minimum rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moody’s</td>
<td>A3 or better</td>
</tr>
<tr>
<td>S&amp;P</td>
<td>A– or better</td>
</tr>
<tr>
<td>Fitch</td>
<td>A– or better</td>
</tr>
<tr>
<td>Dominion Bond Rating Service</td>
<td>A (low) or better</td>
</tr>
</tbody>
</table>

Notes: The Bank for International Settlements (BIS) and the IMF are deemed to be eligible entities. Rating references elsewhere in this document use the ratings scale of S&P.

II. Aggregate and individual limits on holdings

a) Sovereigns and directly guaranteed agencies

<table>
<thead>
<tr>
<th>Type of issuer</th>
<th>Aggregate category limits (as per cent of liquid reserves)</th>
<th>Individual counter party limits (as per cent of liquid reserves)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAA sovereigns in domestic currency (including directly guaranteed agencies)</td>
<td>Unlimited</td>
<td>Unlimited</td>
</tr>
<tr>
<td>AAA sovereigns in foreign currency (including directly guaranteed agencies)</td>
<td>25</td>
<td>10</td>
</tr>
<tr>
<td>AA– to AA+ sovereigns in domestic and foreign currency (including directly guaranteed agencies)</td>
<td>25</td>
<td>10</td>
</tr>
<tr>
<td>Single A sovereigns (including directly guaranteed agencies)</td>
<td>2</td>
<td>See below*</td>
</tr>
</tbody>
</table>

* The limits for single A sovereigns (including directly guaranteed agencies) in US$ millions are as follows:
### b) Other eligible securities/deposits

<table>
<thead>
<tr>
<th>Type of Issuer/Financial Institution</th>
<th>Aggregate Category Limits (as per cent of liquid reserves)</th>
<th>Individual Counterparty Limits (as per cent of liquid reserves)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implicitly guaranteed sovereign agencies (including eligible US agencies)</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>Supranational (not including deposits at the BIS)</td>
<td>25</td>
<td>10</td>
</tr>
<tr>
<td>Deposits at the BIS</td>
<td>10</td>
<td>–</td>
</tr>
<tr>
<td>Commercial bank deposits</td>
<td>US$1.5 billion</td>
<td>See limits below</td>
</tr>
</tbody>
</table>

### III. Financial Institution (FI) counterparty credit risk limits

#### a) For swaps, deposits and forwards

<table>
<thead>
<tr>
<th>Type of exposure (US$M)</th>
<th>Credit Rating of FI Counterparty</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A–</td>
</tr>
<tr>
<td>Actual exposure</td>
<td>10</td>
</tr>
<tr>
<td>Aggregate actual exposure for all FI counterparties</td>
<td>2 per cent of liquid reserves</td>
</tr>
<tr>
<td>Potential exposure*</td>
<td>10</td>
</tr>
<tr>
<td>Total potential exposure for all FI counterparties</td>
<td>10</td>
</tr>
</tbody>
</table>

* Potential exposure on swaps and forwards is calculated based on BIS guidelines.

#### b) For repo transactions

<table>
<thead>
<tr>
<th>Minimum credit rating for a counterparty</th>
<th>A–</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business line limits for counterparties, by credit rating</td>
<td>AAA</td>
</tr>
<tr>
<td></td>
<td>AA</td>
</tr>
<tr>
<td></td>
<td>A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Eligible collateral</th>
<th>US Treasuries and Agencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum rating for collateral</td>
<td>AAA</td>
</tr>
<tr>
<td>Maximum term of collateral</td>
<td>10.5 years</td>
</tr>
</tbody>
</table>
IV. Terms of investments

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Maximum term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial bank deposits and other non-marketable</td>
<td>3 months</td>
</tr>
<tr>
<td>investments</td>
<td></td>
</tr>
<tr>
<td>Commercial bank marketable investments</td>
<td>1 year</td>
</tr>
<tr>
<td>All other marketable securities</td>
<td>10.5 years (unless matching a specific liability that exceeds 10.5 years)</td>
</tr>
</tbody>
</table>

V. Liquidity limits

| Minimum holdings of US Treasuries                   | 10 per cent of liquid reserves   |
| Minimum issue size                                   | US$ 500M                         |
| Maximum holding of any issue/note program/CP program | 10 per cent of the issue/note program/CP program |
| Maximum non-marketable investments beyond 5 days in term | 15 per cent of liquid reserves |

VI. Currency composition guideline

<table>
<thead>
<tr>
<th>Currency</th>
<th>Per cent of liquid reserves</th>
</tr>
</thead>
<tbody>
<tr>
<td>US dollar</td>
<td>US$5 billion +/- operating range</td>
</tr>
<tr>
<td>Euro and/or yen</td>
<td>Remainder of the EFA</td>
</tr>
</tbody>
</table>
PART III

Chapter 10

Risk Management of Government Debt in Denmark*

by

Lars Risbjerg

* Prepared by Lars Risbjerg, Government Debt Management at Danmarks Nationalbank. Main references for this chapter is various editions of the annual publications “Danish Government Borrowing and Debt” by Government Debt Management at Danmarks Nationalbank. Further information about government debt management can be found at Danmarks Nationalbank’s Web site: www.nationalbanken.dk under Government debt. This chapter is based on information up to end-2003.
I. Introduction and framework

This chapter gives an overview of risk management of the Danish central-government debt. Firstly, the overall framework for central-government debt management is described, followed by considerations with respect to management of market risks in relation to the principle of asset and liability management and the implementation of the borrowing strategy. Thereafter, the management of the different types of risks is considered: interest-rate risk, exchange-rate risk, liquidity risk, credit risk, operational risk, and legal risk.

Objective

The overall objective of the government debt policy is to cover the central government financing requirement at the lowest possible long-term borrowing costs, subject to a prudent degree of risk.

Furthermore, the aim is to support a well-functioning domestic financial market, and to facilitate the central government's access to the financial markets in the longer term.

The central government debt is compiled as liabilities comprising the domestic and foreign central government debt, minus the assets of the Social Pension Fund (SPF)\(^1\) and the balance of the central government's account with Danmarks Nationalbank (DNB).\(^2\) At end-2003, the central government debt amounted to DKK 515 billion. The central government debt as a ratio of GDP has been falling since 1995 from 57 to 37 per cent. All the domestic debt is comprised of nominal instruments predominantly fixed-rate bullet loans. The foreign debt is also solely comprised of nominal instruments.

Government debt management entails preparation and implementation of strategies for the management of the central government debt. In addition, government debt management involves administration and risk management of re-lending and guarantees for a number of companies.\(^3\)

Legislative basis

Under the Danish Constitution, loans are raised by the central government according to law. The statutory basis for the central government borrowing is set out in the Act on the authority to raise loans on behalf the central government of 1993.\(^4\)
**Overall funding rule**

The central government borrowing norm (overall funding rule) sets out the framework for the distribution and scope of the central government's domestic and foreign borrowing. The norm is set out in an agreement between the government and DNB. Domestic and foreign borrowing norms have been determined. Together they support the separation of fiscal and monetary policy.

The domestic norm states that domestic krone-denominated borrowing in principle covers the central government’s gross domestic financing requirement, i.e. the central government’s current deficit and redemptions on the domestic debt. The norm for foreign borrowing implies that the foreign borrowing requirements correspond to redemptions on the foreign debt, which is raised in order to maintain an adequate foreign-exchange reserve.

**The central government debt management strategy**

Both domestic and foreign central government borrowing are based on long-term strategies matching the overall objective of the government debt policy.

To support transparency and credibility of government debt management, it is emphasised that the overall borrowing strategies must be consistent over time and known to market participants. Furthermore, only standardised and well-known instruments are used.

**Domestic borrowing**

The overall strategy for the domestic borrowing is to build and maintain an attractive range of on-the-run issues. This is achieved by ensuring large, liquid series of fixed-rate bullet series in the internationally important 2-, 5- and 10-year maturity segments. The liquidity premium resulting from this strategy contributes to low borrowing costs for the central government.

A range of government debt instruments is applied in order to ensure large liquid benchmark issues. This includes interest-rate swaps, buy-backs and swaps from Danish kroner to euro. The domestic borrowing strategy also includes a Treasury bill programme with monthly issues of Treasury bills with maturity up to 12 months.

**Foreign borrowing**

The entire central government’s foreign debt is in euros. Most of the central government’s foreign borrowing requirement is covered via syndicated euro loans. The strategy is to continue to build up a range of large euro loans in the 5-year maturity segment.
To supplement euro loans, domestic issues combined with currency swaps from kroner to euro are used. This type of foreign borrowing can be attractive in price terms and supports the build-up of domestic on-the-run issues.

**Organisation of government debt management and reporting lines**

The Minister of Finance has the overall, political, responsibility for central government borrowing and debt, including relations to the Folketing (Parliament). Since 1991, DNB has undertaken the management of the central government debt. This division of work is set out in an agreement between the Ministry of Finance and DNB. Within DNB, the tasks related to government debt management are undertaken independently of other activities of DNB.

The overall strategy and risk management policy for government borrowing are agreed at quarterly meetings between the Ministry of Finance and Government Debt Management (GDM) at DNB on the basis of written proposals and analyses from GDM. The Ministry of Finance authorises GDM to execute the adopted strategy. At the meeting in December, the overall strategy and risk management policy for the following year is determined, including the duration target and the expected distribution of sales of on-the-run issues. Furthermore, the strategy includes securities eligible for buy-back, re-lending, and the securities lending facilities. At the subsequent quarterly meetings, any adjustments and further specifications of the overall strategy for the following quarter are adopted. Follow-up is done by monthly status reports to the Ministry of Finance and by reporting on the quarterly meetings, including information about risk management issues such as risk analysis and key information on the debt portfolio.

**Organisation of debt management in Danmarks Nationalbank**

At DNB, the management of the government debt is divided into front-, middle-, and back offices, each responsible for separate functions. A clear division of functions and clear procedures reduce operational risks and facilitate internal control. A well-defined division of responsibilities ensures that various categories of professional expertise are utilised efficiently.

The management, including risk management, of central-government debt is audited by the internal Audit office on behalf of the National Audit Office of Denmark. The National Audit Office of Denmark is empowered to audit the central government’s accounts, and to investigate whether government funds are managed as determined by the Folketing (Parliament). The National Audit Office of Denmark publishes the results of its investigations on an ongoing basis.
Figure 10.1 summarises the organisational structure of Government Debt Management.

**Figure 10.1. Structure of Government Debt Management**

II. Overall risk management considerations

A key principle in the risk management of the central-government debt is to consider the overall central government debt, comprising the domestic and foreign debt, minus the assets of the SPF and the balance of the central government's account with DNB. The central government's assets from relending are also included in the risk management by GDM. The consolidated or net debt approach entails a comprehensive assessment of the central government's overall exposure to fluctuations in e.g. interest rates in accordance with the asset and liability management (ALM) principles. In line with the ALM, a duration target is set for the net debt in the management of interest-rate risk as opposed to managing the duration independently on the sub-portfolios constituting the central government debt. A consequence of only targeting the duration on the net-debt is that a reduction in duration may be achieved by for example using either domestic or foreign (euro) interest-rate swaps.

GDM has developed a simulation model – a Cost-at-Risk (CaR) model – for the analysis and quantification of the trade-off between costs and risk. Conceptually, the modelling approach implies the use of an ALM methodology in a broader sense. In addition to the financial liabilities in the form of the central government debt, the central government's future spending and income are taken into account in the simulations via the central government's budget balance as well as the implications of government debt management on the government's budget.
The ALM principle is also applied to the exchange-rate risk on the foreign government debt and DNB’s foreign-exchange reserve. The central government’s foreign debt is exclusively exposed in euros. At the same time, the currency exposure on DNB’s foreign-exchange reserve is predominantly in euro. The objective is to avoid raising loans in one currency and thereafter placing the proceeds in another currency. This reduces the overall exchange-rate risk of the central-government debt and DNB’s foreign-exchange reserves.

Integration of government debt strategy and risk management

The overall objective of ensuring lowest possible long-term borrowing costs, subject to a prudent degree of risk, implies that the government debt management strategy is determined on the basis of a trade-off between cost and risk. Thus, risk management is an integrated part of the setting of the central government debt management strategy.

The overall objective is made operational by formulating intermediate targets, known as strategic benchmarks, for interest-rate exposure as well as for borrowing and liquidity targets. The strategic benchmarks are used as guiding points in the subsequent implementation of the strategy.

Specific strategic benchmarks related to borrowing and liquidity are, for example, the ultimate minimum amount in the individual issues, distribution targets for issuance of government securities in the different maturity segments, and guiding points for buy-backs. In addition, a smooth redemption profile within the coming few years contributes to maintaining a stable borrowing programme.

The central strategic benchmark for interest-rate exposure is the duration target for the central-government debt. The target sums up the trade-offs between costs and risk under the government debt policy. All other things kept equal, shorter duration will reduce the average costs but entail higher interest-rate risk. In addition, interest-rate fixing, i.e. the amount in the debt portfolio for which a new rate of interest is to be fixed in the following year, is applied as a supplementary measure for interest-rate exposure.

The CaR model is a key instrument in the preparation of borrowing strategies, including the setting of strategic benchmarks. The model supports the choice of benchmarks for interest-rate exposure by quantification of the trade-off between costs and risk. In addition, the CaR model may also be applied as a scenario model for the analysis of the impact of government debt policy on outstanding amounts of the individual issues and thereby on setting strategic benchmarks for borrowing and liquidity.

For management purposes, the strategic benchmarks are determined for one year at a time after which an annual update of the risk analysis may lead
to a revision of the strategy. However, as the overall objective relates to a long horizon, the models are used to evaluate liquidity, costs and risk over longer horizons and to ensure consistency over time.

III. Interest-rate risk

Interest-rate risk comprises the risk that the development in interest rates will lead to higher government debt servicing costs. The concept of interest-rate risk also covers refinancing risk, which is the risk that debt has to be refinanced at a time with unfavourable market conditions or particularly unfavourable borrowing terms for the central government.

As stated above, interest-rate risks are managed on the basis of strategic benchmark for duration and interest-rate fixing. These measures for interest-rate exposure are discussed in more detail below.

Duration

In government debt management, duration is used as a measure of the portfolio's average fixed interest period. Interest-rate changes affect the duration, although the actual fixed interest period is unchanged by interest-rate changes. For that reason, duration is also calculated using a fixed discount rate. The strategic benchmark for 2004 concerning duration is:

- A duration band at 3.0 years +/-0.5 years, i.e. a symmetrical band around the duration level at end-2003. The wide band is used to capture the effect of interest-rate changes on duration.
- A duration band (calculated at a fixed discount rate) of 3 years +/-0.25 years. Within the year, management of the duration of the central government debt, calculated on the basis of a fixed discount rate, is applied. Duration calculated by using the current discount rate must still comply with the wider band of 3.0 years +/-0.5 year.

Duration has been reduced by approximately 1 year since 1998. The reduction should be seen in the light of the decline in government debt. The budgetary significance of the risk of rising interest rates on the government debt is thereby reduced. This has led to a strategic decision to change the weighing of costs against risk towards shorter duration.

Interest-rate fixing and redemption profile

As an average measure, duration contains no information on the dispersion of the portfolio's interest-rate exposure over time. The duration target is therefore supplemented with a measure for interest-rate fixing. Interest-rate fixing at a given time comprises the redemptions due within the coming year, as well as the amount of the floating-rate debt and the swap portfolio, for which a
new rate of interest is to be fixed within the following year. All other things being
equal, the exposure should be smoothed from year-to-year in order to avoid
fixing a new rate of interest on a relatively large proportion of the portfolio in a
year when interest rates are extraordinarily high.

Interest-rate fixing as a percentage of GDP is an indicator of the central
government’s “real” exposure. Higher GDP can be expected to render the
government less sensitive to the development in interest rates, e.g. as a result
of a larger taxation base.

Given the objective to spread and thus reduce the central government’s
interest-rate exposure, the government debt policy is aimed at ensuring
comparatively smooth redemptions on the debt after new issues in the next
few years. This contributes to maintaining a stable borrowing programme
with liquid on-the-run securities of even size and reducing refinancing risk.
The redemption profile is smoothed via buy-backs and issuance policy.

Management of interest-rate exposure

The risk profile of the portfolio is managed independently of the issuing
strategy by means of interest-rate swaps and buy-backs. Interest-rate swaps
are used to move interest-rate exposure from one maturity segment to
another, while buy-backs are used to smooth the redemption profile and thus
the size of the interest-rate exposure in individual years. Thus, interest-rate
swaps make it possible to achieve an interest-rate exposure different from
that determined by the maturity distribution of the original issues.

The development in interest rates over the year may justify a change in
the exposure of the portfolio, and likewise shifts may occur in the relative
attractiveness of the various instruments. To enable a flexible response to a
given development, limited scope for deviations around the strategic
benchmarks is allowed. For example, duration may be changed within a fixed
band, and issues in the various maturities may be larger or smaller within
fixed limits. Using this scope does not reflect short-term tactical positioning or
an attempt to “beat” the market by exploiting diverging expectations
regarding future market developments.

Given that the central government is a dominant issuer (player) in the
domestic bond market, performance measurement does not encompass
comparison of the cost relative to that of a specific benchmark portfolio
constructed on the basis of domestic bond issues. However, the central
government borrowing strategy is evaluated; for example, by examining the
issuance of government securities together with the development in market
rates.
Quantification of risk

GDM’s simulation model is applied as a scenario model and a stochastic simulation model (the CaR model). The difference between the two applications of the model is that while the scenario model is deterministic and only considers a single interest-rate scenario, the CaR model allows for the simulation of a large number of interest-rate scenarios.

Interest costs and risk are measured in nominal terms, i.e., as periodised cash-flows, as the focus is on financial debt-service costs. The development in the annual debt-service costs and key portfolio figures are simulated over a 10-year horizon in the models for various assumptions concerning the government debt management strategy and the government’s budget balance. Annex 10.A contains a more detailed description of the structure of the model.

In the CaR model, 2 500 scenarios for the central government’s annual interest costs are simulated 10 years ahead. In this way, statistical distributions of annual interest costs and expected interest costs and risks can be calculated.

Expected future annual costs of a given strategy are calculated as the mean value of calculated costs. The risk is summarised in two measures: absolute CaR and relative CaR. Absolute CaR for a given year states the maximum costs with a probability of 95 per cent, i.e. the 95 percentile of the cost distributions. Relative CaR is the difference between absolute CaR and the mean value. Relative CaR is thus a measure of the maximum increase in costs from the mean value for a given year, with a probability of 95 per cent.

The development of costs and risk over time depends on a number of factors, including the development in the size of the portfolio and its composition. Another key calculation factor is the length of the time horizon as the uncertainty about interest rates increases with time. The dispersion of the simulated distribution of annual interest costs increases therefore with longer time horizons.

A new risk measure, conditional CaR (relative and absolute), has been introduced in 2003 to remove this horizon effect from our risk calculations and to take into account that risk in a given future year depends on developments leading up to that year. The aim is an assessment of the central government’s interest-rate risk from year-to-year for different strategies that are not affected by the chosen calculation horizon. Conditional CaR makes it easier to compare the risk development in individual years because risk is measured over the same horizon. In addition, tail CaR, i.e. the mean of costs in a given year given that costs are higher than absolute CaR, has been introduced as a new risk measure. The key measures used in the analysis of cost and risk are shown in the table below.
Analysis of different borrowing strategy scenarios and CaR analysis are used to support the decision making at the quarterly meetings between GDM and the Ministry of Finance. As the results are sensitive to the assumptions regarding the future central government budget balances simulations stress tests are conducted for alternative paths of government budget balances in order to examine the robustness of the results. In addition, different interest-rates inputs are used.

**IV. Exchange-rate risk**

Exchange-rate risk is the risk that the value of the debt will increase as a consequence of the development in exchange rates. The central government’s foreign debt is exclusively in euros. In view of Denmark’s fixed-exchange-rate policy vis-à-vis the euro, this ensures a low exchange-rate risk.

In the period 1991-2000, exchange-rate risk on the foreign government debt was managed together with the exchange-rate risk on the foreign-exchange reserves of the central bank within a formalised framework. In this way, exchange-rate risk of government debt and foreign-exchange reserves was measured on a net basis. Performance measurement was used in the management of the net foreign-exchange exposure. These arrangements and procedures were abolished by end-2000, due to the decision that all foreign government debt should be in euros. Together with the fact that the central bank has only a very small amount of exchange reserves in other currencies than the euro, the rationale for a formalised arrangement disappeared.
V. Liquidity risk

Liquidity risk is defined as the risk of large unanticipated central government cash flow obligations resulting in a drain in the central government account with Danmarks Nationalbank.

The EU Treaty prohibits monetary financing. This entails that the central government's account with DNB may not show a deficit. Government's buybacks and borrowing operations are therefore planned to ensure an adequate balance on the central government's account in order to absorb fluctuations in government receipts and disbursements. Furthermore, the central government has Commercial Paper programmes, which can be used to increase the balance at very short notice.

Each month, GDM publishes a forecast for the daily government payments in the coming two months. Since the forecast of the development in the balance of the central government's account is subject to uncertainty, it is necessary to maintain a buffer to absorb unforeseen fluctuations in the account.

VI. Credit risk

Credit risk is defined as the risk of loss in the case that a counterparty defaults on its payment obligation. Swap transactions in relation to the management of central government debt are a source of credit risk. If the market value of a swap becomes positive in the central government's favour, the swap will be an asset and thereby entails a credit risk to the central government. Primary issuance of government debt is not considered to entail credit risk as these transactions are conducted on a delivery-versus-payment basis implying simultaneous delivery of funds and securities.

Since 1983, the central government has used swaps to reduce the borrowing costs and to manage the interest-rate and currency risks. The use of swaps was originally introduced for the management of foreign debt, and in 1998 interest-rate swaps in kroner were introduced as an instrument for the management of domestic debt. Foreign borrowing via domestic issues combined with currency swaps from kroner to euro commenced in 2001.

Instruments (loans and swaps) used in the management of the government debt must be simple, standardised and well known in the market. These features support transparency of government debt management and reduce operational risks. For this reason, only plain-vanilla interest-rate and currency swaps are used with a maturity of normally 10 years or less. Structured swaps are therefore not transacted. The same applies to deals that include option elements, including swaptions, interest-rate caps, etc.
Management of credit risk

In order to limit the credit risk on the central government’s swap portfolio, a number of credit management principles have been established. Key elements are:

- Counterparties must have a high credit rating.
- The credit exposure for a counterparty must be kept within relatively narrow lines.
- Swaps are only transacted with counterparties who have signed a collateral agreement.
- Swaps can be terminated if the counterparty's rating falls below a certain level.

The principles for the central government’s credit management are described in more detail in Annex 10.B.

VII. Operational and legal risk

The definition of operational risk corresponds to the definition from the Basel Committee: "... the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events."9

The separation of the various debt management functions (front-, middle- and back-office) results in a clear division of functions and responsibilities. This organisational feature limits administrative errors and operational risks.

The individual tasks of GDM are described in clear procedures that are updated on an ongoing basis. Clear procedures reduce operational risk and facilitate internal control.

In 2003, DNB implemented a new portfolio management system (PSS) for the central government debt. The system has improved the risk management of the central government debt and reduced operational risks. Key features of PSS are:

- The new system is updated once a day with information on central government's transactions from the previous day.
- Transactions are entered automatically from the back-office systems. In addition, price information and data concerning the portfolio are entered automatically. Relevant key risk measures are calculated by using this information.
- The middle-office system provides a consolidated database for the government debt and ensures data integrity and consistency of calculations.
- A group of administrators at DNB undertakes the day-to-day operation and maintenance of the portfolio management system. Apart from being
III.10. RISK MANAGEMENT OF GOVERNMENT DEBT IN DENMARK

responsible for the day-to-day operation of the system, this group has the exclusive right to modify the portfolio management system.

In addition, GDM uses only standardised and well-known financial instruments, thereby reducing operational risks.

A contingency plan ("Second Site") has been prepared so that key parts of GDM can continue in case of major business disruption.

Legal risk is minimised by using standardised contracts; e.g. the use of the ISDA Master Agreement for managing credit risk. Furthermore, simple loan structures used by recognised borrowers contribute to minimising legal and reputational risks.

The place of GDM within the central bank has helped GDM in recruiting highly skilled staff, as GDM is a part of a larger environment, where finance, financial markets and policy are major areas. GDM is able to recruit internally from other departments as well as externally, offering new employees a place in a large and highly skilled organisation. Highly qualified staff is an important element in managing operational risk.

VIII. Outlook

Risk management of government debt is an integral part of government debt management and is further improved on an on-going basis. The development of the CaR model is an important and resource intensive part of the management of market risks. Future plans include the further development and analysis of:

- interest-rate input into the CaR model;
- alternative risk measures such as conditional CaR;
- risk implications of different levels of interest-rate fixing; and
- stress testing of scenarios.

Notes

1. The Social Pension Fund Act, whereby a special national retirement pension contribution was introduced, established the Social Pension Fund (SPF) in 1970. The proceeds were allocated to SPF and invested in bonds. With effect from 1982 the Act was amended, and the payments to SPF ceased. SPF was continued as an asset in Danish kroner of the central government. Government bonds account for around 85 per cent of the assets. The reminder is mainly mortgage-credit bonds.

2. The central government account with Danmarks Nationalbank accrues interest at the official discount rate. The central government’s ongoing receipts and disbursements are made via this account. All cash management related to the management of the central government debt is handled via this account.
3. This chapter focuses on the risk management of the central-government debt. For information about risk management of guarantees and re-lending, see "Danish Government Borrowing and Debt".

4. This Act authorises the Minister of Finance to raise loans on behalf of the central government for a maximum amount of DKK 950 billion, which is the upper limit for the total domestic and foreign debt.

5. According to EU Treaty the central government's account with DNB may not show a deficit. Central-government borrowing is therefore planned to ensure an appropriate balance on the central government’s account, which can absorb fluctuations in central-government receipts and payments.

6. Deviations from the norm for foreign borrowing may occur in situations where the size of the foreign-exchange reserves changes more than found appropriate.

7. ALM implies that, where feasible, the entire balance sheet (i.e., both assets and liabilities), should be included in risk analysis so as to calculate the overall (net) exposure. This makes it possible to limit risk by matching the financial characteristics of both assets and liabilities, so that one side of the balance sheet hedges the other. See Chapters 1 and 2, this volume.

8. In the past, some structured swaps have been used as liability swaps in conjunction with loans on special interest and redemption terms (i.e. structured loans), The net result is a loan on ordinary interest and redemption terms.

ANNEX 10.A

The Scenario and CaR Model

Structure of the scenario and CaR model

The structure of the CaR calculations is illustrated in the chart below. The basis consists of information on the existing portfolio (outstanding amount of all government securities and the swap portfolio), implying information on the redemption profile together with accrued costs and payments on the debt. Assumptions about expected future budget balances are also included. In addition, there is input concerning the strategic arrangement of the government debt policy, including the distribution of future borrowing on various maturity segments, the frequency at which new securities series are opened, and the volume of future swaps and buy-backs of government securities.

All this information together determines the central government’s current borrowing requirement, the distribution of new borrowing of various

Figure 10.A.1. Structure of simulation model
securities and the central government’s interest-rate exposure. New redemptions and interest payments are subsequently included in the future borrowing requirement.

The interest costs are calculated on the basis of simulated zero-coupon-yield curves. The yield curves are applied in the model to determine coupon rates for new loans, the swap interest rates, and prices for bonds subject to buy-back.

Given the information on the initial composition of the debt, assumptions concerning future budget balances and development in interest rates, together with assumptions concerning the use of government debt instruments, the interest costs and key portfolio figures such as size of the debt portfolio, duration, interest-rate fixing, redemptions, and outstanding amount in on-the-run issues are calculated.

The model is used in order to monitor the consistency of the strategy. The results of the model are compared to the objectives such as outstanding amount. If the objectives are not fulfilled, the borrowing strategy is adjusted, and the model is run again. The model is therefore used in an iterative fashion.

**Budget balance input**

Budget balances are obtained from the Ministry of Finance’s medium-term forecasts. The primary government budget balances excluding interest-rate costs for the individual years are included exogenously in the model, while the interest-rate costs and the effect on the government’s budget are determined within the model. Thus, the model can be seen as a financial model that takes into account macroeconomic conditions via the exogenous assumptions about the government budget balances excluding interest-rate cost. The sensitivity of the results to macroeconomic developments can be examined by determining the interest cost distribution on the basis of alternative scenarios concerning, for example, the primary government budget balance. In other words, the underlying macroeconomic assumptions are exogenous variables in both the scenario and CaR model, while the modelling of the term structure of interest rates is not linked to the macroeconomic conditions and business-cycle pattern.

**Interest-rate input**

The calculation of CaR figures is also sensitive to the choice of interest-rate model used to generate future interest rates, and the estimation basis chosen to estimate the parameters of the interest-rate model. Two main approaches are used. One is based on the historical development in interest rates. This method
is now supplemented with estimations based on the interest-rate forecasts from the Ministry of Finance. The purpose of estimating the interest-rate model (CIR\(^1\) model) on the basis of the historical development in interest rates is to recreate the empirical characteristics of the historical interest rates in the simulated interest rates, including interest-rate volatility and level. Since the choice of the historical estimation basis has a major impact on the simulated interest rates, different historical periods are applied. The model is also fitted to the forecasts of future interest rates from the Ministry of Finance. This means that the simulated average interest rates are in accordance with the interest-rate forecasts from the Ministry of Finance.

The CIR model is relatively easy to interpret and implement in practice. The model ensures that the simulated interest rates fluctuate at realistic levels and that there are no arbitrage opportunities in the yield curve. However, since the model is relatively simple, it fails to describe certain empirical characteristics of the yield curve. For instance, the CIR model implies that interest-rate volatility decreases more strongly with maturity than observed empirically. Consequently, there is a tendency to underestimate long-term borrowing risk. Moreover, the relatively simple structure of the model also implies limited flexibility to fit the simulated interest rates to forecasts of future interest-rates. Consequently, efforts are underway to perform interest-rate simulations in the CaR model on the basis of a linear two-factor model.\(^2\)

**Development of the model**

The model has been developed in-house to avoid that the model becomes a “black box” to its users. The first version of the CaR model was developed in 1997. Initially, the model focused only on domestic debt. In 2003, the foreign portfolio was incorporated into the CaR model. At the moment, the model comprises domestic and foreign debt as well as swap portfolios.

As next steps it is envisaged to further develop the stochastic interest-rate and to examine the implications of different cost measures. In addition, it is planned to analyse the links between business cycles, government budget, and interest rates. The analysis will initially be done in an ad-hoc way rather than explicitly incorporating macroeconomic modelling within the CaR model.
ANNEX 10.B

Principles for Credit Risk Management

Counterparty rating

To limit the credit risk on swap counterparties, swaps are only transacted with counterparties with a very high credit standing. A counterparty must normally be rated minimum Aa3/AA- by at least two well-reputed rating agencies (Moody’s, Standard & Poor’s or Fitch). For interest-rate swaps in kroner and DKK/EUR swaps, however, counterparties with a rating of minimum A3/A- are permitted.

Counterparty credit exposure limits

To avoid disproportionately high credit exposures, the credit exposure on a counterparty must be within an authorised line. The size of these lines depends on the counterparty’s rating and equity.

New swaps may only be transacted with a counterparty for as long as the credit exposure is less than 75 per cent of the authorised lines. The remaining 25 per cent of the limit is a buffer to limit the extent of excess credit exposure.

In the event of excess credit exposure, the counterparty relationship is monitored closely. If the excess exposure is considered to be unacceptably high, it is sought to reduce the credit exposure.

Legal basis and early termination

Swaps are only transacted with counterparties with whom an ISDA Master Agreement (which governs the business relationship between the central government and the counterparty), as well as a collateral agreement have been established.

ISDA Master Agreements contain netting provisions whereby gains and losses on transacted swaps are off-set in the event of counterparty default.
Master Agreements are signed only with counterparties domiciled in countries whose legislation provides for netting.

It must be possible to terminate all swaps with a counterparty should the counterparty's rating fall to an unsatisfactory level. All new ISDA Master Agreements therefore contain rating triggers. A rating trigger entails that swaps can be cancelled should a counterparty's rating fall to a given level. In most of the central government's ISDA Master Agreements the rating trigger is BBB+/Baa1, or below.3

An additional safeguard against credit losses, cross-default clauses are included as well. These allow swaps to be terminated if the counterparty defaults on its payment obligations to a third party.

**Collateralisation**

To limit any losses in the event of counterparty default, swaps may only be transacted with counterparties who have signed a collateral agreement (ISDA Credit Support Annex) in addition to ISDA Master Agreements that regulate the relationship between the central government and the swap counterparties. The key elements of collateral agreements are:

- The agreements are unilateral, so that only the central government's counterparties pledge collateral.
- Collateral is not pledged unless the market value in the central government's favour exceeds an agreed amount (the threshold value). This threshold value will depend on the counterparty's rating.
- The market value of swaps is compiled on a regular basis and as required. If the market value less the pledged collateral exceeds the agreed threshold, the counterparty is required to pledge collateral.
- Only collateral of DKK 10 million or more is transferred (reversed).
- Permitted collateral will normally be government bonds with a rating of minimum Aa3/AA-. Other bonds can also be accepted, subject to individual assessment, for example Danish mortgage-credit bonds. The collateral value of the bonds is calculated as the market value after a haircut. Haircuts will depend on the remaining maturity of the bonds and must take the risk of a decrease in the value of the bonds into account.
- The administration of bonds pledged as collateral to the central government is transferred to the custodian bank with which the securities are deposited. On behalf of the central government, the custodian bank will request the counterparty to provide additional collateral, should the collateral value of the deposited bonds decrease and become insufficient to cover the market value of the transacted swaps after deduction of the
threshold. In the event of surplus cover, the custodian bank is equivalently authorised to release bonds to the counterparty.

At the end of 2003, the central government had entered into collateral agreements with 22 counterparties. In terms of loan principal, the coverage ratio of the swap portfolio exceeded 93 per cent.

**Measurement of credit risk**

Counterparties' credit exposure and associated utilisation of lines are monitored on an ongoing basis. The central government's credit exposure to a given counterparty is compiled as the current positive market value of the portfolio less any pledged collateral, plus a premium (the potential credit exposure that takes into account that the portfolio can generate additional market value as a consequence of market developments). Potential credit exposure is quantified by multiplying the numerical value of a swap's asset and liability legs by respectively an interest-rate and an exchange-rate risk weight. These weights are divided into maturity bands and increase with the remaining maturity.

**Notes**


2. The first stage of this work was presented in Chapter 9 of *Danish Government Borrowing and Debt 2001*.

3. Some Master Agreements dating from the period before rating trigger provisions were incorporated do not have rating triggers or very low ones.
PART III

Chapter 11

Risk Management of Government Debt in Finland*

by

John Rogers

* John Rogers, Senior Risk Manager, State Treasury, Finland.
I. Introduction and framework

The legal basis for debt management in Finland is derived from a parliamentary authorisation through which the Ministry of Finance submits a proposal to the Council of State authorising the State Treasury to carry out borrowing as an agent of the Ministry of Finance on behalf of the Republic of Finland.

Borrowing volume limits, in terms of the maximum allowable central government debt outstanding, are delegated through this same decision making process to the State Treasury. Likewise the Ministry of Finance is authorised to issue instructions and guidelines to the State Treasury related to budgetary debt management. The Ministry also monitors compliance.

Government debt management operations are carried out by the Finance Division of the State Treasury. In addition to debt management operations, the Finance Division is responsible for management of cash assets as well as administration of loans granted from central government funds, interest subsidy agreements and central government guarantees.

The State Treasury also carries out borrowing for extra-budgetary funds in cooperation with other authorities. The largest of these funds is the Housing Fund of Finland, for which the State Treasury gets separate borrowing instructions from the Ministry of Finance.

The overall objective for budgetary debt management as stated in the guidelines of the Ministry of Finance is the minimisation of the debt servicing costs, while keeping the relevant risks at acceptable levels. In this context, costs are defined as the long-term costs on an accrual basis. The State Treasury is responsible for cash management in addition to government borrowing and debt management, so risk management encompasses both debt and liquid asset positions. Risk management is based on a new debt management benchmark adopted at the beginning of 2005.

Risk indicators related to the budgetary debt are reported to the internal management and to the Ministry of Finance. The overall strategy for risk management is imbedded in the Ministry of Finance’s guidelines for debt, cash and risk management. Tactical decisions on debt management are made in the ALCO committee of the State Treasury, which meets once a month. This committee is headed by the director of the Finance Division.
The Finance Division of the State Treasury is organised along the following six lines: the Front Office carries out funding and cash management; the Middle Office is responsible for risk control, risk reporting, upkeep of the debt management benchmark, and risk management policy; Business Support includes information services and the Back Office, which handles payments, settlements and bookkeeping; the IT unit is responsible for maintenance and development of the data systems; Legal Affairs is responsible for general legal matters; and the Lending unit is responsible for administering the government’s lending and interestrate subsidies. There are currently two persons in the Finance Division’s risk control team at the State Treasury. There are also two persons working full time on development of risk management policy. Other persons from the Middle Office, Front Office and Legal Affairs are also actively working on projects related to risk management.

Finland has taken a fairly straightforward approach to risk management and this is reflected in the instrument toolbox available to debt managers. The instruments that the State Treasury may use in its operations are stipulated in the guidelines of the Ministry of Finance. In the 1990s the State Treasury stuck primarily to use of plain vanilla instruments in debt management: benchmark bonds, Treasury bills, retail bonds, interest rate swaps, cross-currency swaps, and repos. On the asset side, the main instruments have been bank deposits and CDs. There are plans, however, subject to the approval of the Ministry of Finance, to broaden in the last couple of years the range of derivatives in the toolbox for debt management has been broadened to include FRAs, spreadlocks, bond futures and money market futures.

II. Overall risks and risk management

In general it has not been the goal of risk management to minimise risk per se, but rather to find a suitable balance between the risk/return trade-off, taking into account the risk bearing ability of the central government. The main risks faced are market risk, refinancing/liquidity risk, credit risk, operational risk and legal risk.

The term market risk is used in Finland to denote the potential of a negative impact on the cost of servicing the debt stemming from the debt repayment or interest expenses. The main market risk derives nowadays comes from interest rate risk as there is only a negligible amount of currency risk.

Liquidity risk is the danger that the State Treasury's liquidity sources are insufficient for covering outflows related to servicing the debt or other expenses or that these outflows have to be financed in an unfavourable situation owing e.g. to market disturbances. Refinancing risk can be
III.11. RISK MANAGEMENT OF GOVERNMENT DEBT IN FINLAND

considered to be a subcategory of liquidity risk stemming from the need to roll over the debt. Liquidity risk is a broader concept since it entails also non-debt related expenditures. The time horizon for liquidity risk is internally defined to be less than one year, while the time horizon for refinancing is longer.

Credit risk is the threat of a loss stemming from the insolvency of a counterparty. Credit risk stems from investments of cash assets and use of derivatives.

Operational risk is the risk of a loss resulting from inadequacies or failures in processes due to technology, personnel, organisation or external factors. Operational risk has traditionally been managed in a decentralised fashion at the level of the relevant functions, but in the last couple of years there have been increased efforts to evaluate and control operational risk in a more systematic and analytical fashion.

Finland has enjoyed a relatively strong fiscal position with regard to its budget balance, and this has not constituted a major constraint on debt management in recent years. The projections from the budget department of the Ministry of Finance are taken as given in debt planning. The State Treasury performs stress testing and scenario analysis but macroeconomic growth or its impact on tax revenues have not been incorporated into our simulation models.

III. Market risk

The main market risks faced in debt management are those stemming from currency risk and interest rate risk. In the 1990s risk management was focused primarily on currency risk. Finland was a heavy borrower on international markets in the early 1990s owing to the severe recession. Finland’s currency risk was managed using a foreign currency benchmark based on bands for each individual foreign currency. Each foreign currency had a band within which its market value was allowed to fluctuate. New borrowing and cross-currency swaps were used to keep the component currencies within the bands.

After Finland entered the monetary union in 1998, the amount of foreign currency debt fell to some 14 per cent. The remaining foreign currency debt consisted of only four currencies and there was less active management of the remaining debt. The amount of foreign currency debt was allowed to decrease naturally in line with the redemption schedule.

The exposure to currency risk decreased substantially in 2003. The share of foreign currency debt fell in line with redemptions and hedging activities from 13 per cent to 2 per cent in the first half of 2003. The remaining foreign debt was hedged almost completely toward the end of 2004 when the share of foreign debt fell below 0.1 per cent.
At the end of the 1990s attention became focused increasingly on interest rate risk. Before Finland was a member of EMU, the domestic market was too small for the government to use interest rate swaps in the domestic currency. There were some cross-currency swaps into floating rates, but there was no systematic target or benchmark for the overall interest rate risk exposure.

In the late 1990s the exposure to interest rate risk in terms of cost at risk was fairly low. It was therefore decided to increase the share of floating rate debt in order to get cost savings. In the year 2000, the guidelines of the Ministry of Finance included bands for the share of floating rate debt. In 2002 the method of calculating the floating rate debt was switched to a net debt basis by including cash assets.

In addition to the floating rate debt indicator, the exposure to interest rate risk has been monitored according to other indicators as well. The State Treasury has used duration, for example, as a way of deciding in which maturities interest rate swaps are done. Other indicators that are monitored include the average time to the next fixing and basis point risk as well as their respective bucket-based profiles.

The Ministry of Finance and the State Treasury decided to launch a project on development of a new debt management benchmark in 2001. In this connection, we have been working on simulation models that could be used to simulate interest rate risk in conjunction with this new benchmark. The simulation models allow use of a variety of interest rate models, for instance CIR (Cox, Ingersoll, Ross), Nelson Siegel, principal component analysis and BGM (Brace-Gatarek-Musiela).

---

### Figure 11.1. Currency risk: composition of foreign currency debt

<table>
<thead>
<tr>
<th>Year</th>
<th>USD</th>
<th>JPY</th>
<th>GBP</th>
<th>CHF</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/98</td>
<td>10</td>
<td>5</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>12/99</td>
<td>9</td>
<td>4</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>12/00</td>
<td>8</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>12/01</td>
<td>7</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>12/02</td>
<td>6</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>12/03</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>12/04</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
These stochastic simulation models are not macroeconomic models as such, since the amount of the outstanding debt is determined exogenously. The amount of the debt is normally kept constant, with the horizon being 10 years or longer. The simulation models can be used to assess alternative funding strategies from a cost at risk perspective as well as to optimise the interest rate risk strategy within certain constraints.

The new debt management benchmark was adopted at the beginning of 2005. Broadly speaking, a reference portfolio for debt management defines a
more precise target for interest rate risk management compared to the previous approach based on the share of floating rate debt. It also enables increased quantifiability of the State Treasury operations as regards debt management.

The new target with regard to interest rate risk is defined by utilising the average fixing of the debt indicating the weighted time to repricing the debt. With regard to actual debt portfolio management, the State Treasury may within authorised limits deviate from the benchmark portfolio’s interest rate risk exposure. The deviation is interpreted as the State Treasury’s interest rate risk position. The difference between the costs of the actual debt portfolio and the benchmark portfolio is the result of the State Treasury’s debt management. The performance of the realised transactions versus the benchmark is measured on a total return basis.

The pilot year for implementation of the new benchmark is still in progress so it is premature to go into much detail about the experiences gained so far. Nevertheless, the approach to managing interest rate risk has undergone some fundamental changes. According to the former approach, some of the debt was swapped into floating rate debt in line with the desired share of net floating rate debt. According to the new approach a certain portion of the debt is first swapped into floating rate debt, some of which is re-swapped back into fixed rates of interest. The aim of this strategy is to obtain the desired interest rate risk exposure as well as obtain a smooth fixing profile, thereby diversifying interest rate risk related to issues and buybacks of bonds.

For a small country like Finland with a comparatively small public debt, this type of debt management may be a more efficient way of separating the strategy of issuing benchmark bonds in the 5- and 10-year segments of the yield curve from the strategy of managing duration. This strategy would enable us to take advantage, for example, of lower interest rates at the short end of the yield curve in the 2-3 year sector without having to issue debt with such short maturities.

**IV. Refinancing and liquidity risk**

Liquidity risk has traditionally been the most important variable in the risk management process. The State Treasury is obliged to safeguard the liquidity of the central government under all circumstances.

Short-term liquidity is managed with the aid of a cash forecasting system maintained by the Ministry of Finance. This system includes forecasts from more than 100 government agencies for inflows and outflows of up to one year in the future. The forecasts are generally very reliable in the short-run (e.g. less than one month), but they lose precision the farther we go into the future. Government agencies are obliged to make the forecast of an expenditure one day prior to the due date at the very latest.
The State Treasury is not allowed to have a negative balance in its checking account at the Bank of Finland at the end of the day. The State Treasury has sought to invest its funds as lucratively as possible, but it has also typically matched sizable future cash outflows with investments of the same maturity.

The guidelines of the Ministry of Finance include stipulations on liquidity risk under a one-year horizon. Liquidity risk is assessed in terms of the government’s net cash position, i.e. its own assets and liabilities as well as forecasted revenues and expenditures.

Refinancing risk was deemed one of the most important risks in the early 1990s, when tiny Finland was one of the world’s heaviest borrowers on international markets. Even today the parliamentary resolution authorising borrowing activities includes a stipulation that the short-term debt cannot exceed EUR 10 billion. The short-term debt is defined as the debt with an original maturity of less than one year.

In addition to short-term liquidity risk, the guidelines of the Ministry of Finance include stipulations on refinancing risk for the redemption profile exceeding a one-year horizon. Refinancing risk over a medium- and long-term horizon is managed by keeping a smooth redemption profile. In practice this means benchmark bonds are issued so that they mature at certain intervals spread out over the future. Refinancing risk is typically managed by buybacks or switches of benchmark bonds prior to maturity. The largest benchmark bond is currently the one maturing on July 4th, 2006, with an outstanding amount of EUR 7.1 billion.

Figure 11.4. **Refinancing risk: redemptions within one year**

![Graph showing refinancing risk redemptions within one year](image-url)
Credit risk has gained increasing attention in recent years as the banking industry has come under increasing stress and the ratings of counterparties have edged downwards. The State Treasury has therefore taken further steps to reduce and diversify its exposure to credit risk.

Credit risk is measured with regard to investments of cash funds as well as derivative positions. The exposure is divided into short-term risk (under one year) and long-term risk (over one year). The total exposure consists of the current market value, supplemented by the potential movement in the market value, i.e. the potential future risk. This potential future risk is measured in accordance with the corresponding BIS add-on factors.

The limits for counterparties can be allocated between short-term and long-term exposures in accordance with the rating of the counterparty. For example, some counterparties are given only a short-term limit if they are used only for cash investments. The minimum requirement for long-term transactions is a rating of AA- while the minimum for short-term uncollateralised transactions (under one year) is A-.

Much of the work on reducing the exposure to credit risk has been focused on implementation of collateral agreements in the form of Credit Support Annexes. It is the goal of the State Treasury to have CSA agreements with all Primary Dealers and other major counterparties.

The CSA agreements are one-way agreements so that only the counterparties of the State Treasury pledge collateral. It has been the goal to
discourage use of cash collateral from the counterparties by negotiating pricing that favours the use of bonds. In practice however, the share of cash collateral has exceeded that of bonds because some counterparties have difficulties in pledging bonds.

In the future, efforts will be focused on reduction of credit risk exposure on the asset side as well. After Finland joined the monetary union, the number of counterparties that can be used to place funds has increased and diversified geographically significantly. Finland is no longer solely dependent upon domestic banks for its liquidity management. This means that it is no longer necessary to keep large amount of cash assets as a buffer against unforeseen expenditures. It is nowadays possible to borrow large amounts of funds on short notice, if necessary.

VI. Operational risk

In connection with the ongoing development of the risk management framework, several projects have been undertaken in recent years to establish a more systematic approach to management of operational risk. The main emphasis on reducing operational risk in practical terms has been focused on the implementation of a new Treasury IT system, Finance Kit from Trema. The new system allows straight through processing of trades, which significantly reduces the chance of potential errors from trade entry. Before adoption of the new system in January 2003, trades were ordinarily entered manually into three IT systems.

In conjunction with the adoption of the new Treasury IT system, a project was undertaken whereby all major processes and working instructions were re-documented, taking into account the changes in work flows. A review of work flow processes and related documentation is carried out nowadays on a semi-annual basis.

In addition to upgrading the Treasury IT system, there have been increased efforts to mitigate operational risk via internal controls. In this connection a new scheme for internal control was introduced in the Finance Division in 2003. Twice a year the Finance Division makes a comprehensive report on the most important targets of its internal control. For each control target the objective and control procedures are determined, and they are assigned a quality assessment based on a five-point scale.

In 2004 an operational risk committee was set up to monitor and make recommendations for mitigating operational risk related to the Treasury operations of the Finance Division. One of the tasks of the op-risk committee is to periodically review potential or realised operational risk events. The method of collecting information on operational risk and reporting to the Ministry of Finance has also been made more systematic.
VII. Future plans and open questions

Finland’s entry into EMU at the beginning of 1999 brought with it fundamental changes in debt and risk management. Liquidity and refinancing risk as well as currency risk are now considered to pose less of a threat than before, and the focus of attention has shifted more toward interest rate risk and credit risk.

Major challenges for the future in the case of Finland revolve primarily around the new approach to interest rate risk management described above. The pilot year for implementing the new debt management benchmark in cooperation with the Ministry of Finance is still in progress, so it is too early to say how this will affect our borrowing activities precisely. Based on the work so far, however, it appears that there are clear advantages to be reaped from steering debt management via indicators such as average next fixing and duration instead of the share of floating rate debt.

One of the main operational changes related to the new debt management benchmark is a clearer separation of the borrowing strategy from the interest rate risk strategy via derivatives. The importance of credit risk management is growing as a consequence of this shift in strategy.
PART III

Chapter 12

Risk Management of Government Debt in France*

by

Bertrand de Mazières and Benoit Coeuré

* Bertrand de Mazières (Chief Executive) and Benoit Coeuré (Deputy Chief Executive), Agency France Trésor.
I. Agency France Trésor

Agency France Trésor (AFT) was established in 2001 as a government department within the Ministry of Economy and Finance, and is chaired by the Head of the Treasury. Its role is to manage the debt and treasury of the State at the lowest cost to the taxpayer. Although mostly long-term in perspective, this function must be fulfilled with the highest possible degree of risk control.

II. The overall organisation of AFT risk control

There are two distinctive characteristics of the control system implemented by AFT: i) the choice of a framework based on the rules applicable to financial institutions; ii) the involvement of two external controllers for the supervision of both organisational and financial operations.

A control framework based on banking practices

Although a sovereign issuer operates within a specific framework, its risk exposure and its activities resemble those of other financial institutions. For this reason, it was decided to base the AFT control framework on rules issued by the Commission de réglementation bancaire et financière (in particular CRBF 97-02), which regulates the banking and finance industry in France. Compliance with the following rules was considered essential:

- ongoing controls within each operational unit, with periodical checks to verify efficiency;
- separation of functions (initiation, validation of transactions and control of the risks incurred are entrusted to separate units);
- availability of audit trail at all times (reconstruction of the logical order of operations and related flows).

An AFT unit has been established to be in charge of risk control. This unit is responsible for the secure processing of operations that remains within the framework of AFT risk control rules.

The Agency has therefore designed and implemented a set of procedures outlining the general framework within which it operates and detailing the management, organisational and control standards. To the existing rules for debt and investment operations, these procedures add a detailed framework for swap operations. The Head of the Treasury, who chairs the AFT, has to approve the said procedures. The Agency also has its own professional code of ethics, based on other such codes which already exist in the financial sector.
The involvement of two external controls

AFT is mandated by law to submit its operations to an external audit, performed by a professional firm. Every year, the audit report is attached to the Budget Bill. This audit covers control procedures in force at AFT as well as operations carried out in accordance with the authorisations granted by the Budget Act.

AFT also comes within the scope of the accounting audit performed every year by the Cour des comptes, the general accounting office, as part of the comprehensive certification of the accounts of the State. This audit includes a thorough review of risk management procedures. Cour des comptes assessments are made public.

III. AFT risk control instruments

Internal control rulebook

In accordance with banking regulation CRBF 97-02, an Internal Control Rulebook lays down the rules and principles aiming at securing the best possible monitoring of the risks incurred by the AFT, in order to:

- ensure the quality and reliability of the financial and accounting information;
- check that operations, organisational and internal procedures comply with legal provisions;
- ensure the quality of the reporting and information systems;
- check that the decisions of the chief executive are complied with.

The rulebook defines the following elements:

- Various sorts of authorised operations and the accepted ways of carrying them out;
- Various types of risks and the accepted limits;
- Proxy rules;
- Assignments of external controls;
- Reports of operations; and
- IT system security.

The chief executive of the AFT approves this document, with the exception of the part relating to the accepted limits, which is approved by the Head of the Treasury.

Procedures manual

The internal control rulebook is complemented by a written description of procedures. Procedures may be defined as a chain of tasks carried out by
different actors in order to achieve a common result (e.g. auction process, interest charges refund process, and so on). Procedures are then modelled as structured and organisational graphs in which the tasks of the various actors are outlined.

A detailed description of procedures is a way of assessing how well equipped the organisation in meeting its objectives. Clearly, the manual must be adapted to possible changes in organisation. The manual also serves as a reference for the control of operational risks and for designing contingency planning procedures. The manual therefore also describes the crucial procedures that need to be followed when AFT’s premises would become inaccessible.

The main instances of AFT’s exposure to financial risk

- **Counterpart risk.** This risk is related to the solvency and financial soundness of financial institutions. AFT only deals with 22 primary dealers and a few sovereign issuers. This risk is monitored through negotiated market conventions and daily margin calls for both swaps and repo operations.

- **Cash shortage risk,** incurred by the State’s single current account with Banque de France for financial operations that are not settled. This is a major risk for AFT. As a consequence of the Maastricht Treaty, the account at Banque de France must never become negative.

- **Market risk** incurred when wide interest rate fluctuations result in a variation of values of assets, liabilities and off balance sheet items in AFT’s portfolio. In response, internal models monitoring market risk have been developed by the Agency.

  Internal limits have been formulated for these three different types of risks according to the following principles:

  - Limits are determined according to the nature of each type of operation and counterpart.
  - Limits take into account operational constraints.
  - The evaluation of the counterpart risk for each counterpart is based on a composite indicator.²
  - Temporary exemption from limits may be requested under exceptional circumstances; they are granted by written authorisations from the Chief Executive.
  - Limits will be reviewed every year.

  New indicators will be developed to assess the quality of risk monitoring. They will be carefully tested before definitive implementation. One of them will measure the daily overall exposure to risk for each and every counterpart.
It will make it possible to assess the loss AFT would incur in case one of the counterparty banks would fail.

IV. The provisions in force internally

The past year has seen a host of changes and detailed additions to the internal management and control provisions covering the Agency’s exposure to all the risks specific to its activity. These measures may be divided up into four categories:

Reformulation of the internal limits system and the internal set of procedures

The provisions concerning limits have all been reformulated resulting, in 2003, in a coherent approach to risk whatever the type of operation occasioning it. With this new set of provisions on limits coming into force in early 2004, there are now composite credit risk indicators in place which are designed to give a coherent picture of the size of the risk incurred by the State at a given time for a given counterpart. The provisions also introduce alarm thresholds based on predefined levels. The internal set of procedures sets out the *modus operandi* of each of the Agency’s units. It, too, is updated in order better to reflect the current way in which the Agency works.

The board of the Caisse de la dette publique, which was set up by the 2003 Finance Act to replace the Fonds de soutien des rentes and the Caisse d’amortissement de la dette publique, had counterparty risk limits proposed for it before it began operating.

Monitoring settlement risk

Placement of government cash surpluses is done primarily in the form of repos. Any failure by primary dealers in the issuance of securities presented as collateral of the transaction, results *de facto* in the cancellation of the placement. Because there have been too many failures of this sort, the government has engaged in discussions with primary dealers with the object of remedying the situation. The aim is to find solutions which do not run counter to the essential requirement of securing a good return on government deposits in its account with the Banque de France (as defined by Parliament). This solution will have the additional advantage of making the Paris market safer and hence more attractive to investors.

The record with incidents contains all payment incidents relating to financial transactions and thus serves as basis for monitoring the quality of primary dealers. The treasury unit uses it to determine which primary dealers can be approached for placements. Lastly, it is used to monitor incidents caused by internal organisational malfunctions.
Monitoring counterparty risk

Daily monitoring of risk limits is now well established. It is accompanied by a procedure involving a priori authorisation by the chief executive and, in the event of a significant overrun, a warning from the head of the Treasury, who chairs Agency France Trésor.

Regular reports

Information is regularly provided by the Treasury head, who chairs the AFT, and by the chief executive. Thanks to these reports, which are additional to those relating to debt issue operations, it is possible to monitor execution of the swaps programme, compliance with limits and risk control.

V. Operational and IT related risks

Agence France Trésor is not only exposed to financial or accounting risks. Like any other user of information technology, it is subject to operational risks such as IT disorders or breakdowns. Extreme cases such as a terrorist attack must also be taken care of. Under a protocol signed with Banque de France, operations needed to manage the debt and the State’s treasury are carried out from Banque de France’s premises, in the event that it is impossible to access AFT’s offices or to use AFT’s software.

Another aspect of risk control, as mentioned in our introduction, is to assess regularly the quality of the information system. On the basis of the findings of a special audit, commissioned at the risk management unit’s request, AFT has decided to retool its IT and implement a new and fully integrated specialised software. This will have a considerable impact on its control environment (with full automation of control processes) and work organisation. This importance of this new IT system requires a careful study of questions and issues such as:

- authorisation rules (Who will be in charge of access controls? What will each type of users be allowed to do? And so on.);
- impact on contingency arrangements and availability of the system.

Development of the system will be conducted with constant attention to striking the right balance between the range of possible control tools, their impact on internal organisation and preservation of key processes. Changing an information system must primarily be viewed from an organisational and functional perspective rather than a purely technical one.

VI. Modernisation of the information system

As an independent audit has already shown, Agency France Trésor’s present information system is one that has been repeatedly changed, compartmentalised and spread out over time and it needs modernising if it is
to continue, in the years ahead, to guarantee that the State's financial and placement operations are as secure as possible and, likewise, if it is to allow the Agency's computer equipment to contend with the increasing sophistication both of financial instruments and also the way to deal with all their cycles (model-building, negotiation, accounting, audits).

The drafting of the specifications for a new information system covering all of the Agency's areas of interest resulted in a call for tenders being put out in 2003. The service provider finally selected, for all of the Agency's activities apart from treasury operations, was Ubitrade. None of the solutions put forward for treasury operations were in fact completely satisfactory.

Following the announcement of the choice of provider, the Agency's new information system was launched in spring 2004 as part of a project called SIFT, standing for Système d'Information France Trésor. The project has now been divided into two parts, one dealing with market and accounting operations and the other with treasury operations.

**SIFT/market operations and accounting**

The new system manages all of the Agency's activities, with the exception of treasury operations. The introduction of the system, which is scheduled to last two years, began in 2004 with the inclusion of market operations and will continue with risk control and back office services, before ending with accounting with the Agence comptable centrale du Trésor. The system uses Tradix software.

**SIFT/treasury operations**

A call for tenders confined to treasury operations was also launched in 2004, the object being to complete the two reform processes at the same time in such a way as to have a completely modern information system covering all of the Agency's operations. Treasury activities are of course closely linked to market activities, so combining the two solutions is of the utmost importance.

Moreover, all of the information collected by SIFT will also be used to monitor primary dealers, update the internet site and add to the statistical visibility of the Agency's activities.

**Optimising internal organisation**

As a preliminary to the modernisation of the information system, and in order to give it guidance, the Agence comptable centrale du Trésor and the AFT have engaged in joint discussions on how best to organise the different tasks and controls. It is a matter of determining how well the existing organisation will fit in with that which is going to emerge from the new information
system. It is also an opportunity to lay the foundations for new accounting rules. Lastly, this collaboration will, if necessary, make it possible to change the way internal controls are organised.

**VII. Disclosure**

The global financial community is moving in the direction of greater transparency. Investor demands for full, fair and easy to use financial information and reporting have received broad support from institutions and public policymakers. The Government must make sure that its own transactions are subject to the same degree of transparency as that is required of its counterparts. The adoption of the Organic Law of 1 August 2001 pertaining to Budget Acts (LOLF), often hailed as France’s “new financial constitution”, will definitely introduce commitment-based accounting, together with the traditional cash-based budgetary accounting. For the AFT, this has implications on three levels:

- dual calculation of interest payments on a cash basis and on an accrual basis for the Budget bill;
- participation in the modernisation of government accounting; the new accounting standard for financial and treasury operations has been approved by the French Government’s Accounting Standards Committee;
- adoption for AFT’s internal management purposes of the chart of accounts for lending institutions (Plan comptable des établissements de crédit). The new accounting framework will be introduced in 2005. Ultimately, AFT will be able to track and report its transactions within an accounting framework similar to its market counterparts’ standards.

**Illustration of new accounting method**

The differences made by the “droits constatés” (established rights) method may be illustrated by the way of posting BTFs (short-term, prepaid interest bills). In 2002, for example, the stock of BTFs was, following the summer mini-budget, to increase by an extra euro 12.2 billion compared to the end-2001 loan programme. From a cash budget perspective, the impact in terms of additional interest payments borne by the central government budget was in the region of euro 200 million in 2002, the interest being prepaid, i.e. paid in conjunction with the BTF issue. From a “droits constatés” (established rights) perspective, on the other hand, with the increase being more or less linear over the whole year, the interest burden prorata temporis was of the order of euro 100 million in 2002, euro 100 million being carried forward in droits constatés (established rights) to 2003.
The new method of management accounting, plus the development of new consolidated data, will make a wealth of comprehensive information on the central government debt and treasury position available at all times. This information will, in its turn, help to keep the AFT on a par with the best practices and to benefit from new developments, especially those relating to the application of the International Financial Reporting Standards (IFRS). Completion of this accounting reform does, however, depend on the implementation of the new computer system, the two projects being pursued in parallel.

**Notes**

1. The kind of risks incurred by AFT and the various provisions in force at AFT to control them are summarised below (see section III “Main instances of AFT’s exposures to financial risk”).

2. This indicator is based on the following components: short term external rating of counterpart, turnover weighted by capital, quality of compliance.
PART III

Chapter 13

Risk Management of Government Debt in Portugal*

by

Rita Granger

* Rita Granger, IGCP. The cut-off date for information in this chapter is May 2004.
I. Introduction

The management of the public debt portfolio, as any other financial portfolio, involves the assumption of risks (liquidity, market, credit and operational risks). The construction of an explicit and consistent model to quantify and manage the risks of the Portuguese public debt portfolio is a project that started in 1996, with the creation of IGCP, the Portuguese debt management agency. The IGCP was set up with a high degree of financial and political autonomy, and operates in accordance with a few, core, internal policy guiding principles, namely accountability, transparency and efficiency. The first consequence of those principles was its organizational set-up, based on the financial sector standards, with a clear separation between risk taking and risk controlling units. The Financial Control Unit is responsible for all aspects related with: i) risk and performance valuation of the entire debt portfolio, ii) internal control, iii) procedures definition and iv) internal auditing, and reports directly to the Board of Directors. Currently this risk management unit consists of 4 people.

The first task of the risk management unit was to determine the main risks involved in debt management, and to set up the required framework to control them. That involved 3 structural projects, namely:

Figure 13.1. IGCF organisational chart
Selection of a front-to-back office IT system

The risk management function requires timely and reliable data on the debt portfolio, as well as some basic analytical tools. On the other hand, as is well known, STP1 systems greatly reduce the operational risks, and increase data transparency. Via a public tender IGCP selected the treasury system “Finance Kit” (from Trema), which was assessed as having the best fit with IGCP’ requirements, and has been in use since September 2000.

Proposal of a set of guidelines for the management of debt and a benchmark portfolio

It has been assumed from the beginning that, when creating the IGCP, the Government was giving it a mandate for the management of public debt. The exact scope of that mandate was at the beginning not clearly stated, and neither were the preferences of the portfolio owner (the Government on behalf and as representative of the tax payers) concerning the desired risk/cost profile of the debt.

This assessment led to a comparison with the functioning principles of other professional portfolio managers, which in turn revealed the advantages of a performance benchmark and associated management guidelines. The benchmark incorporates the risk/return preferences of the portfolio owner (on a medium- to long-term perspective), while the management guidelines stipulate the freedom of action of the portfolio manager (in terms of authorised instruments and transactions, degree of deviation of the portfolio vs. the benchmark expressed via relevant risk indicators, performance evaluation and reporting obligations). See the annex for further details.

Elaboration of operating procedures

There was a significant change in most of the processes related to debt management in Portugal, first with the establishment of the IGCP followed by the implementation of the IT system. Accordingly, a project was put in place, lead by the middle office but involving all functional units. The project sought to identify, analyse and optimise these processes and activities, and structure them in the form of internal operating procedures. The main objectives were: i) to have a map of key processes and activities, with clear assignment of responsibilities; ii) to facilitate the auditing functions, both internal and external; and iii) to raise the staff’s awareness of operational risk, and, through the discussions, to start to build an internal control culture within IGCP.
II. Risk management framework

IGCP’s mission is to raise funds and to execute other financial transactions on behalf of the Republic of Portugal by implanting the following objectives:

- to fulfil the borrowing requirements of the Republic in a stable manner;
- to minimise the cost of the government debt on a long-term perspective subject to the risk strategies defined by the Government.

Since its inception, IGCP has spent a significant effort in identifying (and, whenever possible, quantifying) the types of risk and cost measures relevant for public debt management. The modelling of a benchmark portfolio made a critical contribution to this process (it was also valuable as learning process for the staff).

The benchmark portfolio is one of the pillars of the entire risk management framework, justifying the considerable investment in resources. Being a small player in a big (euro) market, has allowed IGCP to separate most financing decisions from risk management decisions. Exceptions are the decisions related to refinancing risk, as IGCP does not use derivatives to manage the repayment profile of its debt.

The financing strategy has typically a medium term horizon, with as principal objective the development of primary and secondary markets, thereby minimising the financing cost for the Republic of Portugal.

Overall risk management of the debt portfolio is done on a relative basis to the benchmark portfolio (relative positioning), most often through the use of interest rate swaps. The strategy group (with members the Board of Directors and the heads of the front-office, middle-office, back-office and the research unit) meets weekly to discuss recent developments in the market and the recommended strategy. The main risks are market risk (which includes interest rate – and currency risk), refinancing risk, and credit and operational risk.

III. Relevant risk indicators

Market risk

The most relevant market risk incurred by debt managers is cash flow risk, i.e. the extent to which financial market volatility affect budget volatility (through changes in debt servicing costs), thereby reducing the freedom of action of the fiscal policy maker. Cash flow risk is measured through a combination of indicators, namely duration, refixing profile, currency exposure and CaR (Cost-at-Risk). Duration has the advantage of being a standard market risk measure, and acts as a proxy indicator for the degree of cash flow cost immunisation to interest rate movements. It is complemented with the refixing profile, which portrays the portfolio exposure to the different yield curve segments, giving a more comprehensive picture of total interest rate risk than the single duration figure.
CaR is theoretically the best measure of market risk, but is highly dependent on the realism and relevance of the interest rates scenarios used in the simulation, which can be its main weakness. However, because of its importance for debt management, it is an indicator in which the middle office is investing significantly in terms of the study and implementation of theoretical interest rate models. The CaR indicator allows not only the comparison of future expected costs of the debt portfolio vs. the benchmark, but also the simulation of alternative financing strategies and/or debt management transactions.

Since the introduction of the euro in 1999, foreign exchange risk has been significantly reduced (reaching zero last year), and is not expected that it will play a relevant risk role in the future.

**Refinancing risk**

This risk concerns the possibility that the government is not in the position to roll over the maturing debt close to previous market prices, or, in the extreme, at any price. High priority is given to the minimisation of refinancing risk, in spite of all the “comfort” associated with the size, depth and liquidity of the euro capital market. The constraints imposed at this level by capital markets are increasingly important, given both the strong demand for liquid bonds (that is, large issues) and Portugal’s relatively small yearly borrowing needs. The reconciliation between these two conflicting factors has been partially achieved by efforts in improving the efficiency of the primary and secondary markets (basically trying to compensate lack of size with extra
efficiency) and on the use of additional instruments for managing the redemption profile (besides issuance) in the form of buy-back programs.

**Credit risk**

**Framework**

The framework for Credit Risk Management is defined as part of the Public Debt Management Guidelines approved by the Portuguese Ministry of Finance. Part of these Guidelines concern specific Credit Risk Management Guidelines that are not publicly disclosed, due to their specific managerial and technical character. The Risk Guidelines were first approved in 1999 and, since then, there has been revisions including improvements in the methodology. One major improvement occurred in 2001, with the introduction of the collateralisation. Credit Risk The credit risk management methodology takes into account BIS recommendations but with modifications related to the calculation of add-ons and the introduction of collateralisation.

**Definition**

Credit risk is defined as the possible loss (probability of default) that could occur for the RoP if the counterparties failed to meet their financial responsibilities, not only at the present time but also in the future (during the maturity of all outstanding transactions that result in credit risk). Settlement risk is explicitly excluded from the definition of credit risk.

**Transactions with credit risk**

In view of the authorised operations and instruments stated in the Guidelines, the following IGCP operations result currently in credit risk: the use of derivative instruments, repurchase agreements (repos), and deposits (depos).

**Overall policy for credit risk**

**Selection of Counterparties Criteria.** The first selection criterion is based on the type of institution: they can either be financial institutions or euro zone sovereigns. The second selection criterion is based on the long term credit ratings assigned by three major international rating agencies. This criterion also establishes a minimum number of long-term ratings (until the maximum of three) that each counterparty should have assigned, as well as minimum rating notations per long-term rating.

**Credit Risk Limits.** IGCP distinguishes three different types of risk limits: 1) global risk limit; 2) risk limit per counterparty; 3) risk limits applied to counterparties belonging to the same group. The purpose of global risk limit
is to restrict the global exposure to credit risk related to derivatives transactions, to a reasonable extent of total debt. Individual limits of counterparties will differ, depending on the type of counterparty (financial institution vs. sovereign) and on the type of financial operations (derivatives, repos, depos, ...).

For financial institutions there is an additional restriction depending on their credit quality and on the existence of pre-established legal contracts. This restriction is formulated as a credit risk group classification, where each credit risk group has maximum amounts and maturity boundaries per counterparty, based on the ratings they have assigned and on the existence of collateral agreements. To prevent any excessive concentration of risk in financial institutions belonging to the same financial group, IGCP applies to those counterparties also an additional Group Limit.

**Legal Requirements.** IGCP requires certain legal formats for the contracts concerning derivatives and repos operations. The legal format used by IGCP for derivatives is the international standard ISDA Master Agreement. In September 2001, a collateralisation methodology was approved in a so-called Credit Support Annex (CSA) and added to the ISDA agreement. Since then, the CSA plays an important role in negotiations with counterparties. For repos the IGCP intends to negotiate with the relevant counterparties PSA/ISMA contracts. However, this process has not yet started.

**Measurement of Credit Risk.** Measurement of credit risk differs according to the type of transactions. For derivatives, total credit risk exposure is given by the sum of current exposure\(^3\) and potential exposure of all outstanding transactions. When calculating potential exposure, the following additional factors have to be considered: 1) the existence of netting agreements under ISDA contracts, which will reduce the value of potential exposure (i.e., via an adjustment factor); and 2) internal add-on factors, depending on the type of instrument (FRA, IRS, CIRS, FX Forward) and on the residual maturity of outstanding transactions. Since repos and depos are very short-term operations, the total credit risk exposure on these operations is given by their current exposure.

**Reporting.** Credit risk indicators are reported internally, to the Board of Directors, on a weekly basis, and, externally, to the Ministry of Finance on a quarterly basis.

**Management of credit risk**

In order to assure adequate prevention and control of credit risk, it is implemented inside IGCP a segmentation of activities related to credit risk management. For short, this segmentation goes through 1) the proposal of new counterparties and the contracting of new operations by the front office; 2) the evaluation of eligibility of counterparties and operations, the calculation
of total exposure and the reporting by the middle office; 3) the processing and accountability of operations by the back office.

Credit risk management controls are also reflected in the IGCP IT System, especially in what concerns to eligible counterparties setup (which works as an active restriction to the registration of transactions by the front office).

**Operational and legal risk**

**Framework**

Due to its diversified risk nature, there is not a specific, formally integrated framework for operational risk. Although there has been a genuine concern about this risk topic in IGCP, the current approach to operational risk management is fragmented with a focus on different priority areas. The final objective is to produce an integrated model for operational risk management. Legal risk is not considered a separate type of risk, but as part of the operational risk framework.

**Definition**

Operational risk is defined by the IGCP as the possible losses that could occur for the Republic of Portugal, due to human errors, technical failures, inadequacies or failures in internal controls, legal aspects and external factors (e.g. natural disasters that affect business activity). Different kinds of financial losses arising from operational risk can be distinguished: direct losses (e.g. legal sanctions), indirect losses (e.g. due to impairment of the Agency’s reputation) and potential opportunity costs as a result of the lack of operational capability (e.g. due to the failure of an information system) to trade in the market.

**Risk areas and Overall Policy for Operational Risk**

**Internal Procedures.** An absence of internal procedures to deal with operational and legal issues would create important additional problems related to the uncertainty brought about by the lack of guidance and insufficient or unclear demarcation of responsibilities. For this reason, since 2001, the creation of an adequate set with internal procedures has been a priority at the IGCP. As a result, several manuals describing internal procedures have been drafted and came into effective use.

The project on the drafting of internal procedures is carried out under the responsibility of the middle-office, with the full support of the Board of Directors (thereby demonstrating and enforcing the commitment of senior management). The middle-office has pursued its task in close co-operation with the operational units involved, thereby ensuring that the various units “buy into” the procedures at all levels. It has been a very labour-intensive project for the middle-office. Perhaps that, in retrospect, our approach was not
the optimal one. For example, one could argue that, theoretically, it would have been better that each unit should have drafted and documented its own set of internal procedures, which could then be reviewed and validated by the internal control unit. However, this alternative approach would have needed an even bigger time commitment from senior management.

**Internal Control.** Internal control requirements are intimately related to the existence of internal procedures. It is important to have written procedures to support the internal control structure. Vice versa, it is essential to have an internal control structure that allows a continuous evaluation and improvement of internal procedures. The project on internal procedures is not yet finished. There still a lot of work to do, especially at the internal audit level. However, some steps have been taken concerning the automation of activity workflows and the implementation of control routines based on certain IT systems’ functions.

It is important to emphasise the promotion of an internal control culture. To that end, the involvement of staff at all levels in the drafting of internal procedures and the commitment of senior management was (and is) essential. Also the promotion of high ethical and integrity standards, the emphasis on the importance of internal controls, and the encouragement of disclosure, is of great importance.

**IT systems.** The area of IT systems is large and complex. There are several types of operational risks associated with IT Systems, such as the adequacy and reliability of IT systems, security procedures (access to the systems and databases; backup routines) and the existence of backup systems in case of a major contingency. Large investments have been made in IT systems. The most important was the acquisition in 2000 of an information management system for government debt (front-to-back-office). This system records all portfolio operations, supports management decisions, and also deals with settlement, accounting and financial control activities. The use of this system has been checked through several internal audit tests and improved where necessary. In order to evaluate the effectiveness of internal systems security, IGCP contracted in 2003 the use of specialised external audit services and is now implementing some of their recommendations.

**Legal.** Legal risk is intimately associated to the specific nature of IGCP’s core business. It is important that there is a good understanding of the sometimes complex, legal framework covering IGCP’s public debt management activities, the institutional structure of IGCP, and the financial markets where public debt is placed. Thus understanding is needed to meet all legal requirements and not to get involved in legal sanctions. To minimise legal risk, a legal team at IGCP works with an external advisory law firm.
Management of operational risk

In order to ensure adequate prevention and control of operational risk, there is a clear organisational separation between risk-taking and risk-controlling. Risk control is assigned to the middle-office, who performs on a continuous basis risk identification and assessment and reports directly to the Board of Directors. Also the internal structure of the front-to-back offices reflects a proper separation of activities and responsibilities, with the objective of minimising operational risk.

IV. Assessment of current risk management framework and next steps

Overall, IGCP’s step-by-step approach to risk control has been satisfactorily. To-day, Portuguese debt is managed significantly better from how it was done 7 years ago when the IGCP was created. A significant part of the procedures and responsibilities of each unit are now fully documented, the flow of information is much better, and all major financial data related to debt transactions can be found in a single IT system. Financial data can be easily and quickly consulted, while disaster recovery procedures are in place. The major risk factors have been identified, while risk measures have been constructed to manage these risks. The use of a performance benchmark together with management guidelines is considered a very positive experience. The benchmark and guidelines state the objectives and limits of the debt management mandate given by the Minister of Finance to the IGCP, while allowing for an objective measurement of the management results.

In spite of these favourable accomplishments, further work in the following areas is needed:

Inclusion of contingent liabilities in the risk management framework

Although the current (non-contingent) public debt portfolio might have an optimal structure in terms of a proper cost-risk trade-off, contingent liabilities pose a threat to this structure. Contingent liabilities cover both formal state guarantees and other contingent liabilities. The risk associated with these contingent liabilities are not yet part of the current risk control framework.

Develop interest rate and macroeconomic models needed for the benchmark and for CaR models

A lot of work has been done in this area. However, we have not yet found a satisfactory model for the generation of interest rate- and macroeconomic scenarios required for the simulation. The available theoretical literature for
interest rate modelling is typically focused on shorter horizons (namely for option pricing or VaR calculations), but when applied to a longer time horizons produces unsatisfactory results. Although we do not intend to develop an extremely complex model, further study is required.

**Application of an ALM\(^4\) approach to the benchmark model**

The current benchmark model was built as a pure liability framework. No public assets are taken into account. It would be of interest to see what the impact would be of (at least the financial) public assets on the optimal debt structure.

**Introduction of risk matrices and internal audit activity**

The most important challenge concerning operational risk is the creation of an integrated framework for operational risk. There are two strategic, medium-term objectives that contribute to this goal. The first one is the development of so-called risk matrices for identification, quantification and management of risk factors. The second one is the introduction of an internal audit activity for a) assessing the adequacy of and compliance with internal procedures; b) contributing to the further consolidation of internal organisation; and c) for helping to identify possible “problem areas” that need to be reformed.

**Notes**

1. Straight through processing.  
2. Swaps, specially interest rate swaps, and currency forwards.  
3. The sum of Mark-to-Market positions.  
ANNEX 13.A

Benchmarking for Public Debt Management

(EXCERPT FROM IGCP’S 1999 ANNUAL REPORT)

The benchmark functions as a reference portfolio for management and should be devised as a replicable efficient portfolio allocation, consistent with the long-term goals and preferences of the portfolio holder. The general objectives for public debt management can draw from the Law that states that it should aim at minimising the financial costs of debt over the long-term, subject to an acceptable level of risk and in accordance with guidelines.

A model was developed to quantify the cost versus risk relationship for a set of replicable debt strategies. Management constraints were incorporated and a short list of such strategies were presented to the Minister of Finance (MoF), the decision-holder, who expressed the acceptable cost vs. risk trade-off. A trial benchmark strategy was adopted for 1999 to work as year of review of the methodology undertaken.

The process proved to be a learning experience in terms of expliciting objectives and constraints, structuring the problem, quantifying variables, observing portfolio dynamics and, specially, visualising the cost vs. risk trade-off for different strategies under a set of pre-defined assumptions.

The framework

Debt management was taken as a “pure liability portfolio” problem, excluding a joint analysis with the asset side of the State’s balance sheet, where financial assets are scarce, or with the foreign exchange reserves. This diverges from more common practice asset and liability management studies and the academic literature in this field remains rare.

The major strategic decision in modelling regarded the choice of the cost and risk variables. Like corporates, and unlike asset managers, the major risk for debt management is the extent to which financial variables’ volatility may
III.13. RISK MANAGEMENT OF GOVERNMENT DEBT IN PORTUGAL

affect budget volatility, thus reducing the degrees of freedom for the fiscal-policy maker. Therefore, risk is assessed on a cash-flow basis, rather than the “value at risk” perspective of asset managers. Costs are also measured on this perspective as liability managers usually take a “buy and hold” strategy and the funding horizon exceeds the maturity of instruments available in the market. For such long horizon, cash flow and marked-to-market cost measures converge as total cost becomes dominated not by price variations but by the cumulative effect of coupon payments.

Table 13.A.1. **Liability and asset management**

<table>
<thead>
<tr>
<th></th>
<th>Liability management</th>
<th>Asset management</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective function</strong></td>
<td>Min (long-term cost)</td>
<td>Max (end portfolio value)</td>
</tr>
<tr>
<td><strong>Time horizon</strong></td>
<td>Long-term</td>
<td>Short-term</td>
</tr>
<tr>
<td><strong>Performance measure</strong></td>
<td>Cash flow cost</td>
<td>Total return</td>
</tr>
<tr>
<td><strong>Risk measure</strong></td>
<td>Cash-flow-at-risk</td>
<td>Value-at-Risk</td>
</tr>
<tr>
<td><strong>Case study</strong></td>
<td>Corporates</td>
<td>Asset managers</td>
</tr>
</tbody>
</table>

Adopting different cost measures impacts greatly on the fixed/float mix decision. Historical interest rate patterns suggest that yield curves usually slope upwards, while short term rates are more volatile. This makes fixed-rate borrowing costlier but with lower debt service cost variability. On a marked-to-market perspective, fixed-rate adds price-risk (via duration) to a higher average coupon-cost, thus penalising this strategy for a liability manager. Debt holders have an incentive for issuing fixed rate instruments (“buy duration”) stemming from their focus on reducing debt service cost volatility. This is best illustrated in the next figure.

In terms of currency composition, the choice was made for a 100 per cent Euro-denominated target portfolio. This is supported by four arguments: 1) that there are no major exchange-rate exposures in the State’s assets (excluding foreign exchange reserves); 2) that Portugal’s current account is mostly focused in Intra-EU trade and flows; 3) that Euroland is a sufficiently liquid domestic capital market for regular issuance by the Republic; 4) that there is no strong evidence to take an active position against covered interest rate parity theory.

**The model**

The first step undertaken in modelling was to most objectively formulate the problem the debt holder faces based on the stated objectives in Law and the conclusions drawn from the previous strategic discussion – in particular the focus on cash-flow risk.
Long-term cost over GDP is measured by debt service cost (on an accrual basis) over a long period of time (15 years) and in relative terms to GDP.

An annual borrowing program is used as the decision variable. Using a fixed refinancing rule for all borrowing requirements continuously, drives the portfolio to a stable “steady state” portfolio. The “steady state” portfolio works as the actual target, with the strategy (the borrowing mix) as an instrument to achieve it. This is most different from portfolio rebalancing that asset managers are able to perform by undertaking significant volumes of transactions (buy & sell), unavailable to issuers, at least at reasonable cost.

Risk is assessed on three major dimensions: refinancing (the concern over time concentration of debt redemptions), refixing (the exposure to different yield curve segments) and budget risk (cash flow risk in the context of public debt management). The three are not orthogonal and together give a good estimate of the “total risk” involved in a chosen debt strategy. Refinancing risk can be measured by the configuration of the redemption profile of outstanding debt, a similar refixing profile addresses the second risk (which outperforms the standard measure of duration) and budget risk forced the need to develop a simulation technique.

Management Constraints were imposed to allow for management flexibility and minimum liquidity of outstanding debt instruments.

The second step involved developing the simulation methodology – which consists of a modular program that includes borrowing strategies and

---

**Figure 13.A.1. DEM rate history**

![DEM rate history](image-url)
scenario generators, a business model that mimics the portfolio dynamics, a simulation engine and a “playing field” where results are analysed.

The program consists of a “steady state” simulation for a 15-year period that considers borrowing strategies that comply with pre-defined rollover and management constraints. The simulation engine computes the portfolio dynamics based on interest rate simulation paths and a set of reference macroeconomic scenarios. Then it plots cash flow cost against cash flow risk (calculating also the efficient curve) and gives redemption and refixing risk statistics which are also monitored. The decision-holder (MoF) will next identify the cost vs. risk trade-off he can live with and the associated efficient strategy.

Interest rate scenarios were modelled based on historical DEM yield curves for the last 25 years – a proxy for the Euro environment. Implemented models included: 1) time series models based on the shape, volatilities and dynamics\(^1\) exhibited by the historical path; and 2) theoretical term structure models\(^2\) also calibrated on this information. Properties of generated scenarios were monitored to assess comprehensiveness and coherence and were analysed to highlight the hypothesis undertaken. The set of macroeconomic scenarios was based on the Convergence, Stability and Growth Programme for Portugal and long-term forecasts on GDP potential growth. Macroeconomic and interest rate developments are currently modelled separately.

Each simulation for each debt strategy consists of taking the corresponding “steady state” portfolio as the starting portfolio composition and applying the borrowing mix for all incoming financing needs based on rates that come from one simulated yield curve path. The simulation engine computes how the portfolio behaves in time and compiles some pre-defined statistics to be analysed. These calculations are performed for a number of scenarios for each strategy.

**Decision support and results**

This modelling approach was aimed at providing an analysis tool that quantified the impact of different strategies in terms of the problem the debt manager faces.

**Figure 13.A.2. Strategies and scenario generators**
Strategies were compared based on simulation results. In particular, estimated average long-term cost (average of Interest/GDP) for each strategy was plotted against budget risk. This last concept had to be defined and several alternatives were forwarded: volatility of interest/GDP (volatility of annual interest expense, whether rising or falling); 95th percentile for interest/GDP (maximum expected expenditure); and 95th percentile for the year-on-year change in Interest/GDP (how rampant the change may be from one year to the next). The general tendency for recent portfolio modelling has been to adopt “downside risk” measures but all measures were presented. Refinancing and refixing risks were monitored, together with other portfolio statistics and all information was presented to the MoF.

Strategies were analysed under different yield curve models and macroeconomic scenarios and efficient strategies were scored in terms of “robustness” under other set of simulation inputs. A set of representative strategies from the spectrum of solutions was taken as a short-list.

By its nature the model does not provide a unique optimum solution that should work as a benchmark portfolio but rather this should be identified according to the portfolio holder’s preferences among a short list of efficient strategies. In this respect, visualisation proved to be key in a successful adoption of the model by its end-user.
DEM interest rate historical patterns suggest that, above some level, the “insurance premium” for duration does not “buy” a significant extra protection in terms of cash flow risk. The preliminary choice by the MoF corresponds to a “steady state” portfolio with a target duration of slightly less than 3 years.

This compares with present durations of between 3 and 4 years for public debt portfolio of small EU countries and higher values for “core-Euro” countries. In fact, one concern in the benchmarking exercise was to avoid “maverick risk” – that is, to position too far from where peer countries stand. Recently, IGCP has been aware of modelling efforts by these EU countries that exhibit convergence in methodology and major results, namely in terms of duration. IGCP has also presented its modelling approach in international forums.

**Implementation**

The year of 1999 was elected as a test-year for the benchmark. Management guidelines were set up regarding: instruments and transactions authorised and limits for foreign exchange exposure, refinancing profile, refixing profile, duration deviation and credit risk, in absolute terms and relative to the benchmark.

An infrastructure was assembled to maintain an artificial benchmark portfolio, monitor guidelines and measure performance, calculated on a marked-to-market basis. Regular reporting was implemented.

The benchmark methodology will be subject to regular reviews or if rendered necessary by unforeseen structural changes. One issue to have continuously under scrutiny is the euro’ track record in relation to the DEM rate history that underpins the model presented.

**Notes**

1. Estimated using principal component analysis.
2. Cox, Ingersoll and Ross and Longstaff & Schwartz.
PART III

Chapter 14

Risk Management of Government Debt in Sweden*

by

Per-Olof Jönsson

* The report (dated April 7, 2004) was prepared by Per-Olof Jönsson of the Swedish Debt Office and includes material previously prepared by Lars Hörngren and Erik Thedéen for the Guidelines for Public Debt Management by the IMF.
I. Introduction and overall framework

The core principles and rules for central government debt management in Sweden are given in the Act on State Borrowing and Debt Management. The government’s right to borrow is based on an annual authorization from Parliament, which is given as part of the decision on the state budget for the subsequent fiscal year. There is no fixed limit on the annual amount of borrowing. Instead, the Act specifies for which purposes the government may borrow, in particular, to finance the budget and to refinance maturing debt. The government invariably delegates the mandate to borrow to the Swedish National Debt Office (SNDO).

The Debt Office is a central government agency subordinate to the Ministry of Finance, working with a high degree of autonomy according to the Swedish government tradition. The Debt Office is responsible for debt management, guarantee issuing and co-ordination, and acts also as an internal bank for state agencies.

The objective of debt management is also formulated in the Act. It stipulates that the state’s debt shall be managed so that the long-term costs are minimised while taking risks into account. Debt management shall also respect the demands of monetary policy. The Act also stipulates that the government each year shall decide guidelines for debt management. This decision shall be based on a proposal submitted by the Debt Office. The proposal shall be sent to the Riksbank, the central bank, for comments, to ensure that the demands of monetary policy are taken into account. The Act also instructs the government to submit an annual report to Parliament in which it makes an evaluation of the management of the debt. The Debt Office’s proposal, the Riksbank’s comments and the government’s guidelines, as well as the evaluation report, are all public documents.

The implementation of debt management on the basis of the guidelines is delegated to the Debt Office. The guidelines define in broad terms how the debt should be structured. They typically include ranges around target values, leaving scope for the Debt Office to make more detailed decisions on the management of the debt. The Government guidelines cover the composition between debt denominated in foreign currency, nominal, as well as index-linked domestic currency debt, the duration of the nominal debt and maturities of index-linked borrowing.
Figure 14.1 shows how the debt and its broad composition have developed since 1990.

Figure 14.1. **Central government debt, 1990-2003 (including derivatives)**

In millions of Swedish kronor

The current debt portfolio is dominated by nominal loans in domestic currency, made up of bonds and bills, but less so than in most OECD countries. First, Sweden has an unusually large share of inflation-linked loans, amounting to close to 15 per cent of total debt. Second, and more significant, nearly a third of the debt is in foreign currencies. The foreign currency debt is largely a legacy from the early 1990s. As can be seen in Figure 14.1, total debt more than doubled between 1990 and 1995, when Sweden experienced the deepest recession since the 1930s. With an annual net borrowing requirement corresponding to 14 per cent of GDP at the peak, it was useful to divert some of the borrowing to foreign capital markets. This reduced the pressure on long-term interest rates in the domestic market and diversified the debt portfolio.

The duration of the combined nominal krona and foreign currency debt is approximately 2.7 years. The inflation-linked debt has a duration (measured in terms of real rates) of close to 10 years. The guidelines for the overall composition of the debt constitute the basis for financial risk management of the Debt Office. In addition, the Government has instructed the Debt Office to follow “best practices” in risk management, and to comply with relevant laws and regulations for financial companies.

The Debt Office has a board consisting of 8 members, of which 4 are members of Parliament, appointed by the Government. The Director General
is chairman of the Board. The Board does not take part in the operational decisions of the SNDO.

Based on Government guidelines, the Board decides on more precise guidelines for debt and risk management operations, including:

- benchmarks for nominal domestic debt and for foreign currency debt;
- strategic approach for domestic borrowing, such as transparency, predictability, liquidity, broadening the investor base and efforts to modernise the market’s infrastructure;
- limits and guidelines (e.g. in terms of Value at Risk) for the active management of the foreign currency portfolio;
- limits and guidelines for credit risks;
- instructions for internal control (operational risks); and
- ethical rules.

The second level of decision-making concerns the operational management of the debt within the framework determined by the Board. These decisions are taken by the Debt Office’s staff, led by the Director General. This operational level includes front offices, planning, executing transactions, administration, back office, financial accounting, IT, risk management, information, law and documentation and research and forecasting.

The organisational structure is based on the principles of:

- delegation of power;
- strict duality in the transaction process;
- independent risk control; and
- internal auditing reporting directly to the Board.

The work on the guidelines and the long-term strategy is a responsibility of the debt management department with the help of the research and forecasting department. The risk management department has more limited responsibility in this work.

The Debt Office has a credit committee and an operational risk committee. Each committee is in charge of risk management within these two areas. The risk management department prepares the issues to be raised at meetings of these two committees. This department (with a staff of 8 officers) has also the following tasks:

- monitoring and analysing financial and operational risks;
- calculating profit and loss for the active management of the FX debt;
- taking initiative for reforms in the risk management area based on the requirements of “best practice”; and
- managing IT and physical security issues.
II. Types of risks

**Ethical and reputational risks**

The risk that what we do and say will lead to a loss in reputation. As a representative for the Government, the Debt Office has to act responsibly in all matters. We should always treat our counterparties fair and objective and avoid entering transactions that could harm the reputation of the Debt Office or the Swedish Government.

**Business and strategic risks**

Risks associated with the basic borrowing strategies. Our approach is to determine foreseeable borrowing, supporting liquidity by concentrating borrowing to benchmarks, using standard selling techniques and striving to develop the market and the market infrastructure. By having an open attitude and discussing these matters with market players and comparing with normal practice in other OECD-countries, these risks are minimised.

**Financial risks**

- **Market risk.** The risk that changes in market prices leads to losses. Our long-term strategic approach is to measure it as variations in coupon costs, plus the realised gains or losses on FX-debt and inflation-linked debt. A real measure of costs and risks according to ALM is regarded as the preferred choice for the future. The short-term tactical approach is to use the concept of mark-to-market and measure the costs as changes in market values.

- **Liquidity risk.** The refinancing risk or roll-over risk, defined as exposure to high interest rates at time of roll-over, has traditionally been managed by limits on redemption amounts. We have now implemented another technique based on Cost-at-Risk methodology for quantifying the effects of rising interest rates. Another aspect of liquidity risk is that instruments and positions in the active management of FX debt must always be liquid so that at all times the SNDO can unwind its positions fast and at low cost.

- **Credit risk.** The risks for losses due to unwillingness/incapability of your counterparty to honour its obligations. Credit risk in our operations stems mainly from the use of OTC derivatives. The credit risk policy states that our counterparties should have a minimum rating from Standard & Poor’s, Moody’s and Fitch. We also require an ISDA agreement with CSA (collateral support annex) with all our derivative counterparties. We have chosen to use cash as collateral and we have bilateral agreements (requiring also the
SNDO to deliver collateral if our counterparty has an exposure on us). The thresholds are rating dependent. A rating trigger is attached to the ISDA agreement making it possible for the Debt Office to terminate the transactions if the rating of the counterparty is below a minimum level. The limit system is based on ratings. We have single limits for all transactions for each counterparty in terms of exposure, expected loss and maximum maturity. We also face credit risks in our liquidity management when we have to deposit surplus in the inter bank market. These credit risks are managed integrated with the credit risks arising from the use of OTC derivatives.

- **Settlement risk.** The credit risk related to a settlement procedure. Our policy is to have Delivery-versus-Payment (DVP). In FX-transactions this is not so easy to achieve. Thus, the counterparties should comply with our rating requirement. Even when DVP is achieved, a minimum rating is normally required for our counterparties.

**Operational risks**

Risks associated with weaknesses in the organisation, systems and routines. Our policy is to comply with industry best practices. The Board has decided on instructions for internal control in order to handle operational risks. The instructions state that:

- The organisation should be based on the principle that duties with risk management, back office and financial accounting are clearly separated from the operational departments.

- The competence of our staff should, at least, be comparable with the competence of the staff in the financial services industry.

- The instructions, routines and models should be documented, of high quality and well-known by the staff.

- IT-systems should have high security and contribute to a high level of internal control.

- The integrity and secrecy of information should be protected. The availability of information should be secured. Safe methods for controlling the identity of our counterparties should be used.

- Physical security should safeguard continuity and protect against trespassing.

As a method for analysing operational risks we construct standardised flowcharts, according to UML-standard, describing the working processes in detail focusing on the risks involved. A recovery site is currently being implemented.
Legal risks

Legal risk is the risk that you fail to bind your counterparty to the provisions in the contract. Since this risk normally is associated with weaknesses in your own organisation including a competent staff and adequate routines), we regard it as an operational risk.

III. Overall risks and risk management

The main risks in government debt management are interest rate risk and currency risk related to the size and overall composition of the debt. The risks should be seen in the context of the overall balance sheet of the government and assessed in relation to expenditure commitments and to future tax revenues. It seems inevitable that an optimal debt policy is state-contingent; that is, the attitude to risk will vary depending on the overall outlook for government finances. Strategic decisions on debt management are thus closely linked to fiscal and budget policies, falling within the responsibility of the government and Parliament. From this overall point of view, real (as opposed to nominal) measures of costs applied within an integrated ALM approach seem appropriate.

Risks arise when assets and liabilities are not perfectly matched. To manage these risks, the government must therefore consider the entire balance sheet and try to limit the mismatch between assets and liabilities. A complete balance sheet analysis of the government is a very complicated undertaking. However, an ALM-based approach to debt management may be helpful even if one does not have a complete quantitative picture. In particular, it becomes clear that the risk of government debt should be assessed on the basis of whether it exacerbates or mitigates strains on the balance sheet. One simple measure of the (current) strains on the balance sheet is budget balance. For example, a debt portfolio that typically has high costs in recessions (when also public finances are under pressure) must be considered more risky than a portfolio for which the opposite is true. This suggests treating deficit smoothing as an operational objective of debt management.

Acknowledging that ALM provides an appropriate conceptual framework for thinking about debt management risks is one thing, translating it into a complete debt management strategy is quite another. The most important effect so far on Swedish debt management is that in qualitative and quantitative analyses, debt costs are expressed in relation to GDP. GDP is used as a measure of other business cycle-related influences on the budget; a debt portfolio with a relatively stable cost-to-GDP ratio is regarded as less risky. Using the cost-to-GDP ratio as criterion for ranking debt portfolios, is a first step in the direction of using an ALM-based approach to debt management.
However, at this stage, market risks measured in nominal terms constitute the basis for the bulk of our analyses. When conducting a nominal risk analysis you need first to decide whether costs (and related risks) should be measured on the basis of a complete mark-to-market of the debt or by using interest rates when bonds were issued. Our conclusion is that market value changes do matter. However, the bulk of the debt cannot be refinanced at short notice. As a first approximation, therefore, it is reasonable to assume that debt instruments are kept until maturity. This means that short-term fluctuations in market values resulting from changes in market interest rates are of little consequence for the realised costs of the debt. This view forms the basis of modelling and measuring costs used for the overall debt management guidelines.

From a short term, tactical perspective, costs and risk are defined according to mark-to-market practice. This is the only possible way of defining costs when interacting with the market, irrespectively if you are auctioning or repurchasing domestic debt or if you are actively managing foreign currency debt.

IV. Simulation model and other risk models

The Debt Office has built a stochastic simulation model, which is used jointly with qualitative reasoning, in the work on guidelines for debt management. The model generates paths for interest rates, exchange rates, GDP and the borrowing requirement for up to 30 years. These time series are then used to simulate the costs of a set of debt portfolios with different characteristics, making it possible to rank portfolios on the basis of their expected costs and the variability of costs. The costs of debt in the simulation model are measured as the coupon costs, plus the realised gains or losses on FX-debt and inflation-linked debt. The model is a quarterly model, but the costs are measured on a yearly basis. The risk of debt is measured as the percentage distance between the 95th and 50th percentile (the percentile distance) of the distribution of simulated costs.

As indicated above, the primary metric used is the cost-to-GDP ratio. Since GDP is generated in the model, it is possible to capture correlations between interest rates, exchange rates and GDP in an internally consistent manner. Based on an assessment of the roll-over risk in different markets, separate duration benchmarks are determined for nominal domestic and foreign currency debt. The duration is higher for nominal domestic debt than for foreign currency debt. Limits for deviations from the duration target are also decided. The benchmarks are defined in terms of duration and for the FX debt currency composition, as percentages of market value. Deviations are measured in the same way. The currency composition is arrived at through a standard mean-variance model. The risk in the active portfolios is measured using the parametric VaR approach.
V. Overall debt policy

Based on qualitative and quantitative analyses, the Debt Office has concluded that it is desirable to reduce the share of foreign currency debt. It adds risk without offering expected long-term cost savings. First, the government has few foreign currency assets (i.e., the foreign exchange exposure is basically unhedged). Second, it is likely that the domestic currency weakens in recessionary periods, since the costs of foreign currency debt would tend to add to swings in the deficit-to-GDP ratio. Third, at a somewhat more subtle level, the simulation model illustrates that (under flexible exchange rates) domestic short-term interest rates are positively correlated with the business cycle, since the central bank will vary short rates in a counter-cyclical manner. This tends to stabilise the debt costs-to-GDP ratio. For a small country, foreign interest rates will be unaffected by domestic events, making foreign currency debt less attractive than domestic currency debt, other things being equal.

The quantitative results from the simulation model for index-linked debt were less clear-cut than for foreign currency debt. The model indicates that there is little difference in terms of costs and risks between nominal and inflation-linked domestic currency debt. One potential explanation is that the model assumes the economy is not subject to severe shocks. For example, budgetary and monetary policy targets are met on average in all simulations. In other words, the debt portfolios are not subjected to any stress tests, since these are hard to handle in a long-term simulation model. In such an environment, there is little reason to expect inflation-linked debt to differ markedly from nominal debt. However, under more realistic assumptions for the real economy, a portfolio made up of several types of debt is preferable from the point of view of reducing risk. As long as inflation-linked bonds are not markedly more costly than nominal bonds, this diversification effect argues for including inflation-linked debt in the portfolio.

The choice of duration involves a trade-off between costs and refinancing risks. Experience indicates that nominal short rates, on average, are lower than long rates. This is also an important assumption in our model. Strict cost minimisation would thus argue for having a debt with short duration. As noted above, domestic short rates may also be positively correlated with the business cycle, which contributes to deficit smoothing. On the other hand, a short duration would make debt costs more sensitive to current interest rate levels. Moreover, short rates tend to be more volatile than long rates. The duration of the nominal part of Swedish debt is 2.7 years, which is considered a reasonable trade-off between the considerations discussed above.

A duration target does not limit refinancing risks. In principle, a mixture of just two maturities can achieve any duration target. In practice, the
refinancing or roll-over risk is limited by the Debt Office’s overall borrowing strategy, based on a set of nominal benchmark bonds with a maturity of at least 10 years and a set of inflation-linked bonds, some of which have an even longer time to maturity. The roll-over risk is measured according to a Cost-at-Risk approach.5

VI. Active debt management

It is useful to distinguish between two types of active debt management. The first type includes actions allowing a separation between funding decisions, on the one hand, and decisions on the characteristics of the debt portfolio, on the other, achieved primarily through derivatives. Such activities are motivated by a desire to use low-cost methods of funding without necessarily accepting the risks attached to those instruments. The resulting debt portfolio should have lower funding costs and/or lower risk than an identical portfolio created by direct borrowing. This form of active management is driven by strategic considerations.

The second type of active debt management refers to positions taken on the basis of views on the future paths of interest rates or exchange rates. This requires that there is a defined benchmark. A position is then created by modifying the actual portfolio so that it deviates from the benchmark. The result of the position can be evaluated by comparing the (market) value of the actual portfolio to the value of the benchmark. This form of active management is typically driven by tactical considerations.

The Swedish National Debt Office uses both forms of active debt management. This section explains the reasons behind, and the frameworks used for, each case.

Separation of funding and portfolio decisions

The separation between funding and portfolio decisions originates from the framework for managing foreign currency debt. Traditionally, the Debt Office pursued an opportunistic borrowing strategy, seeking out low-cost funding sources, without regard to currency or maturity. To achieve the desired composition of the foreign currency debt portfolio, expressed as a benchmark portfolio, it used derivatives to transform the cash flows.

Given this experience of working with derivatives, it was natural for the Debt Office in 1996 to include the krona among the currencies used for funding the foreign currency debt. Funding in different currencies is subsequently transformed into the desired foreign currency exposure. This transformation involves several steps. First, the Debt Office issues a long-term krona bond. Second, it does an interest-rate swap (IRS) in kronor in which it receives payments based on a fixed interest rate and pays based on a floating
interest rate. Third, the floating krona cash flow is converted to euros, say, via a foreign currency swap. Finally, there is an interest rate swap in foreign currency to achieve the desired duration of the foreign currency exposure. At the end of 2003 around 49 per cent of the foreign currency exposure, equivalent to SKr 164 billion, was in the form of krona/currency swaps.6

**Tactical debt allocation**

The Debt Office takes tactical positions to benefit from movements in exchange rates and interest rates only in the management of the foreign currency debt. The framework for this activity is a benchmark portfolio determined by the Debt Office’s Board. The Board defines a neutral portfolio in terms of currency and maturity composition and the maximum permissible deviations from this portfolio. Within these boundaries, the management of the Debt Office has the mandate to take positions. Compliance with these limits is monitored by the risk management department, which is separated from the debt management department.

The Debt Office also uses external portfolio managers (currently six, of which five act as advisors and one enters transactions on behalf of the SNDO) working with the same mandate, scaled down to a fraction of the total foreign currency debt. This practice gives an additional measuring rod for evaluating the Debt Office’s tactical debt management decisions.

In practice, the management of the foreign currency debt is split into a passive portfolio and an active portfolio. In the passive portfolio, consisting of the bulk of transactions, the aim is to be on the benchmark every day with a very small tolerance level. In the active portfolio, the SNDO, its own managers and also external managers, enter into derivative transactions in order to benefit from views on market development. The Debt Office makes no corresponding debt allocation decisions based on views on interest rates in the management of the krona debt. The main reason is that the Debt Office is so dominant a player in the krona fixed income market, that its reallocations could move interest rates. Opportunistic behaviour by such a borrower will raise the overall level of interest rates as investors demand compensation for the additional risks they face. Given its typical dominance of the domestic currency bond market, a predictable and transparent borrowing strategy is a better means to lower debt costs for a sovereign issuer.

**VII. Systems used**

The SNDO uses SimCorp Dimension as a financial administration system supporting the needs of front office, back office and risk management. The dealers enter transactions into the system, the back office confirms the deals and produces files for financial accounting, clearing and settlement and the
depository system. The risk management department produces risk reports and P/L reports on a daily basis. A new system for short- and medium-term borrowing planning is being developed based on the same database. The simulation model uses a simplified database and is not automatically connected with the financial administration system.

**VIII. Performance measurement**

The governance system puts great emphasis on evaluation. Each decision level is evaluated by its immediate superior body. This means that the Board monitors and evaluates operational debt management operations and reports to the government. At the next level, the government evaluates the overall result of the Debt Office's decisions. Finally, the Parliament evaluates debt management as a whole, including the government's guidelines. This evaluation is in the form of an annual written statement, adopted after a debate and vote in Parliament. This statement is published in time for the Debt Office to consider comments and recommendations from Parliament when preparing the next guideline proposal, thereby closing the loop of delegation and monitoring.

Evaluation, or performance measurement, is conducted in many ways. The overall composition of the debt is evaluated both in terms of costs and risks. The active management of the FX debt is evaluated according to a traditional profit and loss approach, based on mark-to-market valuations. Domestic debt management is to a high degree evaluated in terms of how well the strategic objectives (e.g., liquidity, predictability and market infrastructure development) have been achieved. Our own assessments, market inquiries and benchmarking/comparisons with other sovereign borrowers, constitute the basis for this evaluation.

**IX. Publication policy**

The Swedish Government tradition is one of openness; that is, all documents sent between ministries and agencies are publicly available. This tradition is also valid for debt management. The Debt Office actively supports openness since this is the basis for transparency and predictability. Our proposals and the Government's decision on guidelines are made public. We have a publication on borrowing requirement and debt policy, which is made available three times a year. A statement on public debt is published every month. Risk and performance is analysed in detail in our annual report and to some extent also in our half-yearly report.

**X. Management of contingent liabilities**

Contingent liabilities in the form of guarantees can only be issued on the basis of an authorisation by parliament. Four government agencies are in
charge of special guarantee programs related to export credit, housing, international aid, and deposit insurance. The Debt Office issues other guarantees based on specific authorisations by parliament in each case. The budget law stipulates that a risk-related fee should be charged for guarantees. If parliament decides that the recipient of the guarantee does not have to pay, budget means must be reserved to cover the fee. The Debt Office sets the fee; that is, there is a clear separation between the decision to issue the guarantee and the pricing. The accuracy of the Debt Office’s pricing decisions can be evaluated \textit{ex post} by checking whether the fees accumulated over long periods match the payments made to cover guarantee claims.

With an ALM approach to debt management, it is clear that guarantees (and other contingent liabilities) must be considered in analysing the risks related to public finances. In a consistent risk management framework, it should be possible, for example, to consider whether a risk reduction should be achieved via a change in the government debt portfolio or by transferring a guarantee to a guarantor in the private sector. This principle is easier to state than to implement. A first operational step would be to present consistent aggregate information on government guarantees. This should include expected losses on the total guarantee portfolio, but also capture the magnitude of unexpected losses. Reports on the guarantee portfolio should be presented to the parliament in connection with the budget proposal. If expected or unexpected guarantee losses are increasing, then this should be taken into account before decisions on expenditures and taxes are taken, since this would be equivalent to a weakening of the underlying budget position. Such a framework is not yet in place in Sweden, but steps in this direction are being taken to improve the analysis and management of contingent liabilities.

\textbf{Notes}

1. The OECD Working Party on Debt Management is the principal forum for this.


3. The model and the simulation results are described in papers available at the Debt Office’s Web site (\url{www.rgk.se/files/upl553-Teknisk_Rapport.pdf}).


7. See also Chapter 6, this volume.
PART III

Chapter 15

Risk Management of Government Debt in the United Kingdom*

by

Toby Davies

* Toby Davies, UK Debt Management Office.
I. Introduction and framework

Organisational set-up

The UK Debt Management Office (DMO) was established on 1 April 1998. The DMO's brief is to carry out the Government's debt management policy of minimising financing costs over the long term, taking account of risk, and to manage the aggregate cash needs of the Exchequer in the most cost-effective way, in both cases consistently with the objectives of monetary and any wider policy considerations.

In institutional terms, the DMO is legally and constitutionally part of HM Treasury, but as an executive agency, it operates at arm's length from Ministers. The Chancellor of the Exchequer\(^1\) determines the policy and financial framework within which the DMO operates, but delegates to the Chief Executive operational decisions on debt and cash management, and day-to-day management of the office.

The separate responsibilities of the Chancellor and other Treasury Ministers, the Permanent Secretary to the Treasury, and the DMO’s Chief Executive are set out in a published Framework Document, which also sets out the DMO’s strategic objectives (www.dmo.gov.uk/publication/fwork0701.pdf) and its Chief Executive’s lines of accountability to Parliament for the DMO’s performance and operations both in respect of its administrative expenditure and the Debt Management Account which records all its issuance and trading transactions.

The DMO’s annual remit is set out in the Debt and Reserves Management Report, published annually at the time of the Budget. The organisation of the DMO is illustrated in the DMO functional structure diagram, which appears in the annex.

Objectives of debt management

The UK Government’s debt management policy objective is “to minimise over the long term, the costs of meeting the Government’s financing needs, taking into account risk, whilst ensuring that debt management policy is consistent with the aims of monetary policy”. In this context, cost means the average debt servicing cost over the long run, expressed both in nominal and real terms; risks are described in Section II.

The Treasury and the DMO maintain an active research programme keeping the debt management framework under review. One element of this
programme looks at the quantitative modelling of the characteristics of the debt portfolio (currently focussing purely on gilts) under different issuance strategies over the long-term. Such modelling has been used to support the decision-making process on the appropriate long-term cost-risk trade-offs facing the Government.

**Debt instruments**

The portfolio of debt instruments managed by the DMO includes conventional and index-linked bonds and short-term Treasury Bills. It does not use interest-rate or other swaps for portfolio management purposes. The instrument range does not expose the DMO to any credit risk on counterparties through its debt management function.

The DMO also acts as cash manager for the Government. Its cash management function includes transactions and purchase of assets that expose the DMO to counterparty and issuer credit risk. The management of these risks and exposures is discussed in Section VI.

**Risk management**

The overall structure of DMO risk management activities is designed to identify and evaluate all significant risks on a clear and consistent basis so that informed decisions can be made in the context of overall organisational priorities and constraints. In addition the structure seeks to ensure monitoring and reporting of risk to appropriate individuals and committees so that policies and decisions receive a sufficient degree of “challenge” on a systematic basis.

The main aspects of the structure are:

- the Chief Executive/Accounting Officer who has overall accountability and must receive sufficient assurance regarding the governance and control structure of the DMO in order to make a positive Statement of Internal Control on an annual basis;
- an Advisory Board (including external members) which considers the plans and strategic direction of the DMO;
- the Managing Committee which considers strategic and operational issues;
- Cash Strategy, Debt Strategy, Investment, and Risk Committees which consider specific areas of DMO operations;
- professional staff experienced in the relevant areas of the DMO’s business who clearly understand both their own responsibilities and the particular importance of maintaining high standards in their dealings with external parties in order to protect the DMO’s reputation;
an Audit Committee (including external members) which reviews the adequacy and effectiveness of the DMO’s management of risk and internal controls;

an Internal Audit team which provides independent and objective advice on the adequacy and effectiveness of the DMO’s internal controls; and

a Risk Management Unit which supports the business in identifying, managing and reporting its operational, credit, market, and legal risks. It also provides control advice on risks throughout the DMO.

**Risk management process**

This risk management “cycle” generically involves: risk identification; evaluation; assessment of risk appetite; identification of suitable responses; and continuous monitoring, reporting and review which may lead to further adjustments to decisions or controls. The DMO recognises that although reduction of risk is the primary aim, there will be instances where the acceptance of a degree of risk gives the best chance to achieve overall objectives. The key in these circumstances is that there is a process to support these decisions so that they are made on a fully informed and transparent basis.

Whilst there are various formal mechanisms for managing the DMO’s risks, it is recognised that the most important aspect is that a strong risk management culture pervades the organisation at all levels. This should be embedded both in its regular operations and equally into the approach taken to new business initiatives. Risk management should be seen as part of normal business management and is subject to the same value for money considerations when considering whether risks should be accepted, reduced or eliminated.

The risk management process includes:

- a structured business planning process that takes account of all relevant issues and assesses risk ex ante;
- a regular risk and exception reporting process involving all teams which seeks to identify the key risks in a consistent manner across the DMO in order to inform senior management’s decision making, review lessons learnt, and identify major risks for which active contingency plans should be in place. Periodic risk workshops are held to complement the risk and exception reporting process, helping to maintain risk and control data and to assess the adequacy and appropriateness of risk mitigation strategies;
- project management and new product approval procedures that ensure that changes to the business are introduced in a controlled manner;
III.15. RISK MANAGEMENT OF GOVERNMENT DEBT IN THE UNITED KINGDOM

- procedures and controls manuals for all operational teams that are maintained on an ongoing basis and are subject to full review annually;
- a quarterly deal testing programme to “spot check” compliance with approved policies and procedures; and
- a business continuity master plan and individual team plans that are constantly reviewed and signed-off on a quarterly basis. These plans are tested using possible scenarios at least annually.

A risk management function provides control and advice on risks throughout the DMO. The Risk Management Unit has independent reporting lines from the DMO’s trading operations. The Unit also conducts risk analysis and provides an operational, market and credit risk capability for the DMO.

Internal audit reports provide an opinion on the adequacy and effectiveness of the DMO’s internal control system and, where applicable, contain recommendations for improvement. Internal audits are conducted in compliance with the Government Internal Audit Standards.

II. Overall risks and risk management


Broader risk management of government debt

In addition to the market, credit and operational risks described in subsequent chapters, the DMO recognises the following risks in the implementation of debt management policy:

- re-financing risk – the risk that government faces absolute difficulties in raising finance;
- re-fixing risk – the risk that debt servicing costs are higher than expected because interest rates when debt is rolled over, are higher than expected;
- volatility risk in nominal debt servicing costs – the risk that the government’s actual debt servicing costs are higher than expected/budgeted; and
- fiscal risk – the risk that debt servicing costs will rise in circumstances where the government’s fiscal position is worsening (i.e. debt servicing costs undermine the automatic stabilisers).4

The core assumptions that inform the development of the debt management strategy are that:

- the importance of government debt to the overall economy5 argues for maintenance of a liquid, orderly market across a range of maturities and stability of the policy/strategy framework;
III.15. RISK MANAGEMENT OF GOVERNMENT DEBT IN THE UNITED KINGDOM

- a long term borrowing horizon means that short-term opportunity needs to be evaluated over the long run, not short term; and
- efficiency (over time) of the market means that it is unlikely to be cost effective to second guess the market's current pricing.

So the focus in developing a strategy is on minimising risk premia at issuance and maintaining the premia that the market pays for government debt. The UK Debt Management Office achieves this policy objective by:

- pursuing an issuance policy that is open, predictable and transparent (i.e. minimises the risk premium for “bad” issuer behaviour);
- issuing conventional gilts that achieve a benchmark premium (i.e. maximising the liquidity premium that the market will pay);
- adjusting the maturity and nature of the Government's debt portfolio, by means of the maturity and composition of debt issuance and other market operations including switch auctions, conversion offers and buy-backs;
- developing a liquid and efficient gilts market;
- issuing index-linked debt to gain the inflation risk premium versus conventionals; and
- identifying preferred habitats (i.e. liquidity and term risk premia) in investors’ demand for gilts.

III. Risk considerations for debt Issuance

This aspect of risk management is predominantly considered within the DMO by the Debt Strategy Committee with support from members of the Policy and Analysis team.

The UK DMO, in consultation with HM Treasury, is developing a stochastic simulation model of long term bond issuance. The model is based on a stochastic model of the macroeconomy, where the borrowing requirement and the yield curve are functions of the economic cycle. The economy is modelled over 25 years. For a number of issuance strategies, the average cost of issuance, its standard deviation, the 95 per cent upper bound of issuance cost, and the average amount that needs to be rolled over per period are calculated over 5 000 replications of the model. These summary statistics give some indication of the performance of the issuance strategies.

The model allows the consideration of budget smoothing options, a feature which has been referred to as an “Asset Liability Model” (ALM) as it could reflect both sides of the government's balance sheet. However, the government balance sheet is only introduced into the model as an aggregate borrowing requirement, and the ALM approach is therefore quite crude.
The model makes a number of simplifying assumptions in order to reduce its complexity. The model’s parameters are taken from estimates of the UK economy over the last 20 years. This period has some particular features, which are thus reflected in the model. The economy represented is driven by demand shocks, which leads to a negative correlation of the economic cycle and inflation. Further, recent changes of monetary policy in the UK have led to a reduction of inflation, which has continuously been below market expectations. The model is therefore quite specific to the recent experience in the UK. Future work will generalise these features.

The results of previous models have been published in the Debt and Reserves Management Report that is published jointly with HM Treasury on an annual basis. However, given the preliminary state of the model, the results are not used for decision making. Further work is required before decisions can be based on the model’s results.

**Benchmarking and counterfactuals**

The UK continues to have reservations about the wisdom of adopting an active management benchmark approach at present.

The main considerations which support this conclusion are:

- there is potential for investors to demand a risk premium (thereby increasing long run-costs) because of the perceived risk that the debt manager will unfairly use inside information; and
- there is a lack of an objective independent measure against which to measure performance (i.e. the DMO itself could influence market rates).

In this context, the UK also notes that:

- in order to support an expectation that the debt manager could outguess the sum of market expectations which is priced into the yield curve the debt manager would need to incur significant research spend;
- there is potential for investors to demand a risk premium if current practices ensuring predictable and transparent issuance were discontinued as part of introducing active management (although this would not necessarily be the case); and
- relatively few countries use an active management approach in their domestic market unless their domestic market is the euro zone (i.e. where they are not the monopoly supplier of risk free assets and they can operate in interest rate markets which are relatively deep and liquid).

**Duration targeting**

The UK does not express its target debt portfolio or issuance in the form of a duration target. It is instead expressed in terms of cash to be raised within
various maturity bands and sectors. This gives much greater transparency about the DMO’s plans and means that the issuance programme offers far more predictability than if it were expressed as a duration target alone.

**Counterfactuals**

The DMO has been publishing the results of its measurement of auction performance against counterfactuals in its annual review since 2001.

The DMO has compared the results of gilt auctions (in terms of yields achieved) with a number of counterfactuals designed to indicate whether different non-discretionary issuance patterns during the year would have resulted in higher or lower costs of financing.

For conventional issuance the counterfactual assumes that the same amount of cash was raised but by the sale of equal proportions of three alternative benchmark stocks. For 2002-03 the stocks are assumed to be 5 per cent Treasury Stock 2008, 5 per cent Treasury Stock 2012 and 4¼ per cent Treasury Stock 2032.

For index-linked issuance two variants are used

- the yield on the auction stock itself; and
- the average yield of all eligible auction stocks (i.e. 2009 maturity or longer).

Two main counterfactuals are calculated. The first uses the average close of business yields of the counterfactual stocks over the financial year. The second compares actual auction yields with the counterfactual yield\(^6\) at the close of business on both the day before the auction and on the auction day itself.

In measuring actual issuance against such counterfactuals it should be noted that much of the DMO’s operations are constrained by its annual remit which fixes dates for auctions as much as a year ahead and the identity of stocks at individual auctions as much as three months ahead. The other key shortcoming of this approach is that it assumes prices and yields are supply inelastic. However, it is an approach used by other government debt managers.

**IV. Market risk**

The DMO is currently developing its market and liquidity risk policy and implementing a new risk management system with the aims of creating a market and liquidity risk infrastructure, improving consistency between market and credit risk measurement, and ultimately moving towards risk adjusted performance measures. This project will deliver in mid-2004.

The main specific objectives are to:

- build a Value at Risk engine to cover the range of instruments, currencies and risk factors present in DMO and clients’ portfolios (mainly parametric
and Monte-Carlo VaR, but also asset management tools such as tracking error and relative VAR);

- provide pre-trade pricing and risk analytics to the front office for more complex transactions mainly involving the use of derivatives;
- provide cash flow gap analysis, hypothetical and historical stress testing, and back testing;
- create a market risk limit control framework;
- support risk research and policy development;
- improve management information and senior management awareness; and
- decrease operational risk and reliance on spreadsheet based analysis.

V. Rollover and liquidity risk

Rollover risk

The maturity and duration of the UK debt portfolio are amongst the longest within developed markets. At December 2003, the overall portfolio had an average maturity of 11.78 years; the conventional portfolio had a modified duration of 7.40 years and the index-linked portfolio a duration of 10.79 years. No more than 9 per cent of the portfolio is due to mature in any future year. Thus rollover risk would appear relatively modest within UK debt management.

The issuance strategy pays regard to the future redemption profile in aiming to spread redemptions between years, although market demand and the need to establish and maintain benchmarks are equally important considerations.

The DMO works actively to smooth the cashflows arising from coupon payments and redemptions. Most conventional bonds are strippable and thus coupons payments are clustered within each financial year in order to support fungibility of coupon strips. The DMO also actively buys in near maturity stocks to reduce market holdings ahead the redemption date.

Smoothing of cash flows within each year forms part of the DMO’s cash management remit.

Liquidity risk

The DMO faces liquidity risk in both its debt and cash management operations.

As issuer, it would face liquidity risk where it faced a possible difficulty in raising cash through borrowing in a short period of time. As cash manager, it would be a situation where the volume of liquid assets diminished quickly in
the face of unexpected cash flow obligations, where there was a lack of interest in its short-term instruments, or where the number of participants in its key markets for short-term financing was vastly reduced, all preventing the ability to balance the government’s books effectively.

**Issuer liquidity risk**

The DMO’s policy of transparency and predictability in its operations leads it to publish its issuance profile and intended issuance dates up to a year in advance and the specific bonds up to three months in advance. The size of each individual issue is set one week in advance. Consequently, the DMO has little flexibility as to when it issues into the market. The DMO seeks to ensure demand for its issues and manage its liquidity risk through active market consultation with primary dealers and institutional investors to gauge their appetite for specific issues. Consultation meetings take place annually in advance of publication of the annual remit and quarterly before the precise issuance is set for each quarter.

**Liquidity risk in cash management**

The DMO’s cash management objective is “to offset, through its market operations, the expected cash flow into or out of the National Loans Fund (NLF) on every business day, in a cost-effective manner with due regard for credit and interest risk management”.

The DMO conducts its cash management operations through structured tenders and bilateral dealing. It has a Treasury bill programme, which involves issuing Treasury bills of varying size and maturity on a weekly basis to contribute to its short-term borrowing requirements (up to one year). The stock of Treasury bills was £24 billion at end December 2003. In addition, the DMO trades in a range of selected instruments on a bilateral basis with its cash management counterparties. It maintains a pool of liquid sterling collateral (gilts) to use for funding through repo transactions. Cash surpluses are invested in high quality short-term financial assets and through reverse repo transactions.

Government cashflows are forecast by HM Treasury and reported to the DMO for consolidation with its own cashflows in its internal forecasting system. This enables the DMO to predict possible collateral shortages in advance with a view to replenishing its stock of liquid collateral or consider alternative methods of funding.

The DMO aims to smooth the profile of government cashflows actively, investing funds at maturities in anticipation of significant outwards cashflows (e.g. the coupon payment dates on conventional gilts).
VI. Credit risk

For the DMO credit risk arises predominantly from its short-term cash management operations. Essentially it takes two forms:

- counterparty risk inherent in bilateral dealing with counterparties in the repo, cash, and derivative markets; and
- issuer risk that comes from holding short term money market instruments such as certificates of deposit and commercial paper.

In addition there is relatively small risk that successful bidders in gilt auctions or Treasury Bill tenders default prior to settlement.

These risks are mitigated in the following ways:

- a conservative credit policy approved by the Credit and Risk Committee covering guidelines for acceptable counterparties, issuers, limit sizes, and maximum maturities. In general these guidelines are based on the information available from the major ratings agencies;
- experienced staff within the Risk Management Unit to monitor and report on markets developments, counterparty and issuer creditworthiness, and outstanding exposures;
- negotiating appropriate legal agreements with counterparties that incorporate close-out netting and, wherever possible, collateralisation with daily re-margining; and
- using delivery versus payment (DVP) settlement arrangements where possible.

VII. Operational risk

Operational risk has many component types, including: transaction errors; inadequacy or failure in internal controls; compliance and legal risks and business continuity planning. The DMO incorporates all operational risks within its overall risk management policy. One individual within the DMO's Risk Management Unit specialises in the assessment and monitoring of operational risk across the organisation.

The DMO is currently implementing new risk reporting software and processes that is aimed at focussing senior management attention on key risks across the organisation. This reporting is done by team leaders on a quarterly basis and is supported by periodic risk workshops for each operational team in order to assist risk identification, prioritisation, and effectiveness of controls.

**Transaction processing**

The DMO aims to minimise operational risk through the achievement of a high level of automation in transaction processing and portfolio administration.
Wherever possible, straight through processing is adopted to minimise clerical intervention (following execution) in the lifecycle of individual transactions. Reconciliation against external sources (i.e. nostros) is performed frequently.

As a general policy the DMO adopts the “four-eyes” principle to operations and adheres to basic segregation of duties rules in all key areas in order to reduce the possibility of either error or fraud.

Since the DMO is itself an amalgamation of a number of historically discrete functions, it has inherited a number of legacy systems. These are steadily being rationalised on to its core strategic platforms.

**Internal controls**

The DMO operates a strong regime of internal controls. Control regimes are reviewed regularly and subjected to a rolling programme of risk based internal audit. Additionally important is to ensure a strong management culture of risk awareness across the organisation and to establish clear “ownership” of where risks reside within the organisation.

**Compliance**

The DMO is responsible for its compliance with statutory obligations as well conforming to codes of practice for governmental organisations. In a number of areas, compliance is reported upon in the DMO’s Annual Report. As a public sector body, the DMO is formally exempt from many aspects of financial regulation but aims to meet the highest standards of best practice.

Business continuity and dependence on key suppliers.

The roles of a debt manager as short-term cash manager for the Government and as a participant in the financial markets requires it to meet high standards of business continuity. The DMO maintains remote standby computing and office facilities at a disaster recovery site that can be activated a short-notice. Resilience and fallback tests are conducted regularly. At times of high criticality (e.g. an auction), the DMO maintains arrangements to share trading facilities with the central bank.

The DMO seeks to negotiate clear written agreements outlining terms, conditions, responsibilities and service standards, with all third parties on which it has a significant reliance in order to continue its business. Where possible the ongoing financial performance of these suppliers is monitored in the same way as companies for which the DMO has direct credit exposures.

**Legal risk**

As a department of government, the DMO must ensure a sound legal basis for all transactions that it undertakes. The DMO ensures that it receives
appropriate legal advice from Governmental legal advisors or private sector law firms. It bases its documentation on standardised market-agreed contractual structures (e.g. Master agreements) wherever possible and pays special regard to cross-jurisdictional issues.

**Notes**

1. The UK’s Minister of Finance.
2. It has previously included floating-rate gilts but there are none currently in issue.
3. The DMO undertakes a small number of equity index swaps as part of the risk management of certain retail savings products operated by National Savings & Investments.
4. One characteristic of floating rate and inflation-linked debt is that debt servicing costs are expected to fall at the time of a demand shock.
5. E.g. as an asset in completing investment portfolios, to support hedging strategies and the risk-free comparator in price formation.
6. The average yield of the three counterfactual stocks – one short, one medium and one long.
7. Between short, medium and long conventionals and index-linked debt.
8. One of the UK government’s central accounts.
ANNEX 15.A

DMO Functional Structure
PART III

Chapter 16

Risk Management of Government Debt in the Czech Republic*

by

Petr Pavelek

* Petr Pavelek, Ministry of Finance of the Czech Republic, Government Debt Management Unit, Strategy and Risk Management Division. This chapter is based on information up to October 2003.
I. Introduction

The growth of public budget deficits of the Czech Republic is becoming one of the most serious issues in the coordination of macroeconomic policies of central authorities. Decision-making about ways of funding domestic budget deficits is getting more and more complex. This necessitates a more active approach by the Ministry of Finance. This includes preparing alternative central government debt strategies linked to the medium-term budgeting process and the preparation of the fiscal policy. Special emphasis is placed on risk management in a broad macroeconomic context, including issues and policies related to external vulnerability.

II. Governance and institutional arrangements of debt management

Legal framework and status of the new government debt management unit

Legal authority and political responsibility concerning the borrowing needs of the central government, as well as all the functions of the treasury, have been delegated by Parliament to the Minister of Finance. At present there is no comprehensive public debt law in the Czech Republic. Instead, the responsibilities of the MoF in the area of treasury bonds issues and government debt management are governed via several specialised sub-regulations.¹

The MoF is responsible for the formulation of the overall financial policy and debt management strategy of the central government. The operational framework for the implementation of activities related to debt management has witnessed a dynamic development since the beginning of the economic transformation in 1989. Typical for emerging markets is (or was) the relatively dominant role of the central bank in the process of the development and cultivation of the domestic financial market. The international trend of more autonomous debt managers, together with theoretical arguments similar as for the justification of reforms of monetary institutions, were an important impulse to the Czech debate on proposed changes in institutional arrangements of debt management. Studies prepared by international experts on the establishment of the treasury functions also played an important role.² An important conclusion was the recommendation to establish a unit for the government debt and treasury management within the MoF.³
The last stage of this policy discussion took place among the representatives of the MoF and the CNB during the second half of 2002 and first half of 2003. The debate was at that time also driven by current and expected fiscal pressures, the imminent entry of the Czech Republic in the European Union, and the preparation of a programme for state finance reform. This resulted on September 29, 2003 in a decision by the Minister of Finance to establish an independent unit for government debt management. On 1 October 2003 this Government Debt Management Unit (GDMU) became part of the organisational structure of the MoF.

The establishment of the independent GDMU is also related to a new cooperative arrangement between the MoF and Czech National Bank (CNB) in the area of the state debt administration. This administration has been formalised since 2001 in the Agreement on co-operation in the administration of the state debt. This Agreement was further reviewed to better reflect the organisational changes and conditions created within MOF. From the point of view of the co-ordination of debt management and monetary policy, the existence of a permanent coordination Group for state debt management is important. This Group was established based on the above-mentioned Agreement. Its main task is to discuss possible conflicts between the debt management strategy and monetary policy. The resulting constant dialogue with the central bank is also crucial for coordinated efforts to develop further the domestic debt market as well as debt and treasury management functions.

**Debt management objectives and medium-term strategic targets**

The main objectives of debt management are similar to other OECD countries: covering the borrowing needs of the central government and its payment liabilities, while minimising the debt service costs over the longer-term and maintaining an acceptable risk level. Related to the implementation of these main objectives is the derived objective of developing the infrastructure of domestic financial market. Direct support for the development of an efficient domestic financial market follows from MoF’s liquid benchmark issues so as to create a complete yield curve.

The quantification of these objectives allows their better communication to the public and financial market as well as allowing the creation of a performance measurement system. This resulted in basic quantitative criteria formulated as part of the debt strategy reflecting the chosen trade-off between the risks and expected costs of the debt portfolio.

These criteria were published for the first time in 2000 together with the announcement of the MoF’s new issue strategy. A first strategic objective was to gradually decrease the share of treasury bills in the marketable debt from more
than 60 per cent to a limit of one third; that is, an increase in the ratio of medium-term and long-term bonds to treasury bills to a level of 2.00. Another strategic target is to further decrease the share of non-marketable debt. The strategy also aims at extending the average time to maturity and duration (a logical consequence of the decrease in the treasury bills' share in the debt portfolio).

In view of the further implementation of strategic targets, a decision was made about the start of derivatives operations in the fourth quarter of 2002 to and publishing each year a target band for modified duration. The first such band was announced in November 2002 for the year 2003 in the range 3-4 years. The MoF will publish the target band for each calendar year as part of the policy to further increase transparency and accountability of debt management. Accordingly, from the first quarter of 2003 the reporting of modified duration and other basic features of the debt structure (including the risk profile) was published on the web site of the MoF. See as an example the overall summary of the strategic targets for 2003 in Table 16.1.

<table>
<thead>
<tr>
<th>Table 16.1. Published strategic targets for 2003</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Refinancing and redemptions</strong></td>
</tr>
<tr>
<td>Smoothen redemption (maturity) profile of total state debt</td>
</tr>
<tr>
<td>Regular monthly distribution of redemptions (maturities) within one year</td>
</tr>
<tr>
<td>Increase average maturity of total state debt (years)</td>
</tr>
<tr>
<td>Treasury Bonds/Treasury Bills ratio</td>
</tr>
<tr>
<td>Debt issues across a wide range of maturities</td>
</tr>
<tr>
<td>Treasury Bond auctions take place every month; principle of maturities rotation</td>
</tr>
<tr>
<td><strong>Interest rate</strong></td>
</tr>
<tr>
<td>Fixed/Floating rate mix for marketable debt (%)</td>
</tr>
<tr>
<td>Smoothen interest rate refixing profile of total state debt after swaps</td>
</tr>
<tr>
<td>Modified duration of total state debt after swaps (years)</td>
</tr>
<tr>
<td><strong>Currency mix</strong></td>
</tr>
<tr>
<td>Domestic/Foreign currency mix for marketable debt (%)</td>
</tr>
<tr>
<td>Non-marketable debt – no new foreign currency loans</td>
</tr>
</tbody>
</table>

Source: GDMU MoF.

The publication of strategic targets is seen as a key instrument for increasing the credibility of debt management. One of the main objectives of the newly established GDMU is to enhance these communications via the formalisation of strategic targets (via quantitative guidelines for government debt management approved by the Minister of Finance at regular intervals). However, progress will depend on the increase in GDMU’s capabilities in quantitative modelling and the introduction of a system of benchmark assessment of debt management.

**Debt and treasury management instruments and operations**

Debt and treasury management includes the issuing of debt instruments, repo operations and the execution of swap transactions. Since 1997, the
financing needs of the central government have been covered entirely by issuing treasury securities. Foreign debt consists entirely of non-marketable debt instruments in the form of loans from international financial institutions. The growth in the share of these loans in 2003 is related to the decision of the government to finance infrastructure projects, as well as the costs of repairs and prevention of flood damages, via long-term project loans from the European Investment Bank.

The main government debt instruments are short-term Treasury bills (T-bills) and medium-term and long-term Treasury bonds (T-Bonds). As noted, both types of instruments have so far been solely issued on the domestic market in domestic currency (CZK). T-Bills are issued via the “Dutch” auction (single price) usually thrice a month and T-Bonds are issued via the “American” auction (multiple price) once a month. Only primary dealers have direct access to Treasury auctions. Auctions are organised by the CNB. Since 2002 issuance calendars have been published on a quarterly basis.

T-Bills are issued on the domestic money market with maturities 13, 26, 39 and 52 weeks for the purposes of treasury management and long-term state debt refinancing. Face value of T-Bills is CZK 1 million and they are issued as zero coupon discounted instruments. Issue size is in the range from CZK 8 to 20 billion (EUR 250 to 630 million). T-Bills markets are a very liquid segment of the money market which allows a flexible way of balancing revenues and expenditures, without direct credit from the central bank. To that end, the MoF keeps part of the issues in its own portfolio. Apart from T-Bills operations, the MoF may also buy and sell CNB bills as part of treasury management. In case of a surplus of liquidity the MoF can either buy its own T-Bills on the secondary market or to invest excess funds in CNB bills and realise the resulting gains. All market operations (repo transactions, sell and buy backs and direct buys and sales) are executed and initiated via its own account using CNB’s dealing room.

T-Bonds are issued on the domestic capital market with a face value of CZK 10 000. Up to 1999, only maturities of 2 and 5 years were issued usually amounting to CZK 5 billion (approximately EUR 157 million). At that time, the share of T-Bonds in the debt portfolio was very small. In connection with the above-mentioned new issue strategy the structure of available maturities has been modified and extended since January 2000 (at that time available maturities were 3, 5, 7, 10, and 15 years). In 2001 the maturity of 7 years was cancelled.7

Since 2000, more emphasis was put on supporting liquidity in the secondary capital market as well as issuing bonds with benchmark status. To that end, re-openings have become an important instrument. This re-opening lasts approximately 1 or 2 years depending on the maturity of issues and the
requirements of refinancing risk management. Issue size grew gradually from approximately CZK 20-25 billion to CZK 30-100 billion. In terms of maturity, longer ones are preferred by investors, especially the ten-year benchmark.

From the start, T-Bonds have been issued as debt instruments with a fixed interest rate. This means that the gradual increase of their share in the debt portfolio contributes to the strategic target of extending the average maturity of the state debt and its duration. Thus far, the MoF has not been forced to issue floating rate-linked, inflation-linked or exchange rate-linked T-Bonds to reduce refinancing risk. Moreover, refinancing risk management in the case of T-Bonds was always consistent with the desired exposure to market risk.

An important step in market risk management is the implementation of derivatives operations. Based on the framework approved by the Czech government, the MoF began executing interest rate swaps in the fourth quarter of 2002. Due to the high liquidity of the CZK derivative market, these operations (for relatively high notional amounts) had no significant impact on market prices. These operations are carried out by competent staff of the GDMU.

**Organisational set-up and risk management responsibility**

The GDMU was established with an organisational structure allowing proper internal controls and lowest possible level of operational risk (see Figure 16.1. This structure is based on best practices as endorsed by the OECD Working Party on Debt Management and other international bodies.

**Figure 16.1. The Government Debt Management Unit at the MoF – Organisational structure in 2003**

![Organisational structure](image-url)

Source: GDMU MoF.
The GDMU, being part of the organisational structure of the MoF, has no special legal status or formal autonomy. GDMU’s Head is directly subordinated and responsible to the First Deputy Minister of Finance, the chief decision-making person in the area of the debt management and budgetary policy of the central government. The main expected benefits of the operations by the GDMU can be summarised as follows:

- strengthening and development of the two basic treasury functions (government debt management and cash management);
- clear identification of the unit responsible for the management of state financial liabilities vis-à-vis financial market, public, analysts, central bank and other departments of the MoF (particularly Financial Policy and State Budget Departments);
- direct contact with the chief decision-making person in this policy area so as to increase the flexibility of the decision-making process within the MoF required for the long-term successful fulfilment of the debt management objectives;
- transfer of all liabilities created by the transformation process to the central government;
- increase in credibility of monetary- and debt policy via the strict separation of the responsibilities and activities in these two policy areas;
- increase in transparency of debt management activities and better communications with investors;
- higher priority to middle-office functions such as risk assessment and risk management and development of capacity for analysing alternative debt strategies.

Prior to the creation of GDMU, there was a discussion about the proper organisational place of the risk management function. One option was to outsource this activity (e.g. by using the capacity of the central bank). The decision to give the newly created GDMU the responsibility for risk management, was based on the need to support directly strategic decisions about debt policy. An additional argument was the objective to centralise the management of all government liabilities (and not just marketable debt instruments) as well as to integrate hidden debts and contingent liabilities of the central government within a single debt portfolio. This is the only way to monitor and manage effectively the overall risk profile of state finance in the future and to quantify its impacts on the state budget and fiscal policy.\(^{10}\) Consequently, the strategy and risk management division (SRMD) was created within GDMU. The head of the SRMD reports directly to the Head of GDMU. Regular reporting of basic indicators of the risk profile of the central debt
portfolio is therefore conducted by GDMU’s Head to the First Deputy Minister, who in turn informs the Minister of Finance.

III. Risk management framework

Risk management is an integral part of designing alternative debt strategies and belongs therefore to the core of modern debt management and financing policy. Risk management consists of the identification of the main risks of the debt portfolio, the selection of quantitative indicators to measure them, and the determination of risk limits with a medium-term horizon as part of the preparation of the debt strategy.

Currently, risk management is focused on the debt portfolio and not yet on a broader asset and liability management framework. Conceptually, government debt risk is seen in terms of the broader macroeconomic context of the tax-smoothing or the deficit-smoothing approach. In practice these concepts do not play any role at this stage. The reason is the relatively low share of interest costs in GDP (and in the state budget expenditure) and the resulting small potential impact on macroeconomic stability.

**State debt dynamics as the main macroeconomic risk in the medium-term**

The Czech Republic has a relatively favourable position in terms of government debt (the ratio of gross government sector debt to GDP stood at around 30 per cent at the end of 2003). However, this position is expected to worsen in the medium-term. By the end of 2006, the ratio of government debt-to-GDP is expected to reach around 40 per cent, driven by higher structural deficits. Projections also indicate that the ratio of local government debt to GDP will grow slightly in future.¹¹

Debt accumulation and contingent liabilities represent the main threat to the successful fulfilment of government debt management policy objectives (including those for risk management) over the medium-term.

**Main risks associated with the state debt of the Czech Republic**

State debt dynamics is therefore the main source of risk for the central government. Already now, the refinancing amount is higher than that for redemptions – see Figure 16.2.

Consequently, the minimisation of refinancing risk is currently the main impulse for the design of the debt strategy. The MoF pays therefore increased attention to bringing this risk objective in line with another strategic target: increasing the liquidity of T-Bonds issues. Liquidity support via re-openings should contribute on top of the decrease in interest costs to the reduction of liquidity risk. However, when there is a conflict between these two strategic targets, the management of refinancing risk will get higher priority.
Debt accumulation and growing costs of the debt service mean that expenditures are getting more sensitive to financial market developments. The main market risk determining the volatility of debt service cash-flows is interest rate risk. Since the MoF has been issuing only T-Bonds with fixed interest rates, it is the relatively high share of short-term debt that generates this risk (especially T-Bills) which also is responsible for refinancing risk.

The government is not exposed to significant exchange rate risk. In the past, only non-marketable debt was denominated in foreign currencies. Marketable instruments have thus far been issued only in domestic currency.

Credit risk is connected mainly to interest rate swaps.\(^{12}\) Due to the relatively small size of the swap portfolio, the MoF currently does not have special procedures and models to monitor credit risk and does not use collateral for credit risk management. The SRMD only monitors market value of individual deals on a daily basis and follows key standard principles when executing swap executions. Counterparties of swap operations are international banks with high credit ratings and with which the MoF has signed ISDA Master Agreements. Trades are distributed over counterparties so as to avoid high exposure concentrations.

**IV. Refinancing and interest rate risk management**

The risk profile of the Czech state debt portfolio in 2003 is given in Table 16.2.
III.16. RISK MANAGEMENT OF GOVERNMENT DEBT IN THE CZECH REPUBLIC

Table 16.2. **Czech state debt portfolio in 2003**

<table>
<thead>
<tr>
<th></th>
<th>31 March</th>
<th>30 June</th>
<th>30 September</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outstanding (CZK bn)</td>
<td>429.1</td>
<td>452.3</td>
<td>476.7</td>
</tr>
<tr>
<td>Outstanding (EUR bn)</td>
<td>13.4</td>
<td>14.3</td>
<td>15.0</td>
</tr>
<tr>
<td>Market value, inc. swaps (CZK bn)</td>
<td>466.3</td>
<td>495.3</td>
<td>514.4</td>
</tr>
<tr>
<td>Market value, inc. swaps (EUR bn)</td>
<td>14.6</td>
<td>15.7</td>
<td>16.2</td>
</tr>
<tr>
<td>T-Bonds/T-Bills ratio</td>
<td>1.3</td>
<td>1.5</td>
<td>1.7</td>
</tr>
<tr>
<td>Short term debt, maturing within 1 year (%)</td>
<td>44.6</td>
<td>40.9</td>
<td>44.3</td>
</tr>
<tr>
<td>Floating-rate debt (%)²</td>
<td>2.2</td>
<td>2.5</td>
<td>2.1</td>
</tr>
<tr>
<td>Interest-rate refixing within 1 year, inc. swaps (%)²</td>
<td>40.8</td>
<td>36.9</td>
<td>40.5</td>
</tr>
<tr>
<td>Foreign currency debt (%)²</td>
<td>1.1</td>
<td>0.9</td>
<td>0.0</td>
</tr>
<tr>
<td>Average maturity (years)</td>
<td>3.2</td>
<td>3.6</td>
<td>3.9</td>
</tr>
<tr>
<td>Modified duration (years)</td>
<td>2.8</td>
<td>3.0</td>
<td>3.1</td>
</tr>
<tr>
<td>Modified duration, inc. swaps (years)</td>
<td>3.1</td>
<td>3.2</td>
<td>3.3</td>
</tr>
<tr>
<td>Non-marketable debt (%)²</td>
<td>2.9</td>
<td>3.1</td>
<td>2.5</td>
</tr>
</tbody>
</table>

1. Incl. accrued interest.
2. % of total debt outstanding.

Source: GDMU MoF.

The main criteria for managing **refinancing risk** are:

- redemption (maturity) profile for the total state debt between years;
- redemption (maturity) profile for the total state debt within the year;
- monthly refinancing profile of new central government borrowings;
- share of T-Bills of total of marketable debt;
- share of debt due within 1 year of total state debt;
- average time to maturity of total debt.

The profile of future redemptions is a key consideration when designing the issuance schedule, including setting the maximum amount that can be issued along the yield curve. In managing this redemption profile, the MoF seeks to achieve a balance between the volume of debt due in respective years and the regular monthly distribution of respective issues due within the individual years. No explicit quantitative criteria have been introduced thus far.

The main way to achieve desired redemption profiles is via new primary auctions of T-Bonds in line with the objectives of refinancing risk management. These objectives and operations are communicated to the financial market. This increase in transparency of debt policy has led to the successful prediction of quarterly issue calendars by market participants.

For refinancing risk management, the criterion of the share of debt due within 1 year (short-term debt) is relevant. An important contribution to the minimisation of refinancing risk is the raising of funds from the
domestic capital market through the auctions of T-Bonds. Monthly refinancing and redemption profile of T-Bonds during 2002 and 2003 are given in Figure 16.3.

Figure 16.3. Monthly refinancing vs. redemption profile of T-Bonds during 2002 and 2003 (CZK billion)

The management of interest rate sensitivity of debt service costs is based on the concept “cash flow-at-risk” (and not “value-at-risk”) because of its link to state budget risks as being the most important risk facing the government. As part of this approach, both modified duration and the time profile of the distribution of refixing of nominal interest rates (interest rate refixing profile) are being monitored. Even when the duration indicator exceeded the value of 3 years, the share of short-term debt represented an important source of interest rate risk (even after taking into account the impact of interest rate swaps). Interest rate refixing profile is the indicator monitored by the MoF since the beginning of 2003. The reason for its significant difference from the redemption profile (and therefore its growing importance) is caused by the following two factors:

- interest rate swaps are being used in order to manage duration of the debt portfolio;
- decision by the government to accept long-term project loans with floating interest rate (re-fixed on a quarterly basis) from EIB.
The difference between redemption profile and refixing profile of the current debt portfolio is shown in Figure 16.4.

Figure 16.4. State debt redemption profile vs. interest rate refixing profile (inc. swaps), September 30, 2003

Figure 16.4 clearly illustrates the impact of interest rate swaps on the reduction of the interest rate risk exposure vis-à-vis redemption profile and refinancing risk. The MoF carries out CZK swaps to enable to pay a fixed rate on long term maturities and to receive a floating rate on short term maturity (6 month PRIBOR) to cover the T-Bills yield. The positive impact of swaps on the volatility of the interest rate cash-flow is slightly reduced due to the simultaneous acceptance of loans with floating interest from EIB for infrastructure projects. However, these loans, thanks to their long maturity and amortised repayment of the principal, extend the average time to maturity of the debt and contribute to smoothing the redemption profile.

Therefore, portfolio interest rate swaps represent a flexible short-term instrument to increase duration and distribute the refixing of the nominal interest rate payments over time. The development of duration in the medium-term depends mainly on the speed of debt accumulation (which in turn is determined to an important degree by MoF’s efforts in decreasing the share of short-term debt). However, portfolio duration can be expected to increase in the coming years by the continued emphasis on maintaining
sufficient liquid benchmark issues of T-Bonds with fixed interest rate on the domestic market, the management of refinancing risk and possible Czech issuing activity in the future at the long-end of the European yield curve.

V. Future challenges in risk modelling

The decision to develop and modernise these middle-office functions clearly signalled the key importance attached to them by senior management in the preparation of the debt and issue strategy of the central government. Further improvements in procedures and systems in accordance with best international practice as developed by the OECD and other international bodies, are being planned.

As noted, financial risks of government debt are assessed in relation to the volatility of state budget cash-flows, and not only as a part of liability management. The key task of the SRMD is therefore to develop a basic simulation model with a 1 year horizon and, as a related longer-term task, to integrate it in an explicit way within a broader ALM framework.

Moreover, a more sophisticated quantification of risks and specification of cost/risk trade-offs associated with alternative debt strategies is necessary as well. The MoF is aware that the active management of government debt requires a quantitative base for the further development of debt instruments and execution of derivatives operations. The macro simulation model should therefore play a key role in the planning of debt strategies and the related choice of the optimal debt structure. To that end, it is necessary to quantify the relation between debt portfolio duration and budget cash flows volatility, the calculation of Cost-at-Risk, as well as the determination of an optimal portfolio benchmark. Deviations from the benchmark should be carefully analysed and possibly reduced or eliminated via operations on primary and secondary markets. The macro framework for risk management consists mainly of the simulation of the development of the output gap, inflation, primary budget balance, interest rate and exchange rate. Generation of the short end of the CZK yield curve should be consistent with the discretionary reaction function of the central bank.

Against this backdrop, the first step is to calculate on a regular basis the cost/risk trade-offs based on deterministic and stochastic simulations within the isolated debt portfolio. A more sophisticated next step is the use of an integrated ALM framework that would require co-ordination with relevant units within MoF responsible for the preparation of fiscal and macroeconomic projections. The importance of this co-ordination also grows in connection with the approved principles of medium-term fiscal targeting and the binding
expenditure frameworks which are part of the approved draft of the Czech Republic public budgets reform.

GDMU’s development philosophy is to use a step-by-step process of internal development of techniques and models instead of the external acquisition of a single package. The turn-key implementation of externally acquired models has as drawback that MOF users do not sufficiently participate in their step-by-step development. This in turn might impair their capability to interpret correctly relevant outputs, thereby reducing the usefulness of models as support for strategic decision-making about debt policy. Another risk might be the omission of certain specific structural features of transformation economies such as the Czech Republic which would bias the results obtained with externally acquired models.

In view of the further extension of the use of active debt management instruments, there is an ongoing discussion about the use of buy-back and switching operations. The key motivation of the GDMU to implement these operations is to improve the flexibility in managing refinancing risk and interest rate risk, which would in turn allow better support of the liquidity of benchmark issues. However, the introduction of such operations is hampered by high budget deficits and the lack of an internal theoretical model of the CZK yield curve.

Further development in the area of the risk management and risk modelling is determined by hiring and retaining competent employees and by decisions concerning GDMU’s software applications. Due to salary levels at the MoF new employees are usually not hired from the financial sector. Instead, the GDMU maintains intense contacts with academic researchers and focuses on the hiring of university graduates. The GDMU is able to provide them with a flexible environment for further education. However, the hiring of programming- and IT professionals remains an obstacle.

As for software applications, the SRMD uses mainly Microsoft Excel, Visual Basic for Applications and analytical instruments of the Bloomberg terminal. The debt portfolio is segmented within the respective spreadsheets into sub-portfolios – treasury bills, treasury bonds, swap portfolio and non-marketable loans from international institutions. These sub-portfolios are automatically revalued through links to the Bloomberg database. Subsequently, an overall report on the risk position of the central government is generated, including the current values of the risk parameters that are being monitored. Outputs are available on a daily basis, while selected parameters are disclosed at the end of each quarter. For quantitative research, the SRMD uses a software package of Econometric Views for econometric modelling and Statistica (including Neural Networks) for time series modelling and analyses. For the simulation of the development of interest rates only simple methods
have been used thus far, mainly bootstrapping techniques. These simulated interest rates are used to calculate the impact of alternative debt structures on the risk and debt strategy parameters over a horizon of 15 years. The use of more sophisticated interest rate models is part of the above-mentioned step-by-step development of a more comprehensive model simulation framework for government debt management.

The further modernisation of the GDMU concerns the launch of the project “Design and Establishment of a State Treasury System” with assistance provided by the French Ministry of the Economy, Finance, and Industry. This project envisages the introduction of a new IT system for debt – and cash management, including the risk management module.

Notes

1. See Annex for a brief description of these sub-regulations.


8. The only inflation-linked bonds were in the form of a certificate and were issued in August 1997 in connection with the financing of repairs of flood damages (Flood Bonds). The total size was in the amount of CZK 5 billion and they were intended mainly for households via public offer. These bonds were repaid in 2002.


10. See Table (this volume) for details on best practices in managing contingent liabilities.

12. In the Czech Republic credit risk is of great importance in connection with contingent liabilities of the central government. However, their management is not (yet) an integral part of debt management.

ANNEX 16.A

Government Debt Management Regulations

The general authorisation of the MoF to manage government debt and treasury functions is given via the Competency Act (No. 2 of 1969), which stipulates that MOF executes the treasury functions. MoF’s responsibility for the administration of state financial assets and liabilities is addressed in the Budgetary Rules Act, in force since 1 January 2001 (No. 218 of 2000). In accordance with this act, state budget expenses related to the service and amortisation of government debt are reported under the separate budgetary subhead No. 396 State Debt. This act also allows the MoF to execute operations on the secondary market and create reserve funds from the yield of treasury bonds issues, to be used for interest rate and liquidity risk management.

Bonds Act (No. 530 of 1990) stipulates that treasury bonds are issued by the MoF on behalf of the Czech Republic. The MoF is also in charge of determining issue conditions and executes all activities connected with the administration and redemption of government debt arising from issuing treasury bonds. The act also stipulates that the legal permission to issue treasury bonds must be determined solely based on the following special acts.

First, the Budgetary Rules Act, which governs also the treasury liquidity management and authorises the MoF to take measures necessary to adjust the treasury imbalance between income and expenditures by accepting a loan or by selling treasury bonds. There is a limit for these operations, set at 6 per cent of total expenditures of the state budget and approved each calendar year by the State Budget Act. This limit can be increased by the amount of the deficit approved by law. This act also authorises the MoF to cover the state budget deficit from the previous year by issuing treasury bonds until the Parliament decide how to solve this deficit.

Second, Special Acts on bonds programmes; these acts stipulate the purposes, maximum scope and maximum maturity of all liabilities arising within such programmes. During the implementation these programmes MoF has the authority to issue different types of bonds with different issue conditions.
The *Czech National Bank Act* (No. 6 of 1993) is also important for debt management. The fundamental importance of this Act is that it protects the Czech National Bank (CNB) from monetising government debt. CNB’s main target is price stability. It maintains treasury accounts in accordance with the Budgetary Rules Act and it sells treasury bonds on the domestic market in accordance with the Bonds Act. Therefore, by law, the primary auctions of treasury bonds are organised by the central bank. Moreover, CNB executes related activities such as development of the primary market for state securities, primary market and secondary money market operations according to the needs of the MoF, and also related operations concerning bookkeeping, payments and settlement. Thus, CNB acts as fiscal agent of the central government.
PART III

Chapter 17

Risk Management of Government Debt in Poland*

by
Arkadiusz Kamiński and Marek Szczerbak

* Arkadiusz Kaminski, Ph.D., Director of Public Debt Department and Marek Szczerbak, Forecast and Strategy Unit, Public Debt Department, both of the Ministry of Finance. The cut-off date for information in this chapter is end of June, 2003.
I. Introduction and background

**Developments of public debt management since 1989**

Public debt management in Poland has a relatively short history. It begins with the political and economic transition started by the collapse of the communism in 1989. Since then, the structure of public debt and its management, including the institutional and market environment, have changed dramatically. In 1989, State Treasury debt consisted only of vast amount of foreign debt in a form of bank loans. The majority of this debt was not serviced due to solvency problems in the 1980s.

Since 1989, the development of public debt management was guided by a consistent and carefully planned process, moving from passive debt servicing to active debt management, including by managing the various risks involved. This included the restructuring and reduction of foreign debt (in 1991 and 1994 debt owed to official creditors associated in the so-called Paris Club, in 1994 debt owed to commercial banks associated in the so-called London Club), creation and development of the domestic market of treasury securities (first bond issue in 1989, regular T-bills auctions since 1991) and borrowings in the international markets (first bond issue in 1995). Related changes in organisation, legal framework, technical infrastructure, methodology and available instruments followed in parallel.

**Volume and structure of the State Treasury debt**

In 2002, State Treasury debt amounted to EUR 81.6 bn (42.5 per cent of GDP). Approximately 2/3 of the total debt was domestic, mainly in marketable treasury securities that can be a subject of active risk management. The foreign debt, constituting the remaining 1/3, consisted of four different groups. The main part was the non-marketable debt owed to creditors from the Paris Club. Other three groups were the (non-marketable) loans from international financial institutions, granted for various purposes connected with supporting the transition of Polish economy, the (marketable) so-called Brady bonds issued to restructure the debt to the London Club creditors, and new issues of bonds in international markets.

The structure of State Treasury debt changed significantly since 1990, as a result of a strategy to broaden the scope of choice for debt management instruments so as to be in the position to influence the cost and risks characteristics of the debt portfolio. This resulted in a reduction of the share
of non-marketable debt, a developed domestic debt market and credibility in international markets. The following table illustrates changes in the volume and structure of the State Treasury debt:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>State Treasury debt (% of GDP)</td>
<td>95.1</td>
<td>86.7</td>
<td>54.3</td>
<td>43.0</td>
<td>42.5</td>
</tr>
<tr>
<td>State Treasury debt (total = 100)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic</td>
<td>13.1</td>
<td>26.0</td>
<td>39.6</td>
<td>50.9</td>
<td>66.9</td>
</tr>
<tr>
<td>Marketable</td>
<td>0.1</td>
<td>10.8</td>
<td>32.1</td>
<td>36.9</td>
<td>59.7</td>
</tr>
<tr>
<td>Non-marketable</td>
<td>13.0</td>
<td>15.2</td>
<td>7.5</td>
<td>14.0</td>
<td>7.2</td>
</tr>
<tr>
<td>Foreign</td>
<td>86.9</td>
<td>74.0</td>
<td>60.4</td>
<td>49.1</td>
<td>33.1</td>
</tr>
<tr>
<td>Marketable</td>
<td>0.0</td>
<td>0.0</td>
<td>9.5</td>
<td>11.8</td>
<td>8.9</td>
</tr>
<tr>
<td>Non-marketable</td>
<td>86.9</td>
<td>74.0</td>
<td>48.7</td>
<td>39.5</td>
<td>24.2</td>
</tr>
</tbody>
</table>

**Organisational framework**

Management of the State Treasury debt is carried out within the Ministry of Finance. A separate Public Debt Department was established in 1994. At first, it dealt solely with domestic debt. In 1998, domestic and foreign debt activities were merged into a single department. Organisational changes resulted in a move from focusing on instruments to functions. Accordingly, a separate unit for foreign debt, as well as front, middle and back offices were created. These organisational changes reflect the transition from simple borrowing operations to active debt management. In 2002, foreign debt was separated once again and now moved to the Foreign Policy Department.

Sureties and guaranties granted by the State Treasury are managed by a different department of the ministry.

**Debt instruments**

There has been feedback relation between the stage of development of the financial market in Poland and the set of instruments available for public debt management. The introduction of new instruments depended to an important degree on the increasing stability of Polish economy and growing maturity of the financial market. These reforms resulted in the demand for particular financial instruments. Together with the related supply of these instruments a market was created. The range of instruments has been gradually broadened, which resulted in new opportunities for risk management.

The most important developments in the domestic market of treasury securities were:

- 1989 – first (non-marketable) treasury bonds;
- 1991 – treasury bills;
- 1992 – first issue of 1 year inflation-linked bonds;
1992 – first issue of 3 year floating rate bonds;
1994 – first issue of 2 year and 5 years fixed rate bonds;
1995 – first issue of 10 year floating rate bonds;
1999 – first issue of 10 year fixed rate bonds;
2001 – introduction of switching auctions of treasury bonds;
2002 – first issue of 20 year fixed rate bonds;
2002 – introduction of primary dealers system and electronic market of treasury securities.

Retail instruments have been also introduced as an additional, stable source of financing.

In order to gain access to core international markets, foreign issues have been also made since 1995. The basic rationale is to ensure a cost effective source of refinancing the maturing part of the non-marketable stock of foreign debt. Future membership in the euro zone as well as a proper diversification of exchange rate risk have been taken into account in choosing foreign currency markets. The most important developments in issuing in international markets were:

1995 – first USD bond denominated issue;
1996 – first DEM bond denominated issue;
2001 – first EUR bond denominated issue;
2002 – first GBP bond denominated issue;

**Debt management strategy**

Since 1999, the public debt management in Poland has been carried on the basis of a formal policy document on public debt management. Under the Public Finance Act (1998), the Minister of Finance submits each year the Public Sector Debt Management Strategy to the Council of Ministers for approval and, next, forwards this document to the Parliament, together with the justification of a draft Budget Act. The strategy covers normally a 3-year horizon but a longer time horizon is possible. It includes:

- the assessment of the past implementation of the previous strategy's objectives;
- macroeconomic and budgetary assumptions;
- risk analysis;
- objectives of the strategy and corresponding tasks for a three-year horizon;
- new instruments of implementing the strategy;
forecast of debt volume and debt servicing costs;
● analysis of influencing the debt of the public finance sector;
● threats to the implementation of the strategy;
● conclusions – expected effects of implementing the strategy.

The principal objectives of the debt strategy\(^1\) are:
\(a\)) To maintain the amount of public debt at a prudent level.
\(b\)) To minimise debt servicing costs over the long-term subject to an acceptable level of risk (see below).

Long-term is determined by the longest maturity of those debt instruments that have a significant share in the financing of the borrowing needs; currently this means 10 years.

**Risk management**

Because of uncertainty regarding the macroeconomic-, budgetary- and market environment, risk management is an integral part of public debt management. The control of risks emerged as a key part of active debt management, a development facilitated by the increase in the number of available debt management instruments. The importance of risk management is also reflected in changes in the organisational structure such as the creation of a middle office in 1999. The objectives and corresponding tasks of debt management were formulated in both cost and risk terms, including the identification and measurement of the key risk components.

The highly non-optimal debt structure of Polish debt in the early 1990s made it quite easy to formulate the desired overall changes in this structure in terms of risk parameters. For example, foreign exchange rate-, refinancing-, and interest rate risks were all considered too high. The strategic (qualitative) objectives were therefore to decrease the share of foreign currency denominated debt, the development of the domestic market so as to improve its efficiency in order to be able to finance borrowing needs on the domestic market, as well as to increase the average maturity and duration of domestic debt. Over time, the question arises what the desired cost and risk balance should be in terms of more precise quantitative criteria. This calls for a formal framework of risk management, which includes translating the qualitative objectives of the strategy into quantitative targets.

**Reporting and staff considerations**

Currently, the basic risk indicators are used in two ways. Firstly, they are published in monthly State Treasury debt bulletins. Secondly, their expected future values are published as forecasts in the strategy of debt management. Every year, they are analysed in a context of executing the previous strategy’s
objectives. There are no strict quantitative targets; risk indicators are used as input into an informal decision process. Such a system was considered satisfactory during the market development stage. More recently, a start has been made with the development of a more formal framework of risk management.

In doing so, in 2002 the debt management unit was split into two: 1) one dealing with current debt management and borrowing operations, and 2) the other with strategic planning and risk management. The strategy and risk management unit has 4 persons with knowledge of debt management and good theoretical knowledge of risk management (although, thus far, not much practical experience). Their qualifications have been improved through an extensive training programme and study visits to foreign institutions with a more advanced methodology.

II. Overall risk management strategy

The debt management strategy addresses the main risks related to debt management. Analysis of these risks forms a basis for formulating objectives and tasks of debt management. The various risks have been divided into three groups:

Risk related to the volume of debt

This risk is defined as the risk that the volume of debt will exceed a prudent level. Neither theory nor practice determines what the exact prudent debt level is, because it depends on the specific situation of the economy in question. Generally, the more developed the economy, the higher the critical prudent level of debt can be set. A prudent level is understood as a level that would allow the timely servicing and refinancing of debt in a longer-term perspective. An excessive level of public debt can have a negative impact on the state budget itself (high debt servicing costs and crowding out of other expenditures), the economy (crowding out of private investment), and monetary policy (via pressures on interest rates).

Polish law provides for prudential and remedial procedures if the ratio of state public debt to GDP increased by expected payments under sureties and guarantees granted by entities of the public finance sector exceeds thresholds of 50 per cent and 55 per cent, as well as the constitutional limit of 60 per cent based on the Maastricht criterion.3

Clearly, the debt manager has limited means of influencing the level of public debt as this is to a great extent determined by the net borrowing needs.4 However, in a broader context, public debt management is an integral part of economic policy of the government. Since the strategy of debt management is approved by the Council of Ministers, it is incorporated into the overall strategy of public finances.
Risks related to the structure of debt and (volatility of) debt servicing costs

These risks constitute constraints to the objective of minimising debt servicing costs over the long term. The main risks are defined as follows:

- Refinancing risk. Due to structural differences between domestic and foreign markets, refinancing risks in local and foreign currencies are being distinguished.
- Foreign exchange risk. The risk of changes in the value of foreign debt volume and debt servicing payments resulting from changes in exchange rates.
- Interest rates risk. The risk of changes in debt servicing costs resulting from changes in interest rates.
- State budget liquidity risk. The risk that state budget cannot settle current liabilities and pay for current expenses.
- Credit risk.
- Operational risk.
- The distribution of debt servicing costs over time.

In contrast to the risks related to the volume of debt, which is managed mainly by higher-level policymakers, risks related to the structure of debt and volatility of debt servicing costs can be addressed directly by debt managers. 5

Risk related to sureties and guarantees granted by the State Treasury

Sureties and guarantees constitute a contingent debt; they increase the risks related to both volume and structure of the debt. Under Polish law, expected payments under sureties and guarantees add to the debt to GDP ratio (which is subject to limitations under the Public Finance Act), while executed sureties and guarantees are debt servicing costs.

III. Assessing policies and trends in managing risks

Risk related to the volume of debt

Macroeconomic and budgetary risks related to control of debt level are important but usually not directly addressed in debt management strategies. However, in Poland this was done for the first time the debt strategy for 2003-2005, by setting a macroeconomic objective of maintaining the public debt volume at a prudent level. This move reflected concerns about the possible negative consequences of a higher debt level for the economy and the state budget.

In the period 1991-1994, the level of State Treasury debt (as the principal component of public debt6), moved downward, reached 54.3 per cent of GDP and since then gradually decreased to 38.9 per cent in 2000. The main reasons
were fast economic growth, moderate budget deficits and high proceeds from privatisation (a one-time source of financing for meeting the borrowing needs). This trend was reversed in 2001. The structural deficit of public finances was exacerbated by the economic slowdown, while the significance of privatisation decreased. This resulted in a considerable increase in the debt-to-GDP ratio from 2001 onward. Pressure on government expenditures will continue in the near future due to the co-financing requirements related to entering the European Union in 2004.

The strategy of bringing the debt volume down to prudent levels is dependent on a sustainable path of fast economic growth as well as reform of public finances, especially on the expenditure side.

**Risks related to the structure of debt and volatility of debt servicing costs**

**Domestic currency refinancing risk**

The main risk indicators are the average time to maturity (2.80 years for the marketable debt in mid 2003; Table 17.1 contains details from 1999 onward) and share of debt maturing within a year (34.1 per cent for treasury securities). These levels of risk are still considered too high although the situation has improved considerably by developing the domestic market, in particular the introduction of new instruments with longer maturities, ranging from treasury bills with maturities varying from 4 to 26 weeks in 1991, to 20-year fixed rate bonds in 2002. This has resulted in a significant decrease in refinancing risk. The pace of the decrease in refinancing risk by increasing the average maturity was to some degree determined by cost considerations. However, very high priority was attached to the reduction of refinancing risk, even if higher borrowing costs had to be accepted at the beginning of the development of new market segments.

**Table 17.1. Average time to maturity and duration of PLN denominated marketable debt (in years)**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>T-bills</td>
<td>0.36</td>
<td>0.35</td>
<td>0.48</td>
<td>0.52</td>
<td>0.48</td>
<td>0.47</td>
<td>0.47</td>
</tr>
<tr>
<td>T-bonds</td>
<td>3.38</td>
<td>3.17</td>
<td>3.17</td>
<td>3.12</td>
<td>3.33</td>
<td>3.36</td>
<td>3.42</td>
</tr>
<tr>
<td>T-securities</td>
<td>2.52</td>
<td>2.60</td>
<td>2.58</td>
<td>2.51</td>
<td>2.61</td>
<td>2.73</td>
<td>2.82</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>T-bills</td>
<td>0.35</td>
<td>0.34</td>
<td>0.47</td>
<td>0.51</td>
<td>0.48</td>
<td>0.47</td>
<td>0.46</td>
</tr>
<tr>
<td>T-bonds</td>
<td>2.04</td>
<td>2.05</td>
<td>2.10</td>
<td>2.14</td>
<td>2.45</td>
<td>2.61</td>
<td>2.77</td>
</tr>
<tr>
<td>T-securities</td>
<td>1.55</td>
<td>1.69</td>
<td>1.72</td>
<td>1.76</td>
<td>1.96</td>
<td>2.16</td>
<td>2.32</td>
</tr>
</tbody>
</table>
In the beginning stages, bond issuance was aimed mainly at achieving a smooth distribution of redemptions in terms of months. In 2002, when the capacity for dealing with refinancing risk was sufficiently developed, a new issuing policy was introduced, aimed at the creation of large liquid benchmark issues. The strategic objectives were to reduce borrowing costs (via the liquidity premium) and to prepare the Polish treasury securities market for the integration with European markets (on 1 May 2004, Poland became a member of the European Union). Since late 2001, the refinancing risk of these benchmarks is managed via switching and buy-back operations.

Other reform steps included the introduction in 2002 of a primary dealers system and electronic treasury securities market. These institutional reforms contributed to the improvement of the efficiency, transparency and liquidity of the market, contributing to the reduction of both debt servicing costs as well as refinancing risk. In the debt strategy for 2004-2006, the following targets have been set to reduce the domestic currency refinancing risk:

- increasing the average maturity, determined by the market situation;
- achieving a smooth distribution of maturing and serviced debt over time;
- decreasing the share of treasury bills in domestic debt.

**Foreign exchange risk**

The main risk measure is the share of debt denominated in foreign currencies in total State Treasury debt. In mid-2003, foreign debt accounted for 34.0 per cent of the total, while at the beginning of the transition this was 100 per cent. The steady drop in the share of foreign debt was the result of reductions and restructuring of the foreign debt (in 1991 and 1994, about 50 per cent in net present value terms) as well as the adoption of a policy guideline for net foreign financing to be non-positive.

The complete elimination of exchange rate risk is not possible because of the structure of the foreign debt (a large amount of the foreign debt is non-marketable, namely the Paris Club part and loans from international institutions; they accounted in mid-2003 for 57.5 per cent and 11.0 per cent of foreign debt, respectively) but also on the grounds of borrowing cost considerations. The costs of these outstanding non-marketable loans is lower than similar market loans under current market conditions.

The active management of foreign debt includes the use of call options and buy-back operations for Brady bonds. Risk management includes volume considerations and currency structure. The foreign debt used to be denominated in a great variety of currencies. In the past, the foreign debt
portfolio could be characterised as follows: 1) most of it was in non-marketable form (and this could of course not be actively managed); 2) it was relatively cost-effective (due to high spreads between yields in the Polish market and foreign markets as well as costs below market rates); and 3) it was self-hedging (due to diversification of currencies). The following developments have changed this situation: redemptions of the debt; the introduction of the euro; the issuing of new debt in international markets; and convergence of PLN rates to EUR levels. Currently, the bulk of the debt is concentrated in two currencies: EUR and USD, while the low yields of foreign issues do not seem to compensate for risk generated from exchange rate volatility.

In this situation, our debt policy consists of further reducing the share of foreign debt, concentrating the issuance in the EUR market (as a future domestic currency market), as well as properly diversifying exchange rate risk (opportunistic, cost-oriented issues are executed in non-EUR markets). The share of EUR-denominated debt is rising, accounting for 55.5 per cent of the foreign part of the State Treasury debt in mid-2003. Besides exchange rate risk considerations, there are also strategic reasons for using foreign loans for financing certain activities such as for restructuring the economy. Loans are mainly for financing infrastructure projects and provided by international financial institutions (such as the World Bank and European Investment Bank).

In the debt strategy for 2004-2006, the following guidelines were set to reduce the foreign exchange risk:

- continuation of the policy rule to borrow abroad mainly to refinance the existing foreign debt;
- using loans from international financial institutions for financing investment and restructuring projects as well as for the pre- and co-financing of European Union projects;
- using other non-marketable sources for financing special purposes projects of particular importance for Poland.

The maturity profile of the State Treasury domestic debt is presented in Figure 17.1.

**Foreign currency refinancing risk**

The main risk measure is average maturity of foreign debt. It is relatively high (6.0 in mid-2003 for the whole portfolio), although there has been a decreasing trend in recent years. This is mainly the result of the long original maturities of Paris Club loans and Brady bonds, which were designed to help restructuring the Polish economy after the fall of communism. There will be significant changes in the maturity profile in coming years, as the peaks of Paris Club debt that needs to be refinanced will be in the years 2004-2009. As
preparation, starting in 1995, the Polish state is present in crucial\(^8\) foreign markets. At first, small issues were executed once a year; subsequently, the volume and frequency of issues increased. In the coming years, at least 2-4 issues per year will be executed in international markets.

In the debt strategy for years 2004-2006, the following guideline was adopted to manage the foreign currency refinancing risk: the maturity dates of the existing foreign debt will be taken into account, while issuing new foreign debt in other currencies than euro.

The maturity profile of State Treasury foreign debt is presented in Figure 17.2.

**Interest rate risk**

The main interest risk measure applied for domestic debt is average duration of debt, which is a measure of sensitivity of debt servicing costs to changes in interest rates. In mid-2003, the duration of marketable debt stood at 2.32 years (a rise from 1.55 years at the end of 1999; see details in Table 17.1). The improvement was the result of developing new segments of the yield curve and introducing fixed rate instruments with longer maturities, while moving the bulk of borrowing to the longer end of the maturity spectrum. Currently, the most important instrument is the 5 year fixed rate bond, with
2 year zero-coupon bonds the second most important one, while treasury bills still constitute a considerable portion of domestic debt (18.5 per cent in mid-2003).

The interest risk measure applied for foreign debt is the share of debt with interest rates that need to be refixed within a year (that is, the sum of floating rate debt and debt maturing within a year). Such debt accounted for 43.1 per cent of foreign debt (of which 40.2 per cent was a floating rate debt). This generates considerable interest rate risk, but not as significant as exchange rate risk generated by the high volatility of exchange rates (influenced by changes on the Polish currency market and from cross-currency changes).

In the strategy for 2004-2006, the following policy targets were set to reduce the interest rate risk:

- increasing the duration of domestic debt in line with market conditions, in particular the demand for fixed rate bonds with medium- and long-term maturities and further convergence of domestic interest rates to European levels;
- the issuance of mainly fixed rate debt in foreign markets.

**Liquidity risk**

The main instrument for managing this risk is holding sufficient liquid assets to shield the state budget from temporary market distortions that
would prevent the state from acquiring funds at reasonable cost. There are two main aspects of liquidity management:

- Setting the volume of liquidity at the lowest prudent level (due to alternative costs of keeping liquid assets) through careful planning and monitoring of cash flows via improving the technical infrastructure (which includes government plans for introducing a unified budget account for all public sector entities as well as monitoring the sub-accounts in an on-line mode).

- Managing liquid assets in a most profitable way, which includes government plans for widening the instrument range (deposits in commercial banks and other transactions on the money market).

In 2002, the average amount of liquid assets at the end of a month was 96 per cent of monthly gross borrowing needs. Liquid funds assured financing for 9 to 31 days in particular months (on average 25 days). There was no need to issue short-term treasury bills (with maturities below 13 weeks). Switching auctions were used to reduce both the liquidity and refinancing risks, thereby significantly decreasing volumes of bonds outstanding with closest maturities. In 2002, a system for managing foreign currency liquidity was introduced. This system has a foreign account of state budget and revolving credit facilities, allowing short-term (bridge) financing until the proceeds from a foreign bond issue or privatisation (in foreign currencies) become available.

In the debt strategy for 2004-2006, the following objectives were set for managing liquidity risk:

- maintaining a prudent level of state budget liquidity, while ensuring the efficient management of liquid assets;\(^9\)

- further development of the system of foreign currency liquidity management.

**Credit risk**

Currently, there are no sources of credit risk related to debt or liquidity management. But the framework of credit risk management will need to be prepared as new instruments are planned to be implemented. This includes deposits in commercial banks (and possibly repo transactions) for state budget liquidity management\(^10\) as well as derivatives for interest rate and foreign exchange risk management, especially interest rate- and currency swaps. The system for credit risk management is likely to include the creation of lists of approved counter-parties for entering into transactions with the State Treasury, as well as setting limits on volume of transactions, depending on the counter-party's rating and risk involved in a particular kind of transaction.
In the strategy for 2004-2006, the following policy guideline was formulated to manage credit risk: only transactions with foreign and domestic entities with a high credibility are allowed.

**Operational risk**

Operational risk is the least quantitative of all risks considered. Increasing complexity and sophistication of debt management instruments, as well as the international integration of markets, necessitate adjusting the institutional and organisational structure of debt management so as to reduce operational risk. Actions include the creation of a more robust infrastructure of the market but also adjustments in the organisational framework of debt management such as closer co-ordination between the domestic- and foreign debt units. The development of the market creates new challenges to operational risk management that require the use of more sophisticated methods, as well as a more flexible and active approach to debt management using a technical infrastructure compatible with that of market participants. It is also important to avoid possible conflicts between the short-term objectives of the fiscal policy and long-term strategy of debt management.

Operational risk can further be reduced by developing a more sophisticated methodology for supporting key debt management decisions. The Polish Public Debt Department is currently working on the introduction of a benchmark methodology for assessing the volume and structure of debt. Another project is the implementation of an IT system for increasing the safety and integrity of data bases, for strengthening our analytical capabilities, as well as for supporting middle office functions.

In the debt strategy for 2004-2006, the following objective was formulated to reduce operational risk related to the technical infrastructure and organisational structure of debt management.

**Other risks**

Other risks include the risk of changes in debt volume and structure originating from legal obligation to take over the debt of other entities than State Treasury or meeting the obligations of State Treasury resulting from other reasons than financing the borrowing needs. Clearly, legal and political sources of risk are hard to predict and therefore difficult to manage. However, procedures are in place for converting this type of debt (usually non-marketable) into treasury securities, since such operations were already executed in the past. Another risk of a similar nature is related to possible financial operations on assets, liabilities or future proceeds of State Treasury, such as securitisation.
**The distribution of debt servicing costs over time**

Debt servicing costs should have a smooth distribution over time, in order to avoid distortions in constructing the state budget. In budgets prepared using cash-based budgetary accounting rules, the debt servicing costs of securities issued with deep discounts are concentrated at their future maturities. Issuing them might be tempting to policymakers because they reduce current debt costs (but, of course, their debt servicing costs are higher in the future). Since these securities were issued in the past, they are likely to increase our debt servicing costs in the coming years. In order to smooth their distribution over time, the use of debt management instruments such as buybacks and switches is required. In the future we plan to use derivatives as well, especially interest rate swaps.

In the debt strategy for 2004-2006, the objective is to better manage and distribute debt servicing costs (as a ratio of GDP) over time. For domestic debt, we aim at a decrease in the cost to GDP ratio, as a result of the decrease in interest rates and growth of GDP, despite the projected increase in debt volume. This should reinforce issuing bonds of medium and long maturities with payments smoothly distributed over time. In contrast, an increase in the cost to GDP ratio is possible for foreign debt, due to the need of refinancing maturing non-marketable debt (which is relatively cheap), at market rates. Issues with substantial discounts will in the future be avoided.

**Risk related to sureties and guarantees granted by the State Treasury**

The State Treasury granted more sureties and guaranties recently. Accordingly, the risk that potential debt will become actual debt has increased. Expected payments associated with guarantees and sureties as a percentage of GDP rose from 1.3 per cent in 2001 to 1.6 per cent in 2002. The following rules are to be followed in order to reduce or contain the risk related to sureties and guaranties while retaining their advantages:

- Focus on selected sectors crucial for sustained economic development such as infrastructure and protection of the environment (including projects co-financed by the European Union).
- An overall limit of expected payments of 2 per cent of GDP. This includes avoiding that sureties and guaranties will generate substantial risk, especially the ones granted via special (political) "sector" Acts.
- But sureties and guaranties to support traditional sectors of the economy should not be granted either.
IV. Assessment of the current quantitative risk management framework

The simulation model

Efficient management of public debt requires taking into account cost and risk considerations. This in turn calls for a formal modelling framework. Currently, we use a simulation model, which includes the modelling of the impact of various issuance strategies14 (under different budgetary and market scenarios) on the volume and structure of debt as well as the implications for the debt servicing costs. The model allows for stress testing and sensitivity analyses.

The annual plan of financing the borrowing needs is translated into monthly plans and adjusted monthly to the market and budgetary situation, while assuring the coherence with the state budget act and the overall Debt Strategy. Various cost and risk measures are currently in use to support the debt management decisions. The current framework, although quite comprehensive, has many limitations. The most important ones are:

- Lack of an integrated database (data is either fragmentary or highly aggregated; no straight-through processing takes place, resulting in high operational risk).
- A low degree of automation of data processing. This means that more sophisticated analyses would be very time consuming, thereby limiting the capacity and scope of the analyses currently carried out (for example in terms of the number of different scenarios).
- The framework lacks quantitative targets which makes assessing compliance with debt objectives difficult.
- There are no formal procedures for linking the outcome of analyses with decisions.
- Every non-standard project requires a separate model, usually using simulations.
- The lack of a generally agreed theoretical methodology hampers the development and use of mathematical support models.

Conclusions and plans for the future

Against this backdrop, a more formal approach to public debt management should cover the following elements:

1. Quantitative targets for debt parameters (for translating qualitative strategic objectives into detailed, operational targets).
2. A solid theoretical framework (for determining the desired values of debt parameters).
3. Formal procedures for decisions and evaluating (the formalisation of debt and risk management on the operational level).

4. An efficient infrastructure (an information system with an integrated database that can provide the information needs of debt managers).

The following projects are based on the above diagnosis:

- The implementation of an IT system (the implementation of a front and middle office system customised to specific needs of public debt management was completed in September 2003).
- The introduction of a benchmark portfolio (a pilot version is to begin this year).
- The development of a debt management model (planned).

V. Risk management based on benchmarks

In order to introduce more formal debt and risk management procedures, the Public Debt Department of the Ministry of Finance is working on the introduction of a benchmark portfolio. The benchmark methodology consists of:

- a set of (quantitative) parameters of the State Treasury's debt; a target steady state benchmark (the desired values of debt parameters);
- a path for reaching the benchmark (consistent with the time horizon of the debt strategy);
- limits on the values of the debt parameters (these are quantitative bands reflecting risk preferences); and
- a periodical revision of the benchmark portfolio, to adjust for new information in the environment.

Unresolved questions concern the level of acceptance of a benchmark portfolio and whether it should be announced to the market. The benchmark could consist of the following parameters: duration (for domestic debt, EUR denominated debt, other debt); average maturity; share of debt maturing within 1-, 2-, 3 years; share of foreign debt (or possibly currency distribution); share of floating rate debt; share of retail instruments.

Two benchmark portfolios would be distinguished: a medium term reference benchmark corresponding with a 3 year horizon of the strategy and a long term steady state target benchmark. Reference benchmarks would be subject to annual adjustments to new information in the environment, while target benchmarks would be adjusted rarely (for example as new research knowledge would become available). An integrated debt model is to be developed as a conceptual framework for decision-making. An important question to be addressed is whether to develop a model using in-house resources or external expertise. On the basis of the experiences from other debt offices, the best solution seems to be a compromise between these two options: the
development of an in-house model in close co-operation with external experts; the latter experts need to have excellent knowledge of modelling techniques and financial markets.

Implementation of an integrated IT system is a sine qua non for the development of a more advanced methodology for supporting debt management decisions. This system should make available reliable data from an integrated database, automatically calculate cost and risk measures, as well as create reports.

The main objective of the new system is to support front- and middle office functions, budgetary planning, and reporting functions. The new system will enable strategic planning functions and scenario analyses of both existing debt and simulated transactions. It is envisaged that the data generated by this system will be used in the new debt management model.

**Notes**

1. As formulated for the years 2003-2005 and confirmed for the years 2004-2006.

2. The strategy and risk management unit is also involved in other responsibilities.

3. The Polish methodology of calculating public debt is more restrictive than the European Union methodology, resulting in a higher debt to GDP ratio. In 2002, this ratio was 47.2 per cent according to Polish methodology, in comparison with 41.6 per cent according to ESA 95 methodology.

4. For given borrowing needs, the nominal debt volume can to some extent be influenced by the use of debt management instruments such as buy-backs or derivatives. When such instruments are used, there is usually a trade-off between debt volume and debt servicing costs. Also an efficient secondary market can contribute to a reduction in debt servicing costs.

5. The State Treasury debt is directly managed by the Minister of Finance. Other government debt components, such as debt of the remaining central government sector (including health care units and social pensions fund) and of local governments, are subject only to indirect influence with respect to both volume and structure.

6. At the end of 2002, State Treasury debt stood at 93.0 per cent of public sector debt.

7. ATM was higher for overall treasury securities due to long maturities of non-marketable bonds issued on various occasions for special purposes. The importance of non-marketable domestic debt is decreasing, in mid 2003 it accounted for 5.0 per cent of domestic debt.

8. EUR and USD markets are considered crucial, although JPY, GBP and CHF are also of importance.

9. This includes the introduction of a unified account of the state budget, allowing for complete information on liquidity at the end of each day. An on-line system of monitoring and managing the accounts of all budgetary entities will be introduced after that.
10. Currently, liquid assets are invested in a form of short term deposits in the National Bank of Poland only.

11. Such as the restructuring of the debt of health care units.

12. Cash basis accounting rules are currently used in budgetary accounting, as well as in liquidity risk management. Accrual basis accounting rules are used simultaneously as they give a better measure of the distribution of the cost burden over time.

13. In 2002, this ratio stood at 3.1 per cent, of which domestic debt 2.7 per cent of GDP.

14. This also includes buy-backs, switches and swaps.
Advances in Risk Management of Government Debt

Advances in Risk Management of Government Debt is a landmark study about risk management practices of OECD debt managers. Risk management has become an increasingly important tool for achieving strategic debt targets, and is now an integral part of a wider strategic debt management framework based on benchmarks in most jurisdictions. However, the study shows that the extent and sophistication of risk management vary widely across countries.

This study brings together a number of recent reports on best practices for managing market risk, credit risk, operational risk and contingent liability risk. It was prepared by a collective of authors from the OECD Working Party on Public Debt Management, and includes case-studies of risk management practices in selected OECD debt markets.


The full text of this book is available online via this link: http://new.sourceoecd.org/finance/9264104410

Those with access to all OECD books online should use this link: http://new.sourceoecd.org/9264104410

SourceOECD is the OECD’s online library of books, periodicals and statistical databases. For more information about this award-winning service and free trials ask your librarian, or write to us at SourceOECD@oecd.org.