Session 4

MANAGING PUBLIC DEBT

DEBT MANAGEMENT: A SURVEY OF THEORETICAL DEVELOPMENTS AND INNOVATIONS IN EUROPEAN PRACTICES

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Introduction

Debt management practices in Europe are evolving quickly. The working environment of government debt managers in Europe has transformed considerably during the last few years. The introduction of the euro was the most significant one, creating conditions for a pan-European capital market. Exchange rate risks within the euro area no longer exist, market conventions have been harmonised and efficient linkages between European settlement systems have been established. Thus, debt managers became small to medium-sized players in a European capital market, instead of the dominant player in the national market. Consequently, competition among debt managers increased, stimulating a more efficient primary market and a deeper, more liquid secondary market.

Lower government deficits and debts have also changed the work environment of debt managers. Standing at 5.1 per cent of GDP in 1995, the average deficit in the euro area declined continuously until 2000, when a small surplus was reported of 0.2 per cent of GDP.[1] After having peaked at 75.4 per cent of GDP in 1996/1997, the average debt ratio in the euro area declined continuously until 2002, when it stood at 69.0 per cent of GDP. Reduced gross borrowing needs have started discussions on which instruments to use to finance debt, how to preserve liquidity in the market, and what role for interest rate swaps.

These developments have also affected theoretical thinking on debt management. In particular, the fiscal constraints introduced in the Maastricht Treaty have influenced theoretical work on deficit stabilisation. The independence of the ECB and the changed policy constellation, with one monetary policy actor and twelve national fiscal authorities, have been reflected in the academic literature as well.

This paper reviews recent developments in debt management in Europe, focussing on a few key aspects. Relevant theoretical developments as well as practical innovations in debt management since EMU are presented.[2] Key aspects we focus on are the objectives of debt management (section 1), the organisation of

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[1] This includes 1.1 per cent of GDP receipts on the sales of UMTS licenses. After 2001, deficits have been re-introduced, standing at an average of around 2.6 per cent of GDP in 2003 in the euro area.

[2] We refer to Favero *et al.* (1999) and Missale (1999) for comprehensive studies on government debt management before EMU.

debt management (section 2), the maturity of debt (section 3), inflation-indexed debt (section 4), debt denomination (section 5) and the ownership of debt (section 6). The final section offers our conclusions and considers some upcoming challenges for debt management in Europe.

1. Debt-management objectives

Theories on optimal debt management have emphasised a variety of goals over time, including macroeconomic stabilisation, supporting monetary policy, minimising costs and minimising risks.

Tobin (1963) looked at debt management primarily as a tool for macroeconomic stabilisation, with minimisation of interest costs coming secondary, and risk minimising not playing any role at all. Thus, in an economic upturn, issuance of new debt should be concentrated on longer maturities, driving up long-term interest rates, thus cooling off the economy.

Tax smoothing is the central government objective in Barro's work (1999). Debt levels in his approach vary over time to allow smooth tax rates, which is welfare improving. In his approach, issuing debt contingent on uncertain developments would be optimal. GDP-indexed debt, for instance, could be issued, with returns dependent on GDP: in a high growth environment, a higher return can be offered without changing tax ratios. Not being available, attention focuses on combinations of conventional instruments (nominal bonds, indexed bonds and foreign-currency bonds) that may produce similar results (see e.g. Missale, 1999). Which combination of instruments is optimal then depends on the type of shocks that the economy experiences. Inflation-indexed debt, for instance, is optimal in case of demand shocks: assuming a positive shock, rising GDP lowers the budget deficit, which is countered by rising nominal interest spending due to higher inflation. The choice of debt maturity can also play a role in smoothing tax rates (Angeletos, 2002).

More recently, Missale (2000) has suggested deficit stabilisation as the main objective of debt management The costs of using debt instruments for reducing the likelihood of budget balances breaching the 3 per cent of GDP deficit limit need to be weighted against the costs of the deficit exceeding 3 per cent of GDP. He argues that fluctuations in the deficit-to-GDP ratio can be minimised via an appropriate selection of debt instruments on the basis of inflation and real GDP-sensitivity of interest payments. The optimal structure depends on sign and strength of the correlations between inflation, real GDP growth and interest rates. Missale models the changes in optimal debt management under EMU following the introduction of a single monetary policy in the euro area, which affects the aforementioned correlations. Assuming the ECB to give high priority to price stability, his model shows that a combination of long-term conventional debt and inflation-indexed debt would be optimal for the purpose of deficit stabilisation.

Turning to practice, the primary objective of debt-management agencies is to ensure financing of the annual borrowing at minimal (medium-term) costs, at acceptable risks. The precise wording and emphasis differ somewhat between countries, as the two examples below show:

> Italy: "Efficient public debt management aims at meeting public borrowing requirements, and the renewal of redemptions by choosing a strategy that optimally combines the cost and risks of funding. " (Dipartimento del Tesoro (2003), *Guidelines for public debt management for 2004-05*, p. 2),
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> and
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> France: "… to manage the French Government's debt and treasury in the best interests of the taxpayer while maintaining the best possible conditions of security and risk control." (Agency France Tresor (2003), *2002/2003 Annual Report*, p. 4).

The more concrete operational targets or guidelines for debt-management units also differ among the European countries. Often, these are based on asset-liability studies or cost-at-risk models, weighting interest costs against budgetary risks. Targets can take the form of a target (range) for the average maturity or the (modified) duration,[3] subject to certain restrictions such as quantitative limits on the use of derivatives. For example, the French debt agency has a 2004 target of an average maturity (after swaps) of 5.3 years, implying a decline by nearly half a year compared to 2003. The Belgian debt agency has to operate within limits for the shares of different maturities in total debt, such as a 25 per cent cap for total euro-denominated debt for which the interest rate needs to be reset within a year. In the Netherlands, after focussing on duration, now the total annual refinancing amount (including swaps) is targeted, at a level of 9 per cent of GDP.

These goals of European debt managers bear little resemblance to the objectives identified in the academic literature. Active support to macroeconomic policies has lost ground because of reduced confidence in active demand management and more integrated capital markets. Tax smoothing likewise has been ignored as debt-management goal. Instead of focussing on the budget with the aim of avoiding large changes in taxes, debt managers focus more narrowly on reducing public interest payments and avoiding (risks of) large fluctuations. While *ceteris paribus* low interest rate costs contribute to lower taxes, interactions with other budget elements are not taken into account, possibly resulting in sub-optimal debt management from the tax-smoothing point of view.

The lack of practical follow-up also applies to the deficit stabilisation goal. Where the optimal composition of debt depends on types of shocks and on

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[3] The modified duration measures the change in the current value of the debt portfolio if the yield curve changes by 1 basis point.

covariances between macroeconomic variables, these are difficult to predict and may be subject to change. Stabilising deficit ratios could also conflict with the goal of output stabilisation. Finally, current experiences indicate that the costs of excessive deficits, politically, economically and financially, may be lower than anticipated. Taken all together, the benefits of adapting debt-management practices for deficit stabilisation seem limited.

Although the objectives identified in the academic literature do not coincide with the goals of the debt managers, Missale (2001) finds actual debt structures to closely resemble the optimal debt composition. In most countries, fixed-rate long-term debt dominates the funding of debt. The shares of inflation-indexed debt are below optimal levels. Thus, he concludes that current debt structures provide a sufficiently good insurance against macroeconomic shocks, and contribute to reducing risks of deficits above 3 per cent of GDP.

Nevertheless, the gap between the theory and the practice of debt management is striking. As mentioned by Leong (1999), possible causes include the nature of the models used (with taxpayers and bondholders basically coinciding). Differences in accounting conventions may also explain the different focuses. Whereas changes in the market value of the debt portfolio are central in most theoretical contributions, debt managers and policy makers in general focus on annual budgets.

2. Organisation of debt management

The evolution in the organisation of debt management is closely linked to changes in thoughts about debt-management goals. Emphasising macroeconomic stability naturally leads to the debt-management task being arranged to the Ministry of Finance, while fear of interference with monetary policy may lead to operational responsibilities being assigned to the national central bank.

The shift in thinking on the role of debt-management units that took place around the start of the Nineties was also reflected in giving more independence to the units involved. A stronger focus on "narrow" debt-management goals allows for more delegation to separate units. Also, higher product complexity and competition among debt managers requires a high degree of operational independence and professionalism, which is easier to accomplish for a non-government unit. Cost considerations sometimes also played a role.[4]

While the process started earlier, the advent of the euro and increasing competition between debt managers gave additional impulses to granting more independence to debt managers. Increasing independence of debt managers in France and Germany is a relatively recent development (2001).

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[4] In Germany, debt management was centralised in 2001, and is expected to deliver interest payments savings of up to ¾ bln euros per year.

Table 1

Government Debt Managers in the Euro Area

	Manager	Institutional position	Debt manager classification*	Website
Austria	Österreichische Bundesfinanzierungsagentur	Part of Ministry of Finance	SMO	www.oebfa.co.at
Belgium	Federale Dienst van de Staatsschuld	Part of Federal Public Service Finance	DMO	www.treasury.fgov.be/interdette
Finland	Valtiokonttori	State Treasury is supervised by Ministry of Finance	DMO	www.valtiokonttori.fi/rahpa/bulletin/bulletin.htm
France	Agence France Trésor	Part of Ministry of Economic Affairs, Finance and Industry	DMO	www.aft.gouv.fr
Germany	Finanzagentur	Company with German state as sole shareholder, represented by Federal Ministry of Finance	SMO	www.deutsche-finanzagentur.de/eng/
Greece	General Accounting Office	Part of Ministry of Economy and Finance	DMO	www.mof-glk.gr/en/home.htm
Ireland	National Treasury Management Agency	Chief Executive, appointed by the Minister for Finance, is directly responsible to him	SMO	www.ntma.ie
Italy	Dipartimenti del Tesoro	Part of Ministry of Economy and Finance	DMO	www.tesoro.it/publicdebt
Luxembourg	Trésorerie de l'Etat	Part of Ministry of Finance		www.etat.lu/TS/
Netherlands	Agentschap van Financiën	Part of Ministry with much autonomy	DMO	www.dutchstate.nl
Portugal	Instituto de Gestão do Crédito Público	Part of Ministry of Finance	SMO	www.igcp.pt
Spain	Tesoro Público	Part of Ministry of Economy	DMO	www.mineco.es/tesoro/htm/deuda/index_en.htm

* SMO stands for Special debt Management Office, being a separate unit outside the Ministry of Finance to which operational responsibilities are delegated. DMO represents a unit for debt management without such delegation. Classification: Currie *et al.* (2003) and own classification.

The precise organisation of debt management differs between countries (Currie *et al*., 2003). Some countries emphasise the role of portfolio management in debt management, and delegate operational responsibilities to separate units outside the Ministry of Finance (SMO), although the Ministry ultimately remains responsible. Examples include Austria, Ireland and Portugal. Other countries, such as Belgium, France and the Netherlands, have not gone that far, and maintain the debt-management unit as part of their Ministry, but with more independence. These countries emphasise the role debt management can play in public policy, e.g. regarding maintaining well-developed financial markets. Table 1 presents an overview of the organisation of debt management in the euro-area countries.

3. Government debt maturity

Government debt maturity is seen as a key parameter in debt management, both in the academic literature and in practice. In theory, issuing short-term debt is cheaper than issuing long-term debt if the normal term structure prevails. Taking just a short-run cost perspective, the optimal policy probably would be to borrow (much) short-term and to invest in the equity market (Campbell and Shiller, 1996). Against this, the refinancing risk is higher for short-term debt. Regular refinancing implies a higher risk of having to refinance debt at higher interest rates. Such policy will also add to volatility of budget balances and of household disposable incomes.

Debt maturity has often been related to the size of government debt, following a time-consistency point of view. Missale and Blanchard (1994) expect a negative relation between debt and maturity above 100 per cent of GDP, arguing that high debt increases government incentives to inflate the debt burden away, requiring the government to issue short-term debt. De Haan *et al.* (1995) argue that a positive connection between size of debt and maturity sometimes can be expected if a higher debt ratio forces the debt manager to lengthen maturity to avoid a crisis of confidence. In the model of Drudi and Giordano (2000), negative relations between the size and the maturity of debt prevail at low and extremely high debt levels. In the first case, it reflects fears of inflating away debt if debt becomes larger, and at extremely high debt levels the default risk premia become too large for governments to use long-term debt. In the intermediate range, the relation becomes positive, as governments try to avoid refinancing risks by lengthening maturity.

In addition, Miller (1997b) considers effects of political instability on debt maturity. Political instability causes inflation uncertainty, reflected in higher long-term interest rates. This creates incentives to issue a larger portion of debt with short-term maturity.

The link between central bank independence and debt maturity is also explored in the literature. A very high level of central bank independence is a wall against inflationary pressure from a government. Falcetti and Missale (2001) argue that central bank independence is more efficient in overcoming time-inconsistency

problems and in reducing inflationary expectations than issuing inflation-indexed or foreign-currency bonds. Thus, longer maturities in the late Eighties are attributed to increased central bank independence, reflecting increased investors' confidence in longer-run price stability. With a larger volume of nominal bonds outstanding, the sensitivity of output to inflation, and thus the effectiveness of monetary policy is increased. Rising current inflation with constant inflation expectations keeps expenditures constant, thus avoiding changes in distortionary tax rates.

Based on the above, the EMU regime would suggest a lengthening of maturities. Time-consistency concerns have abated, as central banks have a high degree of independence, direct monetary financing has been ruled out, and price stability was set as the primary objective of the ECB. Furthermore, debt levels have come down following the rules of budgetary discipline enshrined in the Maastricht Treaty.

The maturity choice of European debt managers since EMU has been partly motivated by liquidity concerns, with low liquidity premia contributing to low costs. The development of EMU, with decreased cross-border obstacles to trade, has caused an increased interest in issuing standardised "plain vanilla" government bonds, especially 10 year bonds. Usually, the size of these bond issues is rather large compared to the pre-EMU years, with the aim of achieving a high degree of liquidity in the markets. While issues of about 2 bln euros were standard in smaller countries pre-EMU, the minimum nowadays is 5 bln euros, with large countries in the euro area issuing bonds of over 20 bln. euros.[5]

Substantially lower long-term interest rates compared to pre-EMU years also created incentives for a focal shift to the long-term segment of the capital market. This applies in particular to countries with previously less disciplined fiscal policies, such as Greece and Italy. The exchange rate risk premium in interest rates vanished with the adoption of the common currency.[6] In addition, credit risk premia may also have decreased because of improved public finances and limits on government deficit and debt.[7] From a debt-management perspective, therefore, joining EMU has been a major contribution to the objective of cost-minimisation.

With government deficits generally lower than some years ago, the possibilities of issuing one or more large 10-year benchmark bonds decreased, especially for the countries with smaller government debts. Governments have used various strategies to increase borrowing possibilities at benchmark maturities. Buy-back operations and bond switching operations have been introduced or extended, while non-tradable debt instruments, such as retail debt, have decreased in

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5 The lower limit for government securities to be eligible for trading on the EuroMTS electronic platform is 5 bln euros.

6 The exchange rate risk premium was particularly high in Italy (1.5 percentage points), but also significant in Spain (1.0 percentage point) and in Finland and Ireland (0.4 percentage points), according to Blanco (2001) in a study in which Greece was not included.

7 The relative contribution of liquidity and of credit risk as main differentiating feature among government bonds is subject to debate (See, e.g., Codogno *et al*., 2003 and Santillán *et al*., 2000).

Table 2

Residual Maturity of Government Debt in the Euro Area
(years)

	Ultimo 1995	Ultimo 1998	Ultimo 2002	Ultimo 2003
Austria	5.8	5.5	6.0	6.3
Belgium	-	-	6.1	5.9
Finland	-	4.8[a)]	4.5	3.9
France	6.3	6.3	5.9	5.9
Germany	4.9	6.0	6.0	6.3
Greece	-	3.9	6.1	6.2[c)]
Ireland	-	-	4.5	5.8
Italy	4.5	5.2	5.6	6.1
Luxembourg	-	7.0	2.3	1.9
Netherlands	6.9	6.5	6.1	6.0
Portugal	-	3.8	4.5	4.3
Spain	3.7[b)]	5.4	6.0	6.1
Euro Area	-	-	5.8	6.0

a) Ultimo 1999.
b) Ultimo 1996.
c) At the end of the 3rd quarter of 2003.
Source: *Annual Reports of Euro-area Debt Managers*, OECD (2003).

size.[8] Some additional room for issuing benchmark bonds in the market came from a decrease in short-term financing. The share of short-term debt fell particularly in Belgium, Greece and Italy, which all three are countries with very high debt ratios.

At the start of EMU, issuances heavily concentrated on 10-year bonds, with all euro-area debt managers active in that market. The 3, 5 and 30 year segments also remained attractive, with about half of the debt managers issuing at least one security in those segments (EFC, 2000a). More recently, a somewhat wider spectrum of maturities has been selected, including some reversion to issuing short-term securities. Factors underlying this include the aim of establishing benchmarks in the short end of the entire yield curve. Furthermore, disappointing

[8] Easier access of individuals to the primary and secondary market for government bonds via financial intermediaries and the Internet also plays a role in decreasing the volume of retail debt.

deficit developments resulted in unplanned borrowing requirements, which are easier to finance in the short term and allow some smoothing over time. Short-term debt can also help debt managers to even out redemptions over time. This is often a secondary objective of debt managers, to ensure frequent contacts with capital markets and being able to issue large liquid bonds each year. Finally, historically low short-term interest rates favoured issuances in the short-term segment.[9] At the other end of the maturity spectrum, Italy is considering issuing 30-year bonds.

The outcome of these developments has been a strong convergence of the residual maturity of government debt, to an average of around 6 years in 2003 (see Table 2). This process already started before the launch of the euro (Favero *et al.*, 1999). Broadly speaking, the average residual maturity in the large majority of countries is now within a 5.5 to 6.5 years band, with exceptions in a few smaller countries. Dispersion was larger before, though limited data availability and caveats in definitions and data collection call for caution in interpretation, especially when making cross-country comparisons.

The convergence in maturities can be seen as contributing to a more homogeneous transmission mechanism of monetary policy in the euro area. However, it has to be taken into account that government debt only plays a minor role in the entire transmission process. Debt levels of course also continue to differ substantially, contributing to differences in the strength of the transmission. Furthermore, the residual maturity of government debt is a limited indicator for transmission goals. Many debt managers nowadays use interest rate swaps, making the concept of residual maturities a less useful indicator of the short-term interest rate sensitivity of government interest payments.

4. Inflation-indexed government debt

The benefits and drawbacks of inflation-indexed bonds are much debated in the theoretical debt-management literature. Discussing pros and cons of inflation-indexed bonds can be grouped around the objectives of the parties involved. (Shen, 1995).

Treasuries may benefit from issuing inflation-indexed bonds as investors do not need to be compensated for inflation uncertainty, and thus require a lower interest rate. Benefits may be particularly large if government's inflation expectation deviates from markets' expectations.[10] In addition, under some circumstances inflation-indexed bonds may contribute to stabilising expenditures, and thus result in some tax smoothing. Indexed debt may be particularly useful for this purpose if macroeconomic shocks are predominantly demand shocks, and inflation and growth

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[9] Low short-term interest rates made Ireland finance its entire gross borrowing requirement (4 bln euros) short-term in 2001.

[10] A case in point is the first European issue of an indexed bond, in the UK in 1981, where the government had a lower inflation expectation on account of a strong belief in its anti-inflation policy.

Box 1. Interest Rate Swaps Increasingly Popular

Interest rate swaps conducted by euro-area debt managers normally imply that the debt manager receives the long-term interest rate from a counterparty and pays the short-term interest rate. This effectively reduces the duration of the outstanding debt as the maturity until the next interest rate fixing is reduced (Ladekarl and Svennesen, 1999).[11]

The increasing popularity of interest-rate swaps is related to reduced government financing needs. Combined with the policy of issuing high volumes of benchmark bonds to obtain liquidity in these markets and guidelines for the maturity of debt, this leaves little choice for steering the risk profile of government debt.[12] Swaps introduce more flexibility in debt management by separating the question of liquidity from the risk profile.[13] While issuing long term benchmark bonds, cost advantages of short-term interest rates can be reaped.[14]

Using interest rate swaps also introduces risks (Piga, 2001), such as the counterparty risk: the possibility that the counterparty can no longer fulfil its obligations. Authorisation for debt managers to conduct swaps is therefore accompanied by several restrictions, regarding the minimum rating of counterparties, maximum risks per counterparty and overall maximum risks. Only a limited number of government debt managers provide (non-standardised) information on swap operations undertaken and the risks involved. The risks involved were recognised by the French minister of finance, who temporarily suspended swap operations in September 2002 in view of the high volatility in financial markets.

are negatively correlated (Missale, 1999). Potential disadvantages are reduced predictability of nominal interest payments, resulting in larger sensitivity of budgets to inflation and more volatility, unless revenues are also inflation-sensitive. Issuing this type of debt also risks segmenting the market, with a liquidity premium in the

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[11] Swaps can be (and apparently have been) used also to provide government high revenues today, to artificially improve the budget, at the expense of lower revenues later (Piga 2001).

[12] Higher deficits in recent years have increased the number of issuances of 10-year bonds. To avoid overshooting the targets for maturity/duration, some debt managers have used reverse, payer swaps.

[13] Governments being big players, their behaviour may affect the operation of the swap market itself. Remolona and Wooldridge (2003) observe a ceiling on euro swap spreads, as governments enter the market to receive short-term interest rates when differences between government long-term interest rates and swap rates become large.

[14] France uses swaps since 2002 and has estimated the gain at 200 mln euros. The Dutch public debt manager has calculated that it has saved 111 mln euros due to using interest rate swaps in the period 1999-2001.

market for indexed bonds, as their size and trade usually is limited,[15] but possibly also in the other debt markets if liquidity is reduced because of smaller borrowing requirements in that market. It has also been argued that the default risk premium of the government increases, as the road to reducing the real value of debt via inflation is cut off. Price (1997) has documented main rationales for governments to issue inflation-indexed debt in a variety of countries.

Investing in indexed bonds offers investors protection against inflation.[16] Such may be particularly attractive for institutional investors like pension funds, giving the opportunity to match their long-term, inflation-sensitive liabilities. Via "demonstration effects", a larger market for inflation-indexed products may arise, providing more opportunities for inflation-risk adverse investors to hedge against inflation. Campbell and Shiller (1996) argue on these grounds that setting up such a market classifies as a public good. The start of a market for derivatives of inflation-indexed products may contribute to further develop the market, also fostering liquidity (European Commission, 2003b).

For monetary policy authorities, indexed bonds allow for deducing market participants' inflation expectations, by comparing yields on an index-linked bond and on a nominal bond with the same maturity.[17] Inferences on this basis may be more reliable that those based on other sources like interviews as it reflects economic decisions rather than opinions. Furthermore, issuing indexed bonds may reduce government's incentives to put pressure on central banks for higher tolerance of inflation with a view to reducing the real value of government debt,[18] although a high degree of central bank independence is a better safeguard against this. Another consequence of issuing indexed bonds could be the reduction of inflation aversion of investors, as they are protected from its direct adverse effects (Uhlig, 1997). Moreover, inflation indexation could spread to other parts of the economy, notably wage setting, increasing real wage rigidities.[19] Support for monetary policy aimed at price stability then may decrease (Pecchi and Piga, 1997), as well as monetary policy effectiveness.

Turning to practice, it can be argued that the introduction of the euro has reduced interest in this type of bonds following the lines of reasoning above. A large number of safeguards against high inflation have been introduced (the ECB primary objective of price stability, the high degree of independence of the ECB, the prohibition of monetary financing, the no-bail-out clause). The fact that the twelve national governments no longer have national authorities as monetary counterparts

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15 Liquidity is less of an issue insofar as investors, institutional ones in particular, want to hold this debt until maturity.

16 Governments dominate the market for indexed bonds, but some private companies have recently also entered the market. See Commission (2003b).

17 Changes in the inflation-risk, the liquidity premium or the tax treatment of indexed bonds may decrease the reliability of such inferences. See ECB (2003).

18 In this context, Ms. Thatcher referred to inflation-indexed bonds as "sleeping policemen".

19 Guidotti (1992) describes circumstances under which the likelihood of spreading of indexation increases.

but the European Central Bank, which focuses on euro-area wide developments, also reduces governments' possibilities to influence monetary developments.

Nevertheless, the market for indexed bonds is growing rapidly, as EMU has shifted issuers' and investors' incentives. So far, cost savings and establishing credibility had been major motivations for issuing this type of bond, while the primary reason for investing in it was protection against inflation risks. Nowadays, with low inflation (expectations), portfolio diversification emerges as the main motivation to invest in index bonds (European Commission, 2003b). Indexed bonds are of particular interest for pension funds, whose future obligations are linked to nominal developments because of the price or wage indexation of pension benefits. Investing in inflation-indexed bonds offers them the opportunity to match liabilities by nominal claims, reducing mismatches in the growth of assets and liabilities due to inflation. For governments, issuing indexed bonds may have the advantage of establishing one's name in a market that potentially can grow in light of the mounting importance of funded pension systems, and of developing the market for this product with possible private follow-ups.

Within the euro area, the number of countries issuing inflation-indexed bonds is small but growing: France, Italy and Greece. France has been issuing this type of bonds since 1998, linked to a domestic price index. Since 2001, bonds linked to the euro-area harmonised consumer-price index (HICP, excluding tobacco) are also offered, with a view to broadening the investor base. Issuance statistics confirm that ownership of inflation-indexed bonds is widely spread; some 75 per cent of the first French bond linked to the European price index were sold to non-residents, of which more than half were investors outside the euro area. To ensure that sufficient liquidity prevails in this market segment, the issuance programme will be speeded up; eventually some 10 per cent of net bonds issued will be inflation-indexed. Italy and Greece have taken up issues of inflation-indexed bonds of 5-year, respectively 20-year maturity in 2003, while Germany and the Netherlands are considering this option. Although growing rapidly, the share of inflation-indexed bonds in total debt is still relatively minor. In France, it currently represents around 4 per cent of total tradable central government debt.[20]

A somewhat related type of debt, GDP-indexed debt, has not seen the daylight yet. The main advantage of this kind of debt would be to limit the variation of the debt-to-GDP ratio, and thus chances of a debt crisis: in a recession, interest payments would be low.[21] Obstfeld and Peri (1998) discuss GDP-indexed bonds in the context of limited adjustment mechanisms in Europe to deal with asymmetric shocks. They suggest issuing perpetual debt linked to nominal GDP, and invest the proceeds internationally in a diversified portfolio. In that way, the country would be less vulnerable to economic shocks. Potential disadvantages of GDP-indexed bonds include fears of deliberate misreporting of GDP, and moral hazard as benefits of

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[20] The global market for indexed bonds has gown from 190 billion US$ to 440 billion US$ in October 2003, with the US and the UK together now accounting for 75 per cent.

[21] See Borensztein and Mauro (2002) for a discussion of pros and cons of this debt instrument.

growing faster are reduced. Furthermore, large government intervention may be needed to create a market for GDP-indexed bonds because of development costs and setting standards.

5. Denomination of debt

The choice of denomination of debt instruments is less debated in the literature than the choice of nominal versus indexed bonds (Gilson and Gerard, 2002) although there are similarities in choice. Both types of securities can be seen as commitment devices, protecting bondholders against domestic inflation and thus weakening government's incentives to pressure for high inflation. Like indexed debt, foreign-exchange debt can be instrumental in avoiding large variations in tax rates. Issuing foreign-currency debt is seen as more advantageous if the domestic and the foreign economies are strongly positively correlated. In such as case, the domestic economy can enjoy a free lunch: higher inflation in the foreign economy, e.g. to alleviate the debt burden, then also reduces the real burden of the domestic country without bearing the negative reputational consequences (Miller 1997a).

The choice for issuing debt in foreign currency seems to be motivated by practical considerations. These can include avoiding overburdening the domestic capital market, supplementing official foreign exchange reserves, increasing international ownership of bonds, and taking advantage of better financing conditions abroad. Claessens *et al.* (2003) find that smaller economies, with narrower domestic investor bases, take more recourse to foreign-currency debt. Financing conditions were found to have empirical validity in work of De Fontenay *et al.* (1995). Pecchi and Di Meana (1998), testing various theories on the denomination of debt, conclude that (expected) cost considerations matter a lot in deciding on issuing foreign-currency debt.

Issuing non-domestic debt sometimes is avoided because of prestige considerations, with recourse to foreign-currency debt regarded as a token of financial weakness. Furthermore, advantages as to costs are not always obvious in view of interest and exchange rate fluctuations and liquidity premia to be paid when a small issuer enters a relatively large market. Swaps, however, can be used to reduce excessive volatility in budgets resulting from exchange rate or interest rate changes.

The relevance of many of these motives has diminished in recent years in the euro area. Integrated European capital markets and improved public finances have relaxed fears of crowding out private capital demand. As for foreign exchange reserves, national central banks participating in the euro area have not expanded their holdings of foreign exchange reserves, sometimes linked to exchange rate targets, thus not providing additional demand for foreign-currency denominated debt. Likewise, with the advent of the euro, countries no longer need to issue securities in another major, non-domestic currency to attract international investors. The credible price stability objective of the independent central bank also reduced

the need for foreign-currency debt as a commitment device, as modelled by Gilson and Gerard (2002).

Countries' attitudes towards borrowing in non-euro currencies still differ. In some countries, reducing the foreign-currency-denominated debt is explicitly stated as part of the debt-management strategy (Belgium, Greece, Ireland and Italy). A few other debt managers, in search of favourable financing conditions, continue to use this possibility (Austria),[22] or do not exclude this option if conditions turn favourable (Germany, Spain). Italy continues issuing US dollar denominated securities, with a view to maintaining the benchmark status among non-US sovereign issuers. A few countries, such as the Netherlands, explicitly exclude the possibility of financing part of government debt in foreign currencies. France lifted the prohibition on borrowing in foreign currencies in 2003, and Germany now no longer excludes this possibility.[23] Countries using non-euro-denominated debt use forex swaps to reduce the exchange rate risk.

The share of debt in non-euro-denominated currencies, standing at 2 per cent in the euro area at the end of 2002, shows a slightly declining tendency, as it did before (Gilson *et al.*, 2002). With the introduction of the euro, debt denominated in foreign currencies of more than 3 per cent of GDP was automatically redenominated into domestic debt on 1 January 1999. The main currencies in which this type of debt is denominated are US Dollars, UK Pounds, Japanese Yen and Swiss Francs (Table 3). The share of foreign exchange denominated debt exceeds 10 per cent of total central government debt only in Austria (12 per cent) and Finland (13 per cent). Its level had been much higher previously: in 1995, for instance, the share of non-domestic currencies in total debt exceeded 25 per cent in Belgium, Finland and Ireland.

6. Debt ownership

Debt ownership is another topic in debt management that has received little attention in the literature. Issues highlighted are the possibilities to enlarge financing via international investors, and alleviated national macroeconomic and political consequences in case of government default, as default costs are borne by the issuer in trouble, and foreign owners do not vote cross-border. Practical considerations seem to dominate the decisions of debt managers whether or not to actively seek to attract attention of non-domestic investors.

Attracting foreign investors nowadays relies much less on the currency in which debt is denominated, but more on the features of the bond and the distribution

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[22] The Austrian debt management office indicates that long-term cumulative saving from using foreign-currency markets ranges between 1½ and 2 per cent of GDP (Hauth and Kocher, 2001).

[23] The introduction of the euro also had a major effect on debt managers outside the euro area. Denmark and Sweden, but also the ten countries joining the European Union in spring 2004, nowadays denominate a substantial part of their debt in euros, or issue debt in the domestic currency and then swap it to euros.

Table 3

Foreign-exchange-denominated Debt in Euro-area Countries, 2002

	as percent of total central government debt	US$	JP¥	GB£	CHF
Austria	12.7		45		55
Belgium	2.1	5	21		74
Finland	13.2	36	29	29	7
France	0.0				
Germany	0.0				
Greece (1)	2.8	61	15	6	18
Ireland	2.0			100	
Italy	3.5	80		14	6
Luxembourg	5.0				100
Netherlands	0.0				
Portugal	1.7	100			
Spain	3.3	49	47	4	
Euro area	2.0	52	19	10	19

(1) After using foreign-exchange swaps.

channels. While attracting foreign investors has been no major problem for the larger euro-area countries, for the smaller ones it has been a relatively new situation.

With the euro now being the domestic currency for twelve countries and exchange rate risks and costs having disappeared, the degree of national bias in investors' preferences has decreased.[24] Exchange rate risks used to play a major role, but non-standardised market conventions and a lack of efficient pan-European settlement systems also hampered international trade in government bonds. Nowadays, government debt managers are less "assured" about national demand for their debt securities, forcing them to enter into competition with other debt managers. Portfolio managers also diversify into a wider range of corporate bonds

[24] In some cases, legal restrictions on pension funds were effectively relaxed as the obligation to invest only in national currency automatically broadened the investment scope to the all euro-area countries.

given tight spreads for government bonds. Thus, government debt managers face increased competition, requiring them to cater to the desires of investors. Smaller countries in particular have taken action to increase attention for their products, for instance by road shows, and by issuing only a few, large bonds on a limited number of days.

To attract foreign investors, distribution channels have changed. All euro-area countries but Germany use primary dealers to distribute government bonds. These primary dealers mediate between the debt agency and the market and operate on both the primary and secondary market.[25] The latter function implies continuous offering of buy and sell prices, thus increasing the liquidity of the market. In all countries concerned, foreign financial institutions dominate in number, reflecting the wish to spread ownership of government securities widely. Bank syndicates have also gained in importance as distribution channel for government bonds. This approach has the advantage that banks can actively select foreign investors. Furthermore, it allows for placing a large debt volume at once, thus increasing the liquidity of the bond and making it immediately eligible for electronic trading.

Results indicate that ownership of government debt is indeed much more spread than before (see Figure 1). On average in the euro area, domestic ownership of total government debt decreased from 76 in 1997 to 63 per cent in 2002. Increased spreading of bonds' ownership occurred in most countries, but in the smaller ones in particular. Thus, in the Netherlands, foreign ownership of long-term government debt doubled in the period 1997-2001 to 51 per cent, in Spain it increased from 18 (1997) to 41 per cent (2002) in 2002, while in France non-residents' share of marketable debt increased from 15 (1997) to 36 per cent (2002).

7. Conclusions and outlook

Debt-management strategies have changed remarkably in recent years, following the introduction of the euro and declining government debt ratios. The objectives of debt management have remained more or less the same, but financing debt at low costs in this new environment required adapting strategies.

Academic literature on government debt management seems to have little bearing on debt managers' practices. Very practical considerations regarding costs and risks dominate the objectives adopted and debt instruments used.

Although the history and the institutional position of debt managers in the euro-area countries differ, a strong tendency for convergence can be observed since the start of EMU. In particular:

- the autonomy of debt-management agencies continues to develop, although to different degrees,

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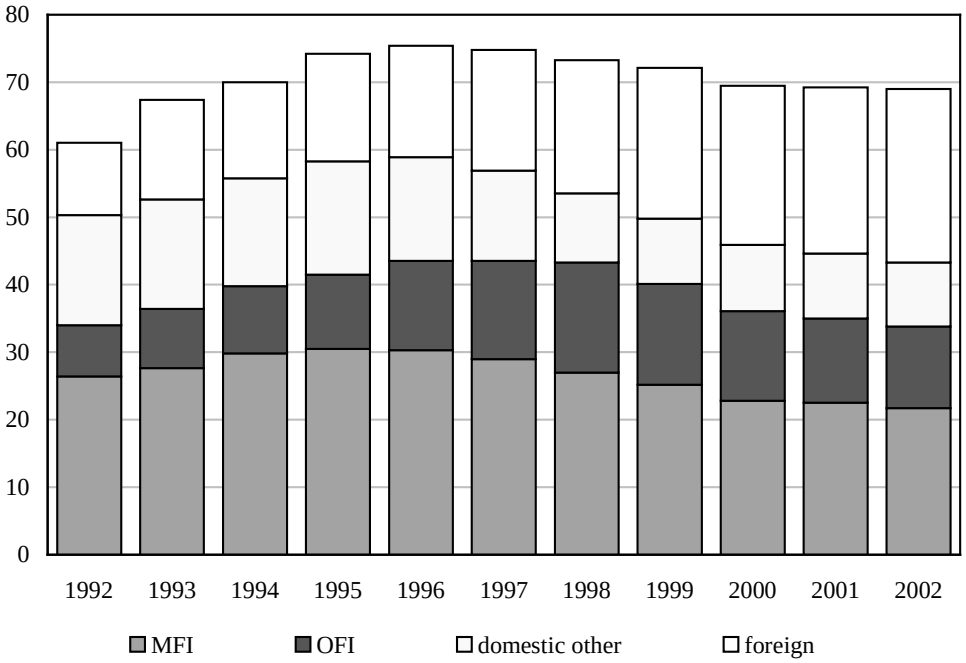
[25] See EFC (2000b) for more information on tasks and privileges of primary dealers in Europe.

Figure 1

Ownership of Government Debt in the Euro Area
(percent of GDP)



Note: MFI = Monetary Financial Institution, OFI = Other Financial Institution.
Source: ECB.

- in line with this, debt-management agencies have been given more precise goals and guidelines, emphasising key aspects of debt management such as maturity and refinancing risk,
- the average maturity of outstanding debt converges. The average residual maturity of debt in euro-area countries is now close to 6 years on average,
- increasingly, the duration of debt is managed by interest rate swaps. Public information on its use and the risk exposure of debt managers is often still lacking,
- index-linked debt instruments increase in importance, with more countries issuing this type of debt than before and others considering it. Portfolio diversification rather then cost saving appears to be the prime reason for issuing this type of debt, with particular emphasis on pension funds,
- less emphasis is given to issuing non-euro-denominated debt given the large pool of resources available in euro now,

- foreign ownership of euro-area government debt has increased notably since EMU, especially in smaller euro-area countries. Primary dealers and syndication are main distribution channels.

While convergence is central in debt management in Europe, some divergences remain, reflecting differences in objectives and in sizes of deficits and debts. Furthermore, the emphasis on converging debt-management practices has decreased somewhat lately reflecting a return to higher government deficits and an increasing willingness to innovate, to attract investors' attention.

Looking forward, debt managers in Europe will face some additional challenges. With low deficits and competitive auction data setting in the beginning of EMU, the issue of coordination of debt-management practices in the euro area has risen (Giovannini, 2000). Current high deficits have put the issue to the background, but it may revive once public finances have been put on a sounder footing again. Debt managers may then start to look for ways to improve coordination.

Ageing of populations will have a noticeable effect on government debt management. Higher pension and health care spending would raise deficits if no compensatory action were taken. Indeed, countries have agreed to make additional efforts to reduce debt burdens to free up resources that otherwise would be spent on interest payments. At the same time the demand for government debt, and possibly for (very) long-term index-linked debt in particular, is bound to rise because of the building up of pension funds, which will want to invest part of the entrusted money in safe government assets.

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DEBT MANAGEMENT IN A LOW-DEBT ENVIRONMENT: AUSTRALIA'S EXPERIENCE

Blair Comley and David Turvey[*]

Introduction

In recent years, debt management in Australia has been conducted within a Government policy of reducing Australian government net debt. Australian Government general government net debt fell from almost 20 per cent of gross domestic product (GDP) to less than 4 per cent of GDP between 1996 and 2003. Over the same period, Treasury bonds on issue have fallen from 15 per cent of GDP to 7 per cent of GDP.

This significant reduction in debt outstanding has lead to examination of the Australian Government debt portfolio from two perspectives: its place in the broader financial markets, and the most appropriate approach to managing the debt from the Government's own financing perspective.

As a result of the reduction in net debt, and concerns raised by key financial market stakeholders, the Australian Government undertook a Review of the Commonwealth Government Securities (CGS) market in 2002. This Review set out to determine whether there was a case, on financial market efficiency grounds or other policy objectives, for the Government to continue to issue debt despite the strong fiscal position.

The Review concluded that closing the CGS market would lead to slightly higher interest rates, given the current state of development of Australian financial markets. This would result primarily from the higher costs associated with managing interest rate risk without a Treasury bond futures market. Further, the Australian financial markets may become less diversified and more vulnerable during periods of instability if the CGS market were eliminated. Accordingly, the Government announced in the 2003 Budget that it would maintain sufficient CGS on issue to support the Treasury bond futures market.

The outcome of the Review means that the debt issuance program will now be tightly targeted at maintaining liquid and efficient CGS and Treasury bond futures markets. Issuance of a long dated bond every second year will continue to support the 10 year futures contract. A new mid curve bond will be required in the years that a new long bond is not being issued, in order to provide better coverage of

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The views expressed in the paper are those of the authors and are not necessarily the views of the Australian Treasury or the Australian Government.

the short end of the yield curve. In total around $5 billion of Treasury bond issuance will occur each year.[1]

The outcome of the CGS Review has provided a clear, well defined and transparent framework for issuance of physical debt. This physical issuance is primarily directed to achieving the financial market efficiency objective of debt management. Accordingly, there is limited scope to alter physical bond issuance to achieve desirable cost and risk characteristics for the Government.

In addition to raising issues about the ongoing operation of the CGS market, the reduction in net debt also raised issues relating to the operation of the portfolio benchmark. As the gross debt portfolio has reduced in size, the within year financing flows have become a greater proportion of the total portfolio, causing greater volatility in the duration of the portfolio. In addition, indexed debt has become a proportionally larger part of the portfolio as gross nominal debt has fallen, increasing the importance of examining the way indexed debt is treated in the portfolio. These issues meant that it was becoming increasingly difficult to manage to the portfolio benchmark in a clear and transparent manner without unduly impacting on the financial markets.

As a result of these issues, a review of the interest rate benchmark applying to the Australian Government debt portfolio was undertaken by the Australian Office of Financial Management (AOFM)[2] and a new benchmark was adopted. In keeping with the approach undertaken in recent years, the new benchmark uses interest rate swaps, rather than the debt issuance program to modify the duration of the portfolio.

The portfolio benchmark represents a trade off between risk and cost minimisation. The benchmark entails lowering the duration of the portfolio below what it would be in the absence of interest rate swaps in order to reduce expected debt servicing costs. This reduced cost is achieved at the risk of slightly higher potential volatility in interest costs. However, reducing portfolio duration also serves to reduce the volatility of the market value of outstanding debt, an important point given that a budget aggregate regularly referred to is Australian Government net debt.

The new benchmark has two major aspects. First, four changes have been made to ensure that more appropriate measures of cost and risk are used to define the benchmark and that the link between these measures and the actual level of management discretion for the AOFM is more clearly stated. Second, having clarified these measurement and governance issues, the new benchmark parameters have been reviewed to ensure that they represent an appropriate balance between cost and risk.

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1 All references in the paper are to Australian dollars.

2 See Appendix I for a description of the institutional arrangements for government debt management in Australia.

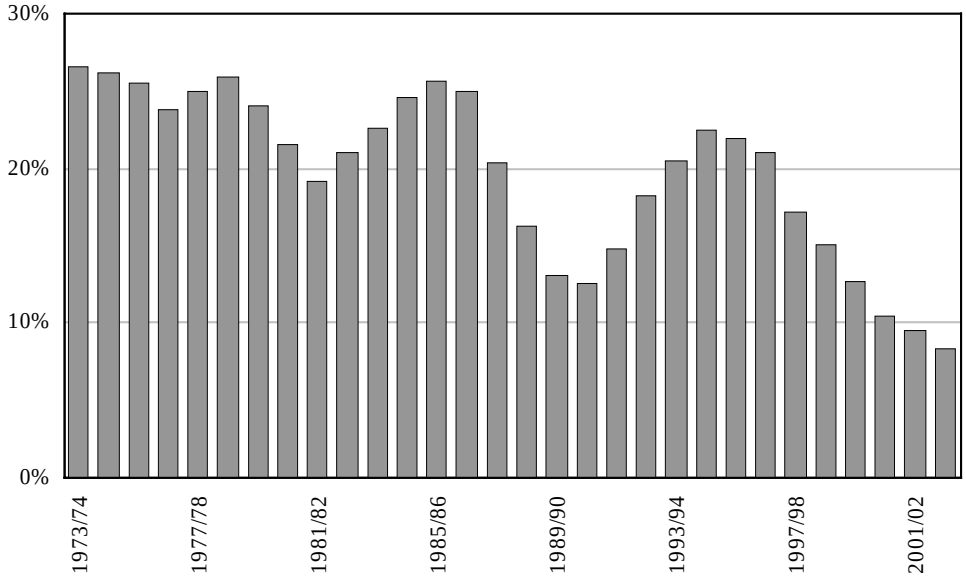
This paper provides the necessary background to understand the current approach to debt issuance and portfolio management. The paper is organized as follows. Section 1 provides background on the evolution of debt levels in Australia and the process of the CGS Review. Section 2 examines in more detail the reasons for the decision to maintain the CGS market. Section 3 discusses the size of the CGS market. Section 4 outlines how the CGS Review outcome will affect the Australian Government's approach to debt issuance, given the prospect of continued fiscal surpluses. Section 5 explains the new benchmark for portfolio management, given the low debt environment, and the constraints imposed by directing debt issuance to meet financial market efficiency objectives. Section 6 provides some concluding remarks.

1. Background

The Australian Government has, in recent history, had relatively low levels of debt by international standards. CGS on issue amounted to about 30 per cent of GDP in the late Sixties and has been below that proportion since. Since then, the peak debt on issue has been just over 25 per cent of GDP (Figure 1).

Figure 1

CGS on Issue
(percent of GDP)



Source: Reserve Bank of Australia and Australian Bureau of Statistics Cat. No 5206.

Debt management operations in Australia have traditionally been focused on lowering debt servicing costs through establishing the appropriate market infrastructure and maintaining relationships with the market for CGS. In the late Eighties, debt management moved towards a benchmark approach aimed at reducing the cost of the debt portfolio subject to an acceptable degree of risk. This approach involved specifying a duration target for the debt portfolio and included a proportion of foreign currency exposure. When this approach was first adopted the Australian Government used the profile of its physical debt issuance program to meet the duration target. While direct borrowing in foreign currencies was used in the Eighties to achieve a proportion of foreign currency exposure, the use of cross currency swaps became the preferred means to achieve this from 1988.[3]

It was not until 1997 that the AOFM introduced the use of domestic interest rate swaps to alter the duration of the portfolio. New debt issuance was targeted at the long end of the yield curve in order to maintain an even, liquid CGS yield curve.

Since 1996, net debt has fallen from a peak of 19.1 per cent of GDP, or around $96 billion in 1995-96, to 3.9 per cent of GDP or around $30 billion in 2002-03. Net debt is expected to fall to 3.2 per cent of GDP or around $26 billion in 2003-04.

This reduction in net debt has been achieved by a combination of budget surpluses within the Government's fiscal strategy of maintaining budget balance, on average, over the course of the economic cycle and by applying the proceeds of asset sales to debt reduction.

Reductions in gross debt outstanding have accompanied the decline in net debt. This is reflected principally in declining CGS on issue. In particular, Treasury bonds on issue have fallen from around 15 per cent of GDP in 1995-96 to less than 7 per cent of GDP in 2002-03 (Figure 2).

Up until the 2003-04 Budget, the reduction in net debt was managed in accordance with the general objective of maintaining a viable CGS market. That is, debt issuance had been targeted at the long end of the yield curve and transactions were undertaken to reduce outstandings in non-benchmark lines.

Notwithstanding this general approach, the reduction in CGS on issue raised questions among some market participants about the future viability of the CGS market. The Government acknowledged these concerns in the 2002-03 Budget and undertook to examine the issue in consultation with key stakeholders (Commonwealth of Australia, 2002a).

The Government initiated a public review on the future of the CGS market, releasing a discussion paper in October 2002 (Commonwealth of Australia, 2002b) and inviting written submissions from interested stakeholders. The Review was conducted by the Debt Management Review Team within the Australian Treasury

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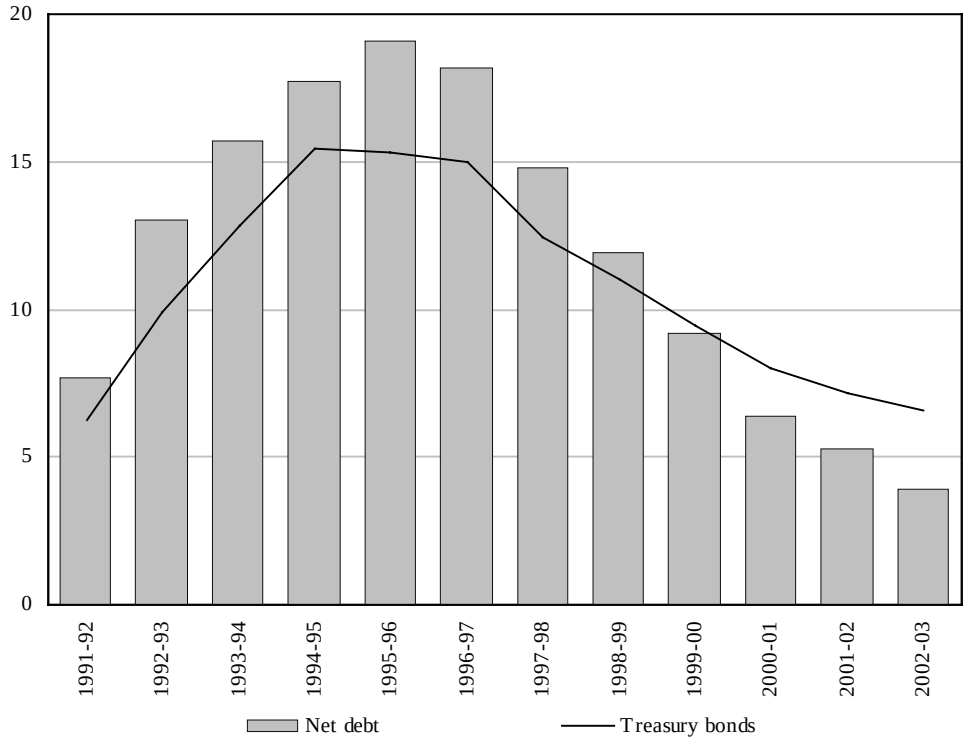
[3] The policy of maintaining a proportion of the debt portfolio in foreign currency was terminated in September 2001 and the foreign currency exposure was eliminated between that time and March 2004.

Figure 2

Australian Government General Government Net Debt and Treasury Bonds on Issue[(a)]

(percent of GDP)



(a) Treasury bonds on issue are net of the Commonwealth's own holdings and debt on issue for the States and Territories.

Source: ABS Cat No. 5206, Australian Government Mid-Year Economic and Fiscal Outlook 2003-04, Australian Office of Financial Management and Australian Treasury.

and involved an extensive and broad based consultation process. During the Review, a wide range of stakeholders lodged over 40 written submissions and over 120 consultation meetings were held involving more than 90 domestic and international market participants and organisations. In addition, a reference committee, comprising representatives of key industry associations and an academic,[4] met on a number of occasions to discuss a range of technical issues.

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[4] The Reference Committee comprised representatives of the Australian Financial Markets Association, the Australian Shareholders Association, the Investment and Financial Services Association, the Investment Banks and Securities Association, the Australian Bankers Association, and Professor Ian Harper of the Melbourne Business School. The Committee was chaired by the General Manager of the Debt Management Review Team.

2. Rationale for retaining the CGS market

The discussion paper published as part of the Review (Commonwealth of Australia, 2002b) outlined possible roles that the CGS market plays and sought feedback from stakeholders to determine the importance of each role and the capacity for other markets or instruments to perform similar roles in the absence of a CGS market. The objective was to determine whether any roles alone or collectively were significant enough to warrant a decision to maintain the CGS market.

This task was made more difficult given the lack of empirical evidence of well developed financial markets operating in the absence of a government debt market. Accordingly, the Review, and the discussion paper, attempted to analyse the role that CGS plays in Australian financial markets with a view to understanding whether other products could substitute for CGS and deliver similarly beneficial effects.

The following sections describe some of these roles and the assessments of them that emerged from the Review process. Before proceeding, it is useful to point out a few key features of government debt markets that underpin these roles.

2.1 Key features of government debt markets

Markets in which government debt securities trade have distinctive elements that commentators have argued are important for developing sophisticated and well functioning financial markets.

Government debt securities usually offer minimal credit risk, high levels of liquidity, a broad range of maturities and well developed market infrastructure, including active derivative markets (International Monetary Fund, 2001).

2.1.1 Minimal credit risk

Credit risk refers to the possibility that the issuer of a debt security, the Australian Government in the case of CGS, will default on its obligations to repay borrowed funds.

The credit standing of an issuer and the degree of credit risk associated with its debt securities is reflected in the price and yield of the security. Investors require an additional margin in the yield of the security to compensate them for bearing the risk of default. This margin increases as the perceived riskiness of a borrower rises.

The credit risk of a government of a well developed economy, such as Australia, is generally considered to be small as such countries have the economic and political stability that enables their governments to increase taxation if necessary to meet debt servicing obligations. Therefore, the margin for credit risk is likely to be small. Indeed, government debt is often referred to as a proxy for a “risk free” asset.

2.1.2 High levels of liquidity

Government debt securities usually are issued into a limited number of maturities (or benchmark lines). For example, as at 30 June 2003 the Australian Government had nine benchmark Treasury bonds with an average of around $5 billion on issue in each line. The concentration of issuance into a limited number of benchmark lines promotes market liquidity.

2.1.3 Broad range of maturities

Benchmark lines of government debt securities are usually spread over a wide range of maturities. The Australian Government's nine benchmark lines are distributed reasonably evenly from less than 1 year to 12 years to maturity.

From the issuer's perspective, this approach reduces refinancing risk and avoids potentially exhausting demand for a particular point on the yield curve.

From the market's perspective, the existence of benchmark lines of government debt securities across a range of maturities provides a source of information on yields at these different maturities (that is, it provides a yield curve).

2.1.4 Well developed market infrastructure

Government debt markets have contributed to developing key elements of financial markets, including mechanisms and processes that also are important for the operation of other sectors of the financial markets.

The types of supporting market infrastructures that the presence of a government debt market may contribute to include:

- skilled workforce in the debt market providing price discovery in securities necessary to promote a liquid market;
- legal and accounting arrangements to govern the issuance, trading and settlement of debt securities that provide certainty in issues such as ownership and payment of debt obligations;
- administrative structures for the clearing, registration of ownership and settlement of debt securities; and
- establishment and development of derivative markets (such as government debt futures markets and repurchase markets) associated with debt securities.

The remaining sections of the Chapter identify several propositions raised in support of the maintenance of a CGS market and the importance of those propositions in the decision to maintain the CGS market.[5]

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[5] The Government's decision was announced in the 2003-04 Budget, Statement 7: Budget Funding (Commonwealth of Australia, 2003).

2.2 Interest rate risk management

The CGS market plays an important role in managing interest rate risk (that is, the risks associated with adverse movements in interest rates). This capacity to manage interest rate risk contributes to a lower cost of capital in Australia.

Two examples related to both non-intermediated and intermediated debt illustrate this point in the Australian market. First, for non-intermediated debt, investors may accept a lower yield from a corporate bond if they can hedge the interest rate risk associated with holding this bond. Second, for intermediated debt, the ability of financial institutions to manage interest rate risks associated with their balance sheets also may contribute to lower costs for consumers on a range of products (including retail loans).

In particular, financial institutions may have a mismatch between the term of their borrowing and lending portfolios. For example, banks fund themselves with a mixture of retail deposits (essentially floating rate liabilities) and bond issuance (often fixed rate liabilities). On the other side of the balance sheet some assets are essentially floating rate (for example, the vast majority of home loans in Australia) while some are fixed rate (for example, fixed rate mortgages or corporate loans). Although the magnitude of the mismatch may change over time, in the absence of hedging facilities, any mismatch would lead to the financial institution charging a premium for accepting the interest rate risk.

The intermediated debt channel is perhaps the most important element in the current Australian financial market given the relatively small, but expanding, corporate debt market. Should the corporate bond market continue to grow, then the non-intermediated channel will grow in relative significance.

Changes that increase the difficulty of managing interest rate risk could, therefore, lead to an increase in the cost of capital. The magnitude of any increase would depend on the extent of the increased cost of new hedging arrangements. Therefore, a key question is the likely difference in hedging costs between current arrangements and a market without government securities.

In considering the likely impact of the removal of CGS, it is useful to compare three possible market structures. The first market structure is the current situation. The second structure could be considered the “benign non CGS” structure. The third could be considered the “non-benign non CGS” structure.

2.2.1 Current situation

Financial market participants in Australia currently use two main markets to manage their interest rate risk: the Treasury bond futures market (an exchange traded market operated by the Sydney Futures Exchange (SFE)) and the interest rate swap market (an over the counter (OTC) market). The Treasury bond futures market is the primary vehicle for managing outright interest rate risk, reflecting its high liquidity, low transaction costs and accessibility to a wide range of participants. Two

main contracts, the 3 year Treasury bond futures contract and the 10 year Treasury bond futures contract are used by market participants to manage risks of different durations.

The interest rate swap market generally is limited to large financial institutions (particularly banks) and is used to establish customised arrangements for interest rate risk management. Interest rate swaps can be specifically tailored to meet the requirements of the participant, whereas Treasury bond futures contracts have standardised parameters. Interest rate swaps also may be more effective in managing the interest rate risk associated with instruments that incorporate credit risk, as the yield on swaps also includes an element of credit risk.

Interest rate swaps generally are a more expensive hedging instrument than Treasury bond futures. A number of factors currently contribute to the higher cost of interest rate swaps including a lower level of market liquidity, less transparent pricing of the "over the counter" market relative to Treasury bond futures (which are exchange traded), and the concentrated nature of the swap market. The cost of using interest rate swaps often is higher due to administration costs and the need to actively monitor and manage the risks associated with these instruments, including operational risk and counterparty credit risk.

The current situation is best thought of as the simultaneous interaction of at least three markets: the physical Treasury bond market; the Treasury bond futures market; and the interest rate swap market. All three markets are very liquid with the liquidity in each market contributing to liquidity in the other markets. For example, participants in the physical bond market are more prepared to take positions as they are able to hedge their exposure in the futures market. Participants that would have used an outright position in CGS to hedge a position can do so by using the Treasury bond futures market. This potentially makes the CGS market more liquid than is indicated just by the outstandings in the market.

In addition, the fact that participants are able to arbitrage the physical and futures markets reduces the likelihood of pricing irregularities in the physical market. In practice the existence of the highly liquid futures market (based on a basket of bonds) allows liquidity to be achieved in the physical market with a lower volume of bonds in each line than would otherwise be the case. This is because an individual seeking to manipulate the futures price would need to effectively manipulate prices based on a pool of bonds three times larger than that of any single line.

Further, the highly liquid futures market allows the swap market to be more liquid than it otherwise would as swap traders can more readily execute transactions knowing that they can quickly, and at low cost, hedge any outright risk associated with entering into a swap transaction. In practice, in the Australian swap market, individual traders generally hedge individual trades in the futures market, with the financial institution rebalancing their swap portfolio on a regular, though less frequent, basis.

Finally, a liquid swap market can provide an additional arbitrage discipline on the exchange traded futures market (although in practice this channel is less important).

The liquidity in each market constrains the bid/ask spread in each of the other markets. In particular, the highly liquid futures market constrains the bid/ask spread in the physical market. Thus, although the futures market cannot exist without the physical market which sets the underlying price, it is the futures market that contributes significantly to the efficiency of the market determining the underlying price.

A key factor that contributes to the role of the futures market is the very broad participation in the Australian futures market – in particular by foreign organisations. This broad participation by diverse players with differing underlying positions contributes to the liquidity of the market.[6] In contrast, the interest rate swap market can often be influenced by large one-off deals or events that mean the market can be some what "one-sided". This is evidenced by relatively large movements in the spread between the CGS market and the swap market. The capacity of interest rate swap dealers to hedge one way flows in the futures market reduces the price of using the swap market for those with an underlying demand to transfer their risk position.

2.2.2 Benign non CGS outcome

There are a number of possible benign outcomes (in terms of providing appropriate risk management architecture) that could occur in the absence of CGS. It should be noted that almost no market participants consulted in Australia believed that these outcomes were likely to occur.

There is general agreement that, in the Australian situation, a benign outcome can only be achieved if a viable exchange traded futures market is established. This reflects the fact that few people believe that an over-the-counter swap market alone would be able to transfer risk at an appropriately low cost (for more on this outcome see below).

The most likely benign outcome would require the establishment of an exchange traded interest rate swap futures market. Under this scenario the liquidity of the interest rate swap market would be enhanced by the capacity of swap participants to hedge their OTC positions. If such a market were established, and were to become highly liquid, then the interest rate swap and swap futures market could reinforce each other in the same way as the three current markets.

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[6] The SFE (2002, p. 27) provides evidence of the broad participation in the futures market: "SFE currently estimates, based on a breakdown or participant type and other data sources, that approximately 20 per cent of contract volumes in the 3 year bond futures contract and 10 per cent in the 10 year bond futures contract are dedicated to swap hedging. Other underlying demand drivers include longer term asset hedging, overlay exposure management, portfolio curve smoothing, non expiry speculation (including day trading) and the use of contracts as a capital efficient proxy for physical bonds, among other reasons".

For the interest rate swap futures market to become highly liquid, it is likely that international market participants would need to be willing and active participants in the market. Increased international participation is likely to increase the diversity of motivations for participation within the market, in turn enhancing the likelihood of a "two way" market.

The SFE launched an interest rate swap futures contract in December 2002. To date the contract is not highly traded. In the first full year of trading (2003), the total volume of 3 year interest rate swap futures contracts traded was 401, compared to 19 million 3 year bond futures contracts. Over the same period, the total volume of 10 year interest rate swap futures contracts traded was 200, compared to 6.7 million 10 year bond futures contracts (Sydney Futures Exchange, 2004). It should be noted that it is difficult to assess the viability of the swap futures contracts in isolation while the established Treasury bond futures contracts are still operating.

It is useful to make one final point about an outcome based on an interest rate swap futures market. The swap market is essentially a bank market (the floating rate for interest rate swaps is the Bank Bill Swap Reference Rate) with rates providing a proxy for bank risk. Without CGS, the concentration of financial market activity in the banking sector is likely to increase. Given the soundness of the Australian banking system, this may be of little consequence. However, in times of major economic and financial instability, it could add to the risk in the financial system. Although major shocks are rare, experience suggests the consequences can be more severe in less diversified financial systems.

A second possible benign scenario would see the establishment of a futures contract based on a basket of Australian semi-government bonds. Establishing such a contract faces some technical difficulties given the heterogeneous nature of semi-government issuance. That said, there have been some discussions between the semi-government issuers about bringing greater uniformity to their issuance programme. Again, if the futures market was established it would enhance the liquidity of the underlying physical markets. The SFE unsuccessfully attempted to launch such a contract in the early Nineties.

A final possibility is that a futures market could be established based on a corporate bond index. This possibility would rely on a sufficiently sized and liquid corporate bond market. Such an index would mirror equity indexes that are currently in widespread use, including in Australia.

2.2.3 Non-benign outcome

The non-benign outcome is that no exchange traded market comes into existence. Some market participants claimed that the swap market would cease to function. A more likely outcome is that the swap market would continue to function, but with wider bid/ask spreads as traders would be unable to hedge their risk in an efficient manner. Participants in the swap market would be required to assume both outright and basis risk when entering into a swap contract. Unless international

participants were prepared to extensively trade in the swap market there may be considerable difficulty in establishing prices.

The implications of this outcome are that the cost of managing interest rate risk would be higher. For investors, this means potentially requiring higher yields to compensate for the increased risk retention. For issuers, this means potentially having to pay higher yields to meet their financing requirements (or potentially move to offshore markets where risk can be hedged more cheaply). For banks, the increased cost of managing their balance sheets would be likely to be passed on to consumers in terms on retail and commercial lending. Thus, interest rates throughout the economy would rise.

2.2.4 Transition between market structures

The current market situation appears to represent a stable equilibrium. It is also possible that the other two potential structures may be stable if they are actually reached. In particular the benign outcome could be stable if sufficient liquidity were established in the relevant exchange traded futures market. However, it is not clear that the benign equilibrium would be reached. The key issue is the likely transition path given the fact that liquidity requires market participants to have confidence in the market (National Australia Bank, 2002). This can be thought of as a self-reinforcing cycle – liquidity breeds confidence, confidence breeds liquidity.

In the Australian case the most likely market to form would be the interest rate swap futures market. For the market to form at least two conditions must be met. First, market participants must have confidence that the underlying price (some basket of OTC swap contracts) cannot be manipulated in a way that places them at risk of significant loss. Second, sufficient liquidity needs to be established so that participants own actions do not unduly affect the futures price.

Two factors related to the role of the major Australian banks may inhibit the establishment of an interest rate futures contract. First, the interest rate swap futures contract is only likely to become liquid if the major Australian banks were to participate actively in the market given their overall size and their underlying demand for risk management arising from the composition of their large balance sheets. Many market participants pointed out that the major banks had a weak incentive to participate as the exchange traded futures would act as direct competition for OTC interest rate swaps, a market in which the major banks have a very large share. For example, the SFE (2002, p. 27) stated that "… it is not in the narrow interests of bank shareholders to see swap price discovery migrate from the OTC derivatives market to the exchange traded derivatives market." Second, for the market to become liquid, other players must have confidence in the robustness of the underlying price. The major banks have a substantial share of the interest rate swap market and as such other participants may be concerned that they could manipulate the price, particularly in the early stages of the market when turnover is likely to be lower. Concern about manipulation may keep volumes low, in turn increasing concern about the ease of manipulation.

2.2.5 Conclusion

The Review concluded that the costs associated with interest rate swaps could increase if the CGS market were closed. The interest rate swap market heavily depends on the Treasury bond futures market, as participants in the swap market extensively use Treasury bond futures to hedge interest rate exposures associated with providing swaps. Without Treasury bond futures, swap market participants would likely require a higher premium as compensation for taking significant additional risk on their balance sheet.

2.3 Providing a safe haven in times of financial instability

During periods of financial instability, investors often sell out of risky assets and seek safe assets to avoid the potential of a capital loss on their investment. Traditionally, investors have sought out government bonds in times of financial instability, but they do also seek other safe financial assets. An example of flight to quality was the change in relative yields on low risk corporate, high risk corporate and government bonds following 11 September 2001. The spreads between corporate bond yields and equivalent maturity Treasury bonds rose immediately after the terrorist attacks. However, the spread widened most for lower credit rated corporate bonds and least for the highest rated bonds as investors sold relatively risky assets and purchased relatively safe assets.

In Australia, events such as the 1997-98 Asian financial crisis, have had a greater impact on the Australian corporate bond spread.

While a government debt market exists, it is likely to be used as a domestic safe haven. If no alternative safe haven assets exist, then financial instability may lead to capital flight. This may push down the exchange rate and further disturb unsettled financial markets. The International Monetary Fund has identified this safe haven role as a key uncertainty in assessing the need for a government debt market (International Monetary Fund, 2001).

The importance of government bonds as a safe investment during periods of financial instability may vary depending on the circumstances of the shock.

At one extreme, a small shock resulting from the collapse of a single large corporation, might lead some investors to seek safe havens in government bonds or other highly rated issuers. In this case, any highly rated bonds could provide the safe haven, and some large, low risk equities also may suffice. At the other extreme, a severe financial crisis, such as a systemic banking crisis, the presence of a government bond market may not make a substantive difference.

A range of cases occur between these extremes. In the intermediate case of a relatively large, financial system wide disturbance, the presence of very low risk government securities may be beneficial.

There may be alternatives to government bonds as a safe haven during periods of financial instability. Investors can hold alternative investments such as AAA/Aaa rated corporate bonds, mortgage backed securities, or cash at commercial banks during financial distress. However, the key problem with relying on private credit instruments is the potential for rapid changes in credit worthiness affecting the security of the asset. For example, investors may hold highly rated corporate bonds as a safe investment, only to learn that their investments are downgraded due to the effects of financial instability on the company's operations.

Cash could involve lower returns than alternative investments, but depending on the rate of inflation, could provide a suitable low risk substitute for CGS. Australia's sound prudential regulation of the banking sector ensures investors are likely to view bank assets as relatively low risk.

Of course, sound financial system regulation and supervision can also assist with identifying and preventing instability. A key issue in an episode of financial instability is liquidity – that is, the ability to convert assets to cash or another safe asset when required. The Reserve Bank of Australia (RBA) can provide emergency liquidity to the financial system by making funds available to the market as a whole through its open market operations. The RBA also can lend directly to an institution (governed under the *Corporations Act 2001*) in cases of liquidity difficulties, if the failure of the institution to make its payments could seriously affect the financial system. This would help calm unsettled markets, and therefore reduce the need for investors to seek safer assets.

In an example of this, central banks around the world acted after the September 11 terrorist attacks to boost liquidity in their financial systems to ensure markets did not experience systemic failures resulting from disruptions in payment and settlement systems or the increased risk aversion (Reserve Bank of Australia, 2001).

Overall, the CGS market is likely to be used as a safe haven during periods of instability whenever it exists, despite the proposition that the benefits of this role may vary according to the scale of the event.

2.4 Investment vehicles

An argument presented in the Review of the CGS market is that the Government should continue to supply CGS in order to provide investors who require a low risk, low return fixed interest investment option. Investors such as superannuation funds find CGS provide a long dated financial asset that can assist portfolio management by closely matching long dated liabilities. Low risk long dated securities also provide investors with greater diversification options.

Historically, the CGS market has been the principal source of long dated financial assets in Australia. The absence of CGS may limit long dated investment options and complicate portfolio management. Several submissions to the Review supported this argument by drawing on analysis (Bomfin, 2001) using portfolio

theory to determine the potential welfare impact on investors from the reduction in investment options if government bonds were to be eliminated from the market.

The extent of this potential problem depends on the importance of CGS as a long term investment for investors, such as superannuation funds. The estimates suggest that pension (superannuation) funds holdings of CGS have averaged around 18 per cent of total CGS outstanding and life insurance corporations holdings have averaged around 11 per cent of total CGS outstanding (Australian Bureau of Statistics, 2003).

The superannuation sector's holdings of CGS need to be considered in the context of the total assets the sector manages. At the end of the June quarter 2003, superannuation funds reported total assets of around $530 billion (Australian Prudential Regulation Authority, 2003), with CGS accounting for less than 5 per cent of these assets. The very small contribution of CGS to total assets suggests CGS may not be a crucial instrument in the investment strategy of the superannuation sector at present.

The Australian Government's decision to maintain the CGS market was not specifically targeted at meeting investor demand for risk free financial assets. The argument that there is a market failure in investment opportunities to justify a role for government was not considered particularly convincing. However, maintaining the CGS market obviously maintains opportunities for superannuation funds and other investors to hold government bonds.

Alternative low risk investment options are available in domestic debt markets, including State government debt and highly rated supranationals. The continued development of markets for securities backed by assets such as residential and commercial mortgages (asset backed markets) also may provide alternative investment options.

2.5 Pricing other financial products

One of the key developments in finance theory in past decades has been increased focus on pricing of risk. Common practice among financial practitioners, as well as in commonly used asset pricing models, is to break risk into component parts. Usually, this process begins with specifying a proxy for a risk free rate (that is, in state preference terminology a security that pays a given return regardless of the state of nature that eventuates). Models such as the Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT) take the risk free rate as a base and then add components reflecting the individual characteristics of the asset. In the CAPM, the additional characteristic considered is the covariance of the asset with a portfolio of securities comprising each security weighted by its proportion of the market.

It should be noted that the risk free asset considered in these models is an asset for which there is zero variance in returns. Clearly, this is not the case with CGS or most other government bonds. When stakeholders refer to CGS as being a

proxy for "risk free" assets, they are generally referring the general lack of default or credit risk. CGS and other government bonds are still affected by interest rate risk, which is the risk that is absent from the "risk free" asset used in CAPM and APT. On this basis, it should theoretically be possible to find another asset with low return variance that could be used as a proxy for a risk free asset. There have been studies that demonstrate that fundamental asset pricing models such as the CAPM can still function without a risk free asset under certain circumstances. A well known case (Black, 1972) involves replacing the risk free asset with a portfolio constructed to be uncorrelated with the market portfolio. While the CAPM holds using this approach, it relies heavily on the assumption that there are no short sales constraints (Ross, 1977).

In more practical terms, approaches to pricing risk that break it into its component parts contribute to a better allocation of resources throughout the economy. If risk can be accurately priced investors are better able to allocate their savings to the types of assets that most closely match their risk preferences and funds managers can allocate capital to its most efficient uses.

Financial market participants pricing private debt securities in the primary market may use the CGS yield as a starting point, and add margins for credit, liquidity and other risks. The CGS curve, in addition to being the closest domestic proxy for a "risk free" security, is a homogenous curve facilitating price discovery across the maturity spectrum. Several problems could arise if the pricing of debt securities is less efficient.

If the yield on new issues of debt securities is inappropriate there may be income transfers between investors and issuers as the yield adjusts in subsequent market trading.

Some market participants may withdraw from the segments of the market where problems with pricing debt securities are ongoing. For example, a corporate may restrict issuance to short dated bonds if longer dated bonds have ongoing pricing difficulties. This may mean the corporate foregoes lower cost alternatives, potentially increasing the domestic cost of capital.

A systematic reduction in pricing efficiency may lead to misallocation of capital in the economy as some sectors face either too high or too low a cost of capital. For example, if corporate bond yields of a particular industry were systematically too low because of pricing inefficiencies, then they would borrow and invest more than would be appropriate, potentially reducing funds available for more productive investment elsewhere in the economy.

Possible alternatives for pricing debt securities in the Australian market could be based on the price of existing debt securities of organisations with similar risk characteristics or the interest rate swap curve.

Pricing could rely on a yield curve constructed from corporate bonds and debt issued by "supranationals" (multinational public institutions such as the World Bank and the Asian Development Bank) with the same credit ratings. However, at this

point, these markets do not appear to be liquid enough across the yield curve to play this role permanently.

Another alternative is to price debt securities against the price of interest rate swaps. The interest rate swap market is liquid and the interest rate swap curve currently extends to a similar maturity as the CGS yield curve. This should allow pricing at the same range of maturities.

The price investors paid for some recent issues of corporate debt securities was based on the rate for an interest rate swap at that maturity, plus an additional margin for risks such as credit risk. While some of these issuances also note the price as a margin over the CGS yield, increasingly the interest rate swap curve is used as the primary pricing benchmark.

The International Monetary Fund (International Monetary Fund, 2001), the Bank for International Settlements (Bank for International Settlements, 2001) and the Organisation for Economic Cooperation and Development (Organisation for Economic Cooperation and Development, 2002a) report these benchmarks are commonly used overseas for pricing new issues of debt securities implying that, internationally, government securities also are becoming less important for pricing.

Overall it seems unlikely that prices would continue for long periods of time at the "wrong" level. For example, if an investor has paid "too much" for a corporate bond, then this will become apparent over time. In essence the pricing argument reduces to the fact that in the absence of a clear pricing benchmark the market may find the "wrong" price for a, possibly short, period of time. Concern by market participants that they may pay the "wrong" price may lead to them requiring a risk premium. It seems unlikely that this risk premium would be significant.

2.6 Implementing monetary policy

As in many countries, Australian government debt has played an important role in implementing monetary policy. In Australia, the RBA announces the desired stance of monetary policy in terms of a target for the interest rate on overnight cash funds borrowed and lent between banks. This interest rate forms the base of the structure of interest rates in the economy.

The RBA's open market operations involve purchases and sales of securities to inject funds or withdraw funds from the banking system. These transactions once were carried out exclusively through outright purchases and sales of government securities, but now are conducted almost entirely through repurchase agreements. Repurchase agreements involve the sale of a security with an agreement to repurchase it on an agreed future date at an agreed price. They expose the RBA to little market risk and are efficient because the RBA can set the maturity dates to meet expected future flows of funds.

The RBA has responded to the decline in the amount of CGS on issue by broadening the range of securities that it will accept as collateral on repurchase agreements in open market operations. The RBA will now accept:

- CGS,
- Australian dollar securities issued in Australia by central borrowing authorities of State and Territory governments (since June 1997),
- Australian dollar securities issued offshore by central borrowing authorities of State and Territory governments but traded in the Australian Austraclear System as euroentitlements (since June 2001),
- Australian dollar securities issued by a range of AAA/Aaa rated, supranational organisations (since October 2000/June 2001), foreign sovereigns and government agencies (since March 2004), and
- bills of exchange and negotiable certificates of deposit (CDs) accepted or issued by eligible banks (since March 2004). Bank bills and CDs will be eligible where the issuer has a short term rating of P 1 or equivalent, and a long term rating equivalent to A3 or above, by all major credit rating agencies that rate it, and in any event by at least two major credit rating agencies. Banks will not be able to offer their own bank bills or CDs to the Reserve Bank.

In addition, the RBA has increased its use of foreign exchange swaps to supplement its operations in domestic securities. Foreign exchange swaps work like repurchase agreements. Australian dollars are exchanged for foreign currency rather than domestic securities. Moreover, the foreign currency can be invested in foreign debt securities. As the swap involves agreement to unwind the transaction at a future date at an agreed exchange rate, neither party to the swap is exposed to exchange rate risk. In 2002 03, foreign exchange swaps undertaken for liquidity purposes amounted to about $90 billion (Reserve Bank of Australia, 2003).

Given these developments, the effective operation of monetary policy would likely continue without CGS on issue.

2.7 Attracting foreign capital inflow

Some commentators argue that the CGS market is necessary to attract foreign capital inflow. However, the level of capital inflow is not a policy goal in itself. A more desirable policy goal is to keep the cost of capital in Australia as low as possible.

The Government's fiscal strategy is to maintain budget balance, on average, over the course of the economic cycle. Since the Government is not investing more than it is saving (and therefore not borrowing by issuing CGS), it does not directly require additional foreign capital inflow for its own purposes. Instead, private sector savings and investment decisions will determine whether additional foreign capital inflow is required.

Accordingly, the key question is whether the existence of CGS lowers the cost of other borrowing in Australia. As discussed previously, the decision to maintain the CGS market was aimed at ensuring the cost of capital remained as low as possible by facilitating efficient interest rate risk management.

However, it could be argued that foreign investors may only be prepared to invest in a country if it has a liquid sovereign debt market. That is, investors may not be prepared to invest in private financial markets if they are not underpinned by an efficient government debt market. The existence of a liquid sovereign debt market ensures the "visibility" of the country, for example, through inclusion in international bond indices (Australian Stock Exchange, 2002). Consultations with international investors indicated that very few investors fit into this category. Many investors only invest in sovereign debt. Other investors indicated that they would reconsider their investment in other Australian markets only if the removal of the CGS market had significant undesirable consequences for the financial markets generally.

This line of thinking also contributed to calls from some market commentators to maintain the CGS market to assist with the Government's policy objective of promoting Australia as a global financial centre. Clearly, the more developed Australia's financial markets are, the more attractive it will be as a centre for financial service provision. However, Australia also boasts many other attributes that contribute to this objective – a strong, dynamic economy; world class information and communications technology; highly skilled and flexible workforce; and time zone advantages.

3. Size of the CGS market

The Review discussion paper sought stakeholders views on the optimum size of the CGS market. Relatively few submissions were specific about an optimum size in terms of volumes outstanding, but estimates ranged from around $30 billion (Catholic Superannuation Fund, 2002) to $80 billion (ICAP, 2002) or more. In determining the optimal size, most stakeholders that commented linked the required size of the market to either the efficient operation of the Treasury bond futures market or the needs of investors for long term investment vehicles.

As previously mentioned, the Government did not decide to maintain the CGS market primarily to maintain a long term investment vehicle. As the decision to maintain the market was based on interest rate risk management, the Review concluded that the CGS market should be maintained at a sufficient size to facilitate continued efficient trading in the Treasury bond futures market.

The Treasury bond futures contracts specifications require at least three bonds in each contract basket to ensure that the price of the futures contract is not unduly affected by unusual factors affecting a single bond. In order to support both the 3 year and 10 year Treasury bond futures contracts, this required a minimum of six bonds on issue.

Bonds with less than 18 months to maturity were deemed to not be useful for the purposes of the 3 year futures contract as they are largely subsumed by money market dealing.

As will be discussed more fully in the next section, the Review concluded that at the long end of the yield curve, spacing of up to 2 years between each bond would be consistent with efficient futures contract operation. Market participants indicated that the average maturity of the bonds underlying the 10 year bond futures contract could range from 9 to 11 years. However, it was more important that the average of the bonds underlying the 3 year bond futures contract varied in a more narrow range: preferably around 2.5 to 3.5 years.

In order to keep the overall market size as small as possible (due to the Government's concerns about accumulating significant financial assets – see Section 4.2), the Review concluded that an issuance pattern involving a new 13 year bond every second year would be consistent with efficient operation of the 10 year futures contract. This should be supplemented by issuance of an additional bond with a term to maturity of around 5 years in the year that a new 13 year bond was not being issued. This issuance pattern would result in a market of around eight to nine lines, with 2 year spacings at the long end and 1 year spacing at the short end.

Most stakeholders were of the view that each bond line should contain around $5 billion on issue. Combined with the requirement for three bonds per futures contract basket, this would ensure that there was limited scope of manipulation of the futures contract price. Given the issuance arrangement outlined above, this would result in a overall Treasury bond market of around $40 to $45 billion.

At the beginning of the Review process, many stakeholders argued that the market would need to grow over time to maintain efficiency. Estimates of the required growth rate varied from the expected growth rate of nominal GDP (to maintain the market constant as a proportion of economic activity) to the growth rate in financial assets (to maintain the market a constant proportion of financial assets). However, over the course of the Review, a general consensus emerged that mechanical growth rules were not appropriate given the uncertainty surrounding the minimum required size and the ongoing process of financial market evolution. Accordingly, the approach adopted has not been to set a mechanical growth rule, but rather to monitor the market to see whether inefficiencies are arising that may justify additional issuance.

4. Implications for Australian Government debt issuance and portfolio management

4.1 Implications for debt issuance

In the several years immediately preceding the Review of the CGS market, the Government issued new debt in excess of funding requirements with the general objective of maintaining a liquid and efficient CGS market. As a result of the

Review, debt issuance will now be more specifically targeted to meet the objective of maintaining an efficient CGS market. Both approaches targeted a financial market efficiency objective. The new approach is more clear, well defined and transparent given the explicit link to the key role of the Treasury bond futures market.

CGS issuance will be structured to underpin the 3 year and 10 year Treasury bond futures contracts. The Treasury bond futures contracts are supported by an underlying basket of Treasury bonds. This basket provides a price against which the futures contracts can be settled. Each basket usually is comprised of three Treasury bonds determined on the basis of their liquidity, amount outstanding and term to maturity. The 3 year futures contract requires the basket of bonds underpinning the contract to have an average remaining period to maturity of around 3 years. Similarly, for the 10 year futures contract, the underlying basket of bonds should provide an average remaining period to maturity of around 10 years.

Figure 3 illustrates the profile of benchmark Treasury bonds outstanding as at 30 June 2003 and highlights those bonds included in each of the futures contracts at that time.

At 30 June 2003, the basket of Treasury bonds underpinning the 10 year futures contract comprised bonds maturing in June 2011, May 2013 and April 2015, providing an average term to maturity of around 10 years. This profile of around 2 years between maturity dates of bonds in the basket effectively supports the 10 year futures contract. The 2 year spacing of bonds may result in some fluctuations in the average term to maturity of the basket around the notional target of 10 years. However, given the long dated nature of the contract, these divergences are relatively minor and should not impact on the contract's efficient operation.

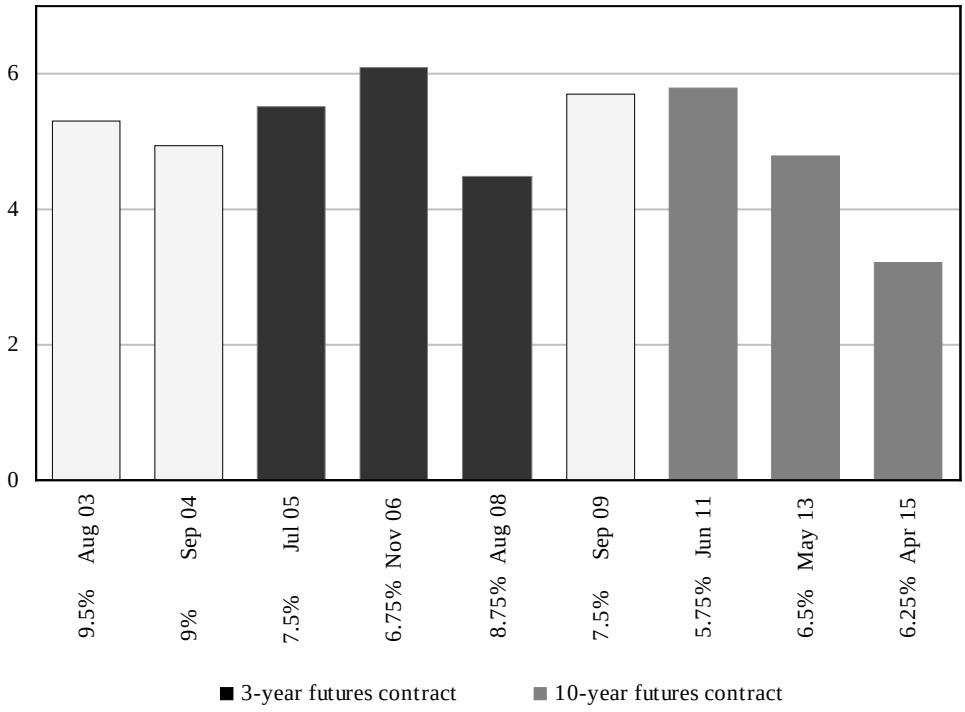
Maintaining this profile of outstandings will require issuance of a new long dated Treasury bond every 2 years with a term to maturity of around 13 years. The Australian Government announced that around $5 billion will be issued into each new line of Treasury bonds over the 2 year period (Commonwealth of Australia, 2003).

At 30 June 2003, the basket of Treasury bonds underpinning the 3 year futures contract comprised bonds maturing in July 2005, November 2006 and August 2008, providing an average term to maturity of around 3 years. This profile of around 1 to 2 years between maturity dates of bonds in the basket effectively supports the 3 year futures contract.

The efficiency of the 3 year futures contract may be undermined if the bonds in the underlying basket had intervals of 2 years or more. This profile would at times result in the average term to maturity of the basket being significantly higher than the target of 3 years. Departures from the notional maturity target are more likely to significantly impact on efficiency of the 3 year futures contract (compared to the 10 year futures contract). Therefore, given the expected issuance pattern of long dated benchmark lines, additional issuance of Treasury bonds needs to be undertaken in the mid section of the yield curve. This issuance will reduce the interval between the benchmark lines to around 12 months and will mean that the

Figure 3

Profile of Benchmark Treasury Bonds Outstanding (June 2003)[(a)]
(billions of Australian dollars)



(a) Treasury bonds on issue are net of Australian Government holdings. Several smaller Treasury bond lines currently on issue, including the February 2006 and October 2007 Treasury bonds, are excluded from the chart as they are not considered benchmark bond lines.
Source: Australian Office of Financial Management.

yield curve is more closely spaced at the short end than the long end. To achieve this, a new Treasury bond line with a term to maturity of around 5 years will need to be issued every 2 years. Issuance of around $5 billion will be undertaken over the course of the 2 year period.

Figures 4 and 5 provide a stylistic illustration of the broad pattern of issuance and debt profile outstanding that will likely be required over time to support the Treasury bond futures market. The issuance pattern of commencing new benchmark lines of Treasury bonds every 2 years will be phased in as current benchmark lines of Treasury bonds progress down the yield curve.

Maintaining the CGS market to support the Treasury bond futures market will require issuance to be concentrated in Treasury bonds. The Government will also

Figure 4

Treasury Bonds Outstanding and Issuance in Alternate Year 1
(percent outstanding)

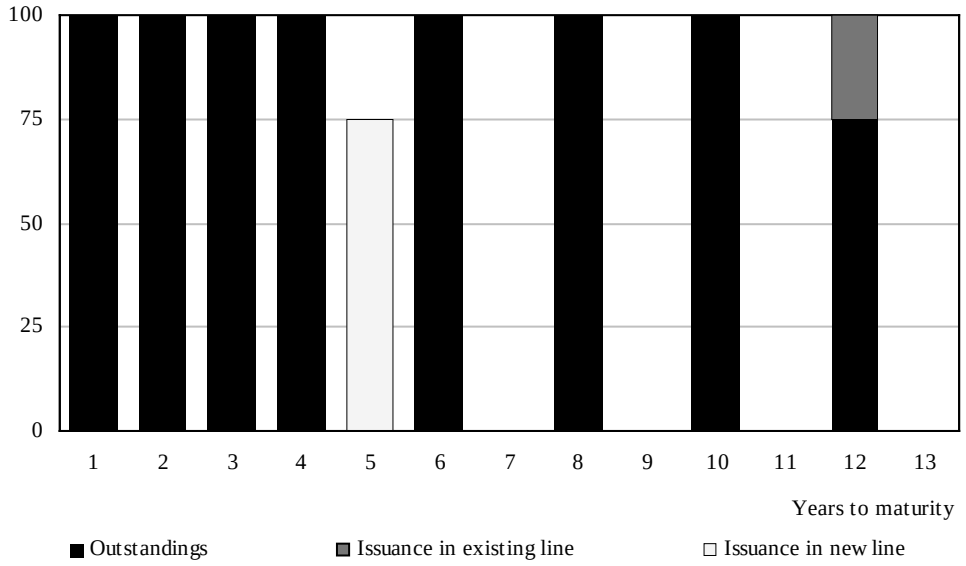
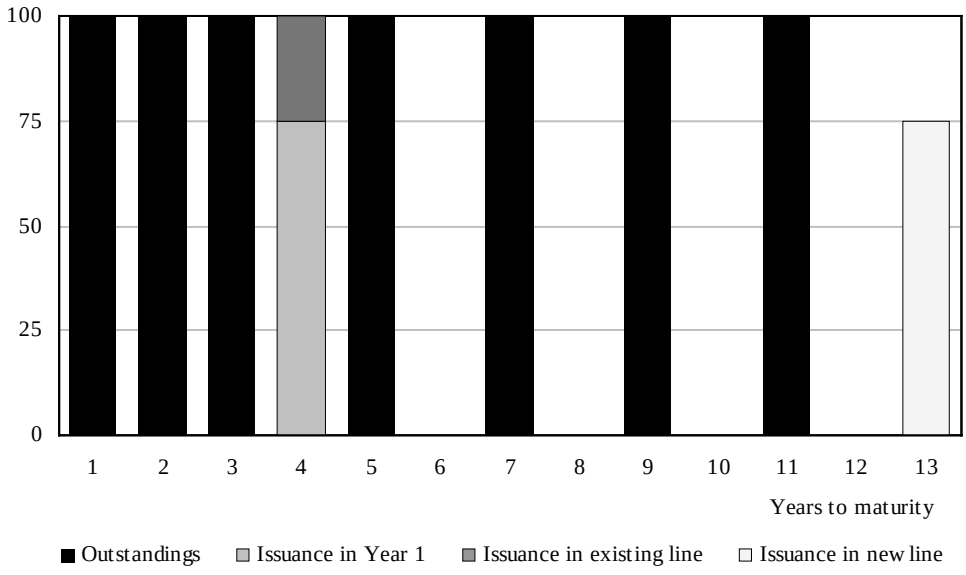


Figure 5

Treasury Bonds Outstanding and Issuance in Alternate Year 2
(percent outstanding)



seek to minimise the level of financial assets it accumulates in supporting the CGS market. On this basis, the issuance of Treasury Indexed Bonds, the only other type of long dated debt used by the Australian government in recent years, has been suspended.

4.2 Management of financial assets

Given the Government's fiscal strategy of maintaining budget balance, on average, over the course of the economic cycle, the Government's decision to maintain the CGS market will result in surplus funds that will need to be managed.

The Review considered concerns about the potential impact of government ownership of private financial assets. Key concerns were: the potential for government activities to distort financial asset prices; the impact of government ownership on the operations of the firm the government was investing in; the potential for asset to be liquidated for use in general government expenditures; and the commitment of government resources to monitoring and oversight of governance structures for investment. These considerations were taken into account in determining how assets resulting from debt issuance should be managed.

The Australian Government has held some financial assets in the form of term deposits with the RBA since December 1998. These assets resulted from the policy of maintaining liquidity in the CGS market and have been used to assist with the Australian Government's short term funding requirement.

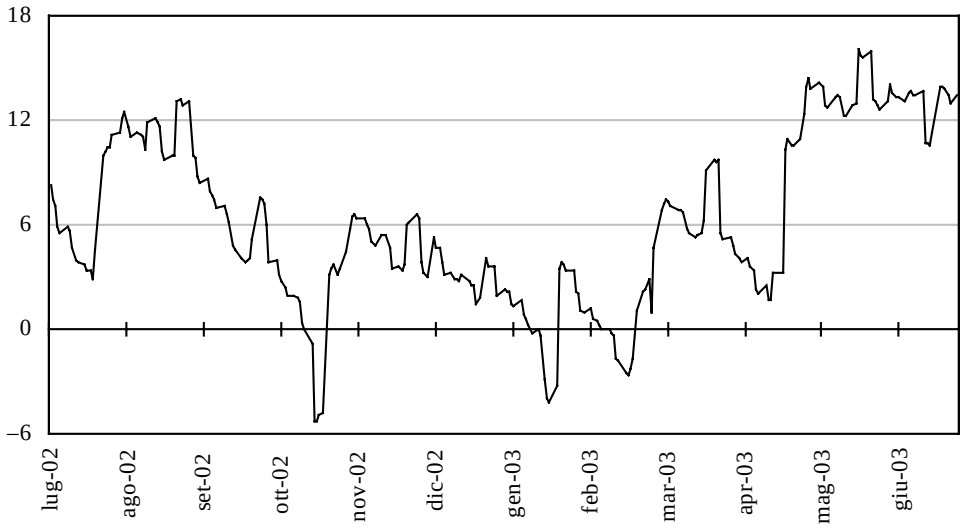
Short term funding is required when the timing of the Australian Government's cash receipts do not match the pattern of its expenditures and debt repayments. Short term funding requirements are met by a combination of running down RBA term deposits and issuing Treasury Notes (a discount instrument with less than twelve months to maturity). The latter usually have been issued where RBA term deposits were not available to meet short term funding requirements.

The size and volatility of the short term funding requirement is illustrated by changes in Australian Government financial asset holdings at the RBA (overnight cash and term deposits). Figure 6 shows the Australian Government's short term funding requirement for 2002-03. In this period the net short term asset position was initially $8.3 billion (1 July 2002). It improved to around $13 billion (late August 2002) followed by a short term funding requirement of around $5 billion (mid October 2002) before rising to a peak of $16 billion (late May 2003), producing a fluctuation of around $21 billion over the year (Australian Office of Financial Management, 2003a).

The Australian Government intends to continue to hold surplus funds in the form of term deposits to meet short term funding requirements. Historical fluctuations of the funding requirement suggest that the Australian Government may require around $25 billion of term deposits to meet funding needs. However, given

Figure 6

Australian Government General Government Financial Asset Holdings at the Reserve Bank of Australia Less Treasury Notes on Issue
(billions of Australian dollars)



Source: Australian Office of Financial Management.

the volatility of the funding requirement, the average term deposit balance over the year would be considerably lower.

Using the Reserve Bank term deposit facility provides the Australian Government considerable flexibility in managing its financing requirements. As the facility uses the infrastructure in place for managing the Reserve Bank's reserves, the Australian Government has been able to utilise an established institutional framework for investment.

The expanded term deposit facility at the Reserve Bank is expected to accommodate the management of financial assets resulting from supporting the CGS market over the next several years. In the event financial assets exceed $25 billion on an ongoing basis, the Australian Government will consider allocating some funds to other liabilities. This may include allocating some funds to meet currently unfunded liabilities relating to public servant pension entitlements.

4.3 Implications for portfolio management

The nature of the new issuance program and the associated financial asset holdings raises new issues for portfolio management. Debt issuance was previously

targeted at the long end of the yield curve to assist with maintaining the length and efficiency of the CGS market. Now, issuance will be targeted at both the long end and the middle of the yield curve. This change on its own would lead to a shortening of the average duration of the portfolio. Holding an increased amount of short term deposits at the RBA would contribute to lengthening portfolio duration, by defeasing short dated liabilities.

While these issues are clearly important for portfolio management, there have been a number of other pressures in recent years driving adjustments in the approach to portfolio management. These issues and the outcomes of the review of the portfolio benchmark are discussed below.

5. Portfolio management

Australian debt management can be thought of as having two policy objectives: to contribute to promoting financial market efficiency; and to manage the portfolio at least cost to the government subject to an acceptable degree of risk.[7] To achieve these two objectives the AOFM primarily has two instruments: physical issuance and the use of derivatives instruments.

The outcome of the CGS Review means that the general size and tenor of bond issuance will be determined by the requirement to maintain a liquid bond futures market. As in the past, this means that the physical bond issuance program cannot be substantially modified in order to meet a particular portfolio duration benchmark. In other words, the physical bond instrument is primarily aligned to meet the objective of contributing to financial market efficiency.

Given the assignment of physical issuance to the financial market efficiency objective, the AOFM uses another instrument to manage the cost of the debt portfolio – interest rate swaps. Use of interest rate swaps allows the AOFM to manage the cost independently of the physical debt issuance program.[8] However, managing the cost of the portfolio involves making judgments about an acceptable degree of risk in debt servicing costs.

There are a number of potential approaches to the concept of risk for a sovereign debt manager. In the Australian context, primary consideration was given

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[7] These two objectives are explicitly stated in the mission statement of the Australian Office of Financial Management (AOFM): "The AOFM aims both to manage Commonwealth net debt at least cost over the medium-term and contribute to supporting financial market efficiency, subject to the government's general policies and risk preferences".

[8] Conceptually the two instruments – physical issuance and interest rate swaps – are completely independent. However, in practice there is some interdependency. For example, the Government needs to take account of the depth and liquidity of the interest rate swap market. In Australia the interest rate swap market is not highly liquid beyond 12 years. Accordingly, the Government may not be able to issue, for example, 30 year bonds, and expect to be able to independently manage the duration of the portfolio. More generally, where possible the Government undertakes a physical issuance program that, subject to the constraint of supporting the futures baskets, minimises the required interest rate swap program.

to the risk associated with variations in the annual debt servicing costs involved in managing the portfolio.

The shorter the average term to maturity of the portfolio, the greater the risk borne by the Government in instances where there is a parallel shift in the yield curve[9] because there is no particular interest rate locked in beyond the maturity date. The Government is exposed to the risk that it will have to pay higher interest rates at the point of refinancing. At the same time, because the yield curve is generally upward sloping, a short average term to maturity will generally reduce the expected cost of the debt portfolio. The yield curve is generally upward sloping because investors demand a "term premium" over and above the expected path of future short term rates for locking up their funds for an extended period. However, the term premium is not directly observable as the observed slope of the yield curve is a composite of the term premium and expectations regarding changes in interest rates.

Overall, choosing the right average term to maturity involves a balance between the lower expected costs associated with a lower average term to maturity and the higher risk associated with not having a particular interest rate locked in for a long period of time.

An added consideration is that the volatility of net debt, valued at market prices, will be reduced when modified duration is reduced.

5.1 The previous benchmark

From 1996 to 2003, the interest rate risk of the Australian dollar share of the net debt portfolio was controlled through managing the portfolio to a benchmark modified duration target range of 3 to 3.5. As described above, this benchmark was aimed at balancing the competing considerations of reducing the expected debt servicing cost and reducing the risk to the expected debt servicing cost in a dynamic interest rate environment.

The Treasury bond portfolio, without interest rate swaps, typically has a relatively high modified duration of between four and five. The net debt portfolio modified duration is lower due to the transaction of interest rate swap contracts that effectively exchange some of the Treasury bond portfolio's fixed interest rate obligations for floating interest rate obligations with a modified duration of less than 0.5.

As at 30 June 2003, the notional face value of interest rate swap contracts outstanding stood at $27.6 billion (Figure 7).

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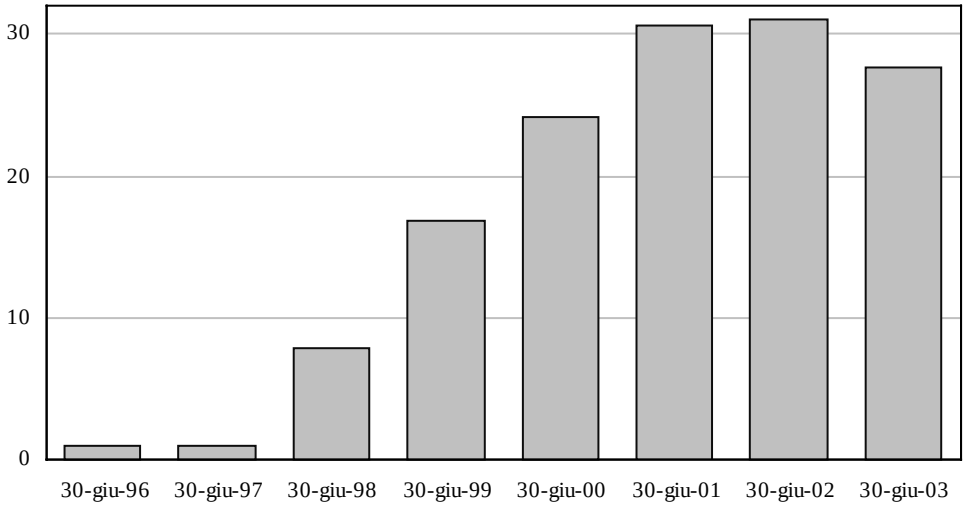
[9] Average term to maturity, often proxied by modified duration, is a good measure of interest rate risk when considering parallel shocks to the yield curve. However, the precise detail of the maturity profile will affect debt servicing cost outcomes in the presence of non-parallel yield curve shocks. An example of a non-parallel shock may be a short term monetary policy tightening with well anchored long-run inflationary expectations.

Figure 7

Notional Face Value of Interest Rate Swap Contracts
(billions of Australian dollars)



Source: Australian Office of Financial Management.

As at 30 June 2003, the interest rate swaps had realised a gain of $1440 million ($1630 million in current dollar terms) since the AOFM first entered into interest rate swap transactions for duration management in 1997.

5.2 Reasons for reviewing the benchmark

While periodic review of significant debt management policies is normal practice, there were several considerations that lead to increased pressure to review the portfolio benchmark outlined above. Two major considerations resulted from the impact of a lower net debt environment.

First, at the same time as net debt was falling, the within year financing task was increasing in scale. That is, the range between peak and trough within year financing requirement has grown in recent years. The level of short term borrowing had a greater impact on the overall portfolio duration target. This meant that the portfolio duration target was increasingly difficult to meet for periods within the financial year. As these fluctuations were known to be temporary, it made little sense to undertake further interest rate swaps to bring the portfolio within the benchmark range.

Second, as the volume of nominal debt on issue fell, the proportion of the portfolio in indexed debt rose. As will be discussed below, the portfolio benchmark

did not specifically address the differences between nominal and indexed debt in terms of their response to interest rate changes. As indexed debt became a greater proportion of the portfolio these difference were becoming more important.

5.3 New interest rate benchmark

In 2002-03, the Australian Government completed a review of the portfolio benchmark. This review was undertaken partly because of changes in the net debt portfolio's composition that have been driven by the reduction in net debt achieved since 1996. The findings of the review were subsequently verified by an independent consulting firm (Deloitte Touche Tohmatsu).

The new benchmark is based on the same philosophy as the old benchmark – to use interest rate swaps to shorten the duration of the net debt portfolio in order to achieve a lower average cost outcome. However, the new benchmark enhances the former approach by, among other things, taking better account of the low debt environment.

The new benchmark has two major aspects. First, four changes have been made to ensure that more appropriate measures of cost and risk are used to define the benchmark and to clearly state the link between these measures and the actual level of management discretion for the AOFM. Second, having clarified these measurement and governance issues, the new benchmark parameters were reviewed to ensure that they represent an appropriate balance between cost and risk.

5.4 Enhanced measurement and governance

The four key changes to improve measurement and governance are set out below.

First, for management purposes, the net debt portfolio was decomposed into a Long Term Debt Portfolio and a Cash Management Portfolio. The Long Term Debt Portfolio holds the debt required for the Australian Government's ongoing borrowing program and is quarantined from the effects of large swings driven by within year financing needs. The impact on the overall duration of the net debt portfolio of these swings has become more pronounced as net debt has fallen.

The Australian dollar Long Term Debt Portfolio holds all domestic currency financial assets, liabilities and derivatives under the AOFM's management and control, except those required for cash management purposes. The new benchmark applies to this portfolio.

Long Term Debt Portfolio should reflect the trend level of net debt. Transfers to ensure this will be made between the Long Term Debt Portfolio and the Cash Management Portfolio, based on Budget and mid-year budget review information. All transfers will be fully transparent, ensuring that the AOFM is not able to inappropriately use transfers to artificially meet risk targets.

On average, the Cash Management Portfolio should therefore have neither a net asset balance, nor a net liability balance.[10]

Second, the benchmark has been defined in terms of modified duration and also short dated exposure (a measure of the proportion of the portfolio subject to immediate repricing). A portfolio with higher short dated exposure will generate changes in debt servicing costs sooner when interest rates change than a portfolio with lower short dated exposure and the same modified duration. The inclusion of a target for short dated exposure provides more information on the extent to which interest rate changes may flow through to debt servicing costs. It also ensures that the duration target is not met by generating an unacceptably large exposure to floating interest rates.

Third, the new benchmark distinguishes between nominal interest rate debt and inflation indexed debt. This is important, as the interest rate risk for inflation indexed debt is not the same for real rate and inflation shocks.

Inflation indexed debt behaves similarly to nominal fixed interest rate debt with regard to real interest rate movements.

Inflation indexed debt behaves similarly to floating interest rate debt with regard to inflation rate movements.

Distinguishing between the two types of debt became more important as the stock of nominal debt fell while the volume of indexed debt remained stable (thus increasing the proportion of the portfolio in indexed debt).

The new benchmark applies to the nominal component of the Long Term Debt Portfolio but was selected by taking into account the level of indexed debt. This is because the nominal component will be the key driver of debt servicing costs going forward, partly because issuance of Treasury Indexed Bonds has been suspended. There is no intention to repurchase current Treasury Indexed Bonds the latest of which matures in 2020. While the compliance regime is based on the nominal component of the portfolio, the modified duration and short dated exposure of the Long Term Debt Portfolio will also be reported under both treatments of inflation indexed debt.

Fourth, the governance framework applying to the benchmark has been enhanced by clarifying the nature of the benchmark limits. Two types of limits around the benchmark parameters set out the level of discretion that can be exercised by the AOFM and by the Secretary to the Treasury. The Treasurer has approved Policy Interest Rate Limits around the benchmark parameters. The AOFM would need to seek approval from the Treasurer to breach these limits. The AOFM will operate within narrower Operational Interest Rate Limits. The AOFM would need to seek approval from the Secretary to the Treasury if it wished to breach or vary these Operational Interest Rate Limits.

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[10] Appendix II outlines the rules for transfers between the Long-term Debt Portfolio and the Cash Management Portfolio (Australian Office of Financial Management, 2003b).

5.5 New benchmark parameters

The modified duration and short dated exposure levels for the nominal component of the Australian dollar Long Term Debt Portfolio are key risk parameters. The new benchmark parameters and associated limits approved by the Treasurer are outlined in Table 1. These will be reviewed periodically.

Table 1

Australian Dollar Long Term Debt Portfolio Benchmark Parameters and Limits

	Nominal portfolio
Modified Duration	2.00
Operational Interest Rate Limit	1.75-2.25
Policy Interest Rate Limit	1.50-2.50
Short-Dated Exposure	35%
Operational Interest Rate Limit	30%-40%
Policy Interest Rate Limit	27%-43%

The previous benchmark's modified duration target range of 3.0 to 3.5 was inclusive of the impact of Treasury Indexed Bonds, where these were treated as being equivalent to Treasury bonds. Based upon the current mix of inflation linked and nominal debt within the net debt portfolio, the new benchmark's modified duration target of 2.0 for the nominal component equates to a modified duration target of 2.9 when Treasury Indexed Bonds are included in the traditional manner. Therefore, the reduction in the modified duration target has been relatively minor.

At the time the new benchmark was introduced, Australian dollar Long Term Debt Portfolio had a higher modified duration and also a higher short dated exposure than the new benchmark levels. A lower modified duration would reduce the expected debt servicing cost. A lower short dated exposure would reduce short term risk to debt servicing cost in the event of higher interest rates, but at the expense of an increase in expected debt servicing cost. Overall, compared with the previous net debt portfolio, the new benchmark should result in broadly the same expected debt servicing cost but reduced exposure to short term interest rate increases (Section 5.8 outlines the types of transactions that will be required to move towards the new benchmark).

The benchmark parameters were determined by modelling a range of potential portfolios and comparing them to a "standard" portfolio (which consisted of an equal proportion of debt issued from one to eleven years). A series of shocks (including non-parallel yield curve shocks) were applied to these and the expected cost outcomes compared to the standard portfolio under the same shocks. This analysis considered both the impact of these shocks on short term accounting results as well as the long term cost of the portfolio. The parameters set out above were chosen on the basis that they provided an acceptable trade off between short term volatility in debt servicing costs and potential long term cost savings.

An additional consideration in the determination of the benchmark parameters was to minimise the expected size of the swap portfolio required to meet the benchmark. This consideration was driven by concerns over an adverse market movement that compressed bond/swap spreads in the long end of the yield curve. In addition, a lower stock of swaps would reduce governance concerns over counterparty credit risk and operational risk management.

5.6 Term premium assumption

The key assumption underlying the benchmark is that there is a positive term premium in market interest rates. Analysis was undertaken on the implications of a range of different term premia. A positive term premium implies it will generally be more cost effective for the Government to have a debt portfolio that has a shorter average term to maturity. A benchmark based on this assumption will reduce the cost of debt when averaged over a period of years. The higher the assumed term premium, the stronger is this conclusion.

However, in the event of a general increase in interest rates, the debt servicing cost of a portfolio with a shorter average maturity will increase more quickly than those of a portfolio with longer average maturity. This should be set against the savings expected to be achieved over the longer term from the term premium effect.

Clearly, from time to time, there may be circumstances where short term rates equal or exceed long term rates (that is, the yield curve becomes flat or inverted). The key issue is whether this circumstance is expected to continue for an extended period. Experience suggests that a flat or inverted yield curve usually indicates that increased short term rates are not expected to be sustained. In these circumstances, adhering to the benchmark portfolio may be expected to continue to provide net benefits over the longer term. However, it would be appropriate to reconsider the term premium assumption and the benchmark portfolio if there is evidence that the term premium has changed significantly over time. For this reason, the benchmark is subject to ongoing review and monitoring including a formal annual review.

5.7 Benchmark reporting

Reporting will primarily focus upon the modified duration and short dated exposure of the Australian dollar Long Term Debt Portfolio and compliance with the associated limits. Benchmark cost outcomes will also be compared against outcomes associated with default portfolios that do not include interest rate swaps. Additionally, the AOFM will report on the interest rate risk associated with the Cash Management Portfolio.

5.8 Portfolio transition

In order to achieve the new benchmark targets, the AOFM will be undertaking two different types of interest rate swaps. First, as in the past, the AOFM will enter contracts agreeing to receive fixed rate interest flows at terms around 10 to 13 years and pay floating rate interest flows. This will shorten the portfolio duration towards the target. Second, the AOFM will enter into contracts to receive floating rate interest flows and pay fixed rate interest flows with terms of up to 4 years. This will reduce the floating rate exposure of the portfolio and assist with meeting the short dated exposure targets.

It is expected that the transition to the new benchmark parameters will take up to three years. Transitional interest rate limits will guide the management of the portfolio during this period. However, these limits will not be made public as publication may prejudice the Australian Government's financial interests.

5.9 Total cost of the debt portfolio

As mentioned above, the physical debt portfolio normally has a duration of around 4 to 5 years, reflecting the dominance of long dated bonds. The assets held at the RBA generally have a very short term to maturity and as such earn a lower return than the market yield on outstanding physical debt.

However, this comparison ignores the impact of the interest rate swaps on debt servicing costs. Any increase in the level of term deposits would increase the net debt portfolio duration by defeasing short dated liabilities. This would have the effect of moving the portfolio away from the benchmark target. As such, additional interest rate swaps would be transacted to reduce the portfolio duration.

Very broadly, the short term interest rate received on the term deposit matches the payment of a short term interest rate on the interest rate swap. The Australian Government receives a long term interest rate on the swap, which is broadly consistent with the market yield it is paying on the longer term physical debt securities in the portfolio.

With this defeasance arrangement in place, the net cost of the debt portfolio is then determined by the application of the portfolio benchmark to the Long Term Debt Portfolio.

6. Summary and conclusion

Over recent years, the Australian debt management framework has been driven by the need to adjust to declining levels of net debt.

The reduction in net debt lead to concerns within the financial community that further declines in CGS would result in lower financial market efficiency. These concerns lead to a thorough consideration of the issues through a public review of the CGS market.

The Review concluded that given the current state of financial market development in Australia, the cost of managing interest rate risk was likely to rise in the absence of CGS due to the decline of the Treasury bond futures market, which is currently the key market for interest rate risk management. An increase in the cost of managing interest rate risk would lead to increases in interest rates throughout the economy. The next most efficient alternative risk management market, the interest rate swap market, is less cost effective due to lower liquidity and higher transaction costs. In addition, the absence of a CGS and bond futures market would increase the costs of executing interest rate swaps. There is also a risk that the Australian financial system may be more affected by a significant shock if it were to rely on the interest rate swap market, as this market is dependent on the banking system.

The outcome of the Review of the CGS market has implications for debt issuance and portfolio management. CGS issuance will now be directed to supporting the 3 year and 10 year Treasury bond futures contracts. Put another way, physical debt issuance will primarily be assigned to promoting financial market efficiency. This will involve issuing a new Treasury bond of around 13 years to maturity and a new Treasury bond of around 5 years in alternate years. Each new bond line will be built up to around $5 billion outstanding over a two year period.

Debt issuance proceeds and budget surpluses will be placed on term deposit with the RBA. This strategy takes advantage of a well established governance arrangement and allows the asset portfolio to be used to assist with financing with year budget fluctuations. Should term deposits at the RBA exceed $25 billion on a sustained basis, the Government will consider allocating some assets to offset other liabilities.

The reduction in net debt also raises implications for the management of the remaining debt. A new portfolio benchmark represents an evolution of the previous approach which takes account of the low debt environment. The net debt portfolio has been split in to a long term debt portfolio and a cash management portfolio in order to handle the growing significance of short term financing fluctuations. The new benchmark target applies to the long term debt portfolio and is expressed in terms of both modified duration and the proportion of the portfolio subject to immediate repricing. The new benchmark distinguishes between inflation linked bonds and fixed coupon bonds to take account of the differences in the impact of changes in interest rates on the two types of bonds. The opportunity has also been taken to clarify the governance arrangements around the transactions used to move

the portfolio towards the benchmark. Finally, the portfolio targets have been reviewed and adjusted to ensure an appropriate balance between cost and risk. These portfolio targets are achieved through the use of interest rate swaps.

In conclusion, the decline in the level of Government net debt in Australia has led to a fundamental review of debt management operations. This process of review has lead to a clearer, better defined and more transparent debt management framework. Debt management in Australia now explicitly has two objectives – contributing to financial market efficiency and achieving an appropriate balance between cost and risk for the Government. Two instruments are used to achieve these two objectives. Physical bond issuance is primarily assigned to promoting financial market efficiency and interest rate swaps are primarily assigned to achieving an appropriate balance between cost and risk.

APPENDIX I

INSTITUTIONAL ARRANGEMENTS FOR GOVERNMENT DEBT MANAGEMENT IN AUSTRALIA

The Treasurer is accountable to Parliament for administering legislation associated with debt management. Acting on advice from the Australian Treasury and the Australian Office of Financial Management (AOFM), the Treasurer determines the scope and terms of the debt management mandate. The Secretary to the Treasury is accountable for implementation of this mandate.

The Secretary uses the resources of both the AOFM and the Treasury to deliver the mandate, and to provide advice to the Treasurer on debt policy and debt management issues more generally. In discharging his accountability, the Secretary also draws on advice from an advisory board which is comprised of representatives from within the government and from the private sector.

Role of Treasurer

The Treasurer is accountable to Parliament for administering legislation associated with debt management.

The debt management framework is defined by the broad settings of fiscal policy and related strategic directives, such as net debt objectives. These policy parameters and directives include:

- the Australian Government Budget;
- net debt objectives;
- broad financial market and Commonwealth Government Securities (CGS) market considerations;
- investment strategies;
- risk philosophies, priorities and tolerances for the Commonwealth's net debt portfolio; and
- debt management operational objectives.

Acting on advice from the Treasury and the AOFM, the Treasurer takes decisions on strategic debt management issues, approves debt management risk benchmarks and debt management risk policies, and considers any possible breaches of risk exposure limits brought to the attention of the Treasurer in accordance with the approved risk policies. In addition, the Treasurer approves an Annual Remit for debt management which includes approval for interest rate swaps programs for the coming financial year.

Role of Secretary to the Treasury

The Secretary to the Treasury is responsible for advising the Treasurer on debt management issues, drawing on the resources of both the AOFM and the Treasury. The specific split of responsibilities between these two organisations is detailed in a Memorandum of Understanding.

Subject to overarching risk policy and benchmark frameworks approved by the Treasurer, the Secretary is responsible for approving annual debt management risk strategy documents and associated exposure limits documents, and for addressing any possible breaches of risk exposure limits brought to the Secretary's attention in accordance with the approved risk policies.

The Secretary is also the Chair of the AOFM Advisory Board. The Treasury is responsible for advising the Treasurer on strategic debt policy issues and wider policy issues as they relate to debt management.

Role of AOFM Advisory Board

The accountability of the AOFM Advisory Board is to the Secretary to the Treasury, the Chair of the Board. The Board performs an advisory role to the Secretary and does not possess executive powers or decision making authority in its own right. The Board advises the Secretary on issues of debt management, including benchmark design, and matters relating to corporate governance and business planning of the AOFM, and is responsible for monitoring the performance of the debt management function generally. The Board comprises both senior public policy executives and private sector participants with experience of debt management issues.

Accountabilities of Chief Executive Officer of the AOFM

Day to day management of the AOFM is the responsibility of the Chief Executive Officer (CEO) who is appointed by the Secretary to the Treasury. The CEO of the AOFM reports, and is accountable to, the Treasurer through the Secretary to the Treasury.

The CEO of the AOFM is responsible for debt management operational issues and for the operation of the AOFM and, in this regard, is required to:

- ensure compliance with the relevant legislation governing the operation of public sector bodies;
- oversee the efficient and effective management of the AOFM including its day to day operations and fulfilment of the Annual Remit and approved annual strategic plans:
- maintain appropriate risk management policies;

- maintain an appropriate governance framework;
- develop organisational performance targets and budgets;
- maintain and develop appropriate personnel resources to provide professional management of the AOFM's functions and accountabilities; and
- report fully and promptly to the Treasurer, where appropriate, the Secretary to the Treasury and the AOFM Advisory Board on all matters related to the operation of the AOFM.

Principal accountabilities of the AOFM

The AOFM is accountable for all aspects of operational debt management. The AOFM conducts its activities within a prudent risk management framework consistent with the government's risk tolerance and the responsibilities of a sovereign debt manager.

AOFM debt management operations are governed by a number of accountabilities and principles:

- to meet all legislative, administrative and accountability requirements for debt issue, repurchase, and redemption;
- to provide recommendations to the Treasurer, via the Secretary to the Treasury and the Advisory Board, regarding appropriate benchmarks for financial and operational risk management consistent with the Government's debt management objectives;
- to ensure a sound financial and operational risk policy framework is in place through the identification and measurement of key risks, the development of appropriate risk benchmarks and through the development of risk policy documents and related strategy and limits documents;
- to provide recommendations to the Treasurer, via the Secretary to the Treasury and the Advisory Board, on the Annual Remit to meet the Government's debt management objectives;
- to meet the Annual Remit approved by the Treasurer for the issue, redemption and management of Commonwealth debt instruments and management of any assets held as part of the net debt portfolio, consistent with benchmark requirements, maintenance of risk exposures within approved delegations, broader public policy objectives of the government, and with attention to benchmark out performance where mandated to do so;
- to develop and promote advances in sovereign debt management policy and practice that may help to enhance the efficiency of debt management;
- to conduct market operations in a transparent and efficient manner, consistent with promoting and accruing the benefits of an efficient and liquid market for Commonwealth Government Securities;

- to enhance the transparency of debt management activities by making information publicly available on a timely basis on CGS outstandings and on AOFM operations;
- to contribute to the Treasury's consideration of strategic debt policy matters, and to related wider public policy issues as defined through the MOU;
- to provide advice and expertise to other Government agencies and to other sovereign debt managers as required; and
- to develop and manage organisational systems, capabilities and resources in order to deliver objectives effectively and efficiently, consistent with a vision of excellence in sovereign debt management.

Central bank involvement in debt management

The Reserve Bank of Australia (RBA) is responsible for implementing monetary policy independently from the Government, as set out in the Second Statement on the Conduct of Monetary Policy, July 2003, issued jointly by the Treasurer and the Governor of the RBA.

The Australian Government does not borrow from the RBA. However, the RBA does act as agent for the Australian Government in conducting tenders of CGS and provides registry services. The RBA also facilitates some transactional banking services for the Australian Government.

The RBA provides banking services to the AOFM, including the operation of the Australian Government's official public account and the provision of overdraft facilities and term deposits. These arrangements are conducted on commercial bases.

The RBA usually holds a stock of CGS on its balance sheet for use in assist with the conduct of open market operations. This includes providing repo facilities on CGS held by the RBA.

APPENDIX II

RULES FOR GOVERNING TRANSFERS BETWEEN THE LONG-TERM DEBT PORTFOLIO AND CASH MANAGEMENT PORTFOLIO

Portfolio framework

The AOFM's portfolio framework allocates the Australian Government net CGS debt portfolio between a Long Term Debt Portfolio and a Cash Management Portfolio. The objectives underpinning the allocation methodology are that:

- the Long Term Debt Portfolio represents the trend volume of the net CGS debt portfolio on a year to year basis; and
- the Cash Management Portfolio is to accommodate within year variability in the volume of net debt around this trend level.

Initially, longer term instruments such as bonds reside in the Long Term Debt Portfolio, while shorter term instruments such as Treasury Notes and term deposits reside in the Cash Management Portfolio. Debt volumes are subsequently allocated between the two portfolios using transfers of assets and liabilities from one portfolio to the other, as governed by a set of objective rules.

Transfer rules

The principles behind the transfer rules are that the trend level of net CGS debt should reside in the Long Term Debt Portfolio and that the Cash Management Portfolio should accommodate any within year variation from this path. On average, the Cash Management Portfolio should therefore have neither a net asset balance, nor a net liability balance.

There are two types of transfer rules. The first are defined in terms of the steps necessary to offset the impact of one off events such as bond issuance and maturities. This process is mechanical and triggered by externally observable events.

For example, consider the impact of the maturity of $5 billion worth of bonds. Initially, these bonds would have resided as liabilities within the Long Term Debt Portfolio. If no transfer were made on the day of maturity, the Long Term Debt Portfolio would fall by $5 billion. Consequently, a transfer is undertaken to reverse the impact of the maturity. This transfer of assets from the Long Term Debt Portfolio to the Cash Management Portfolio removes the discontinuity in the volume of net debt within the Long Term Debt Portfolio. From the perspective of the Cash Management Portfolio, the transfer of assets serves to offset the impact of the cash repayment of the maturing bonds.

The second set of transfer rules forces the value of the Long Term Debt Portfolio to trace out the estimated path of net CGS debt.

For example, in the event of a forecast budget surplus giving rise to an estimated reduction in the level of net CGS debt through the course of a financial year, a steady reduction in the level of the Long Term Debt Portfolio is to occur. This is achieved through the transfer of assets from the Cash Management Portfolio evenly through the course of the year. These assets serve to partially defease the liabilities within the Long Term Debt Portfolio, thereby reducing its net volume.

Estimating the path of net debt

The AOFM bases its estimate of the path on financing information embedded within Budget projections, released in May each year. This data is used to generate the estimated path of net debt for the following financial year, under the assumption that any change in net debt will occur evenly over the course of the financial year.

Approximately halfway through the financial year, Mid-Year Economic and Fiscal Outlook (MYEFO) forecasts are released. Any change in the estimated financing requirement from the previous Budget projection is reflected in a revision of the path of net debt for the remainder of the financial year, effective 1 January. It is worth noting that there is no one off adjustment to the stock of net debt, but rather the path is adjusted to reflect any changes in that year's expected financing requirement.

At the end of the financial year, the AOFM is in a position to determine the actual trend level of net debt through the course of that year. By determining the average daily balance of the Cash Management Portfolio throughout the year, a one off adjustment is made to reduce this balance to zero, effective 1 July.

For example, in the event that the Cash Management Portfolio had an average asset balance of $1 billion throughout the course of the year, a one off transfer of $1 billion worth of short term assets would be made from the Cash Management Portfolio to the Long Term Debt Portfolio, effective 1 July.

This revision process ensures that the Long Term Debt Portfolio converges upon the trend level of net debt. It is important to note that the path estimation process is rule based and therefore not subject to any discretion on the part of the AOFM.

Information principles

It is important that the AOFM provide confidence that the Long Term Debt Portfolio truly reflects the best estimate of the trend level of net CGS debt. If it were not to do so, it is likely that the Portfolio Framework would be criticised as a vehicle through which the AOFM could artificially achieve compliance with its benchmark risk limits.

For this reason, estimates of the path of net CGS debt are based upon information contained within Budget and MYEFO projections of annual financing requirements. The one off adjustment to the stock of net debt within the Long Term Debt Portfolio made on 1 July is based upon information that, while not publicly available at that time, will subsequently be made available at the time that the AOFM Annual Report is released. Therefore, the net debt adjustment path and one off adjustments can be independently verified.

The table on the following page summarises the various triggers that can give rise to a transfer of assets between the Long Term Debt Portfolio and the Cash Management Portfolio.

Transfer trigger-event	Why a transfer is required	How will the transfer be achieved?	What are the consequences of not doing the transfer?
Level of Long Term Debt Portfolio (LTDP) changes each day under target LTDP Path to reflect estimated path of net CGS debt.	To ensure volume of debt in LTDP moves in line with estimated trend for net CGS debt. (Note the trend is revised on 1 July and 1 January).	Internal transfer of cash-like assets between Cash Management Portfolio (CMP) and LTDP.	Volume of net debt within LTDP will differ from trend level of net CGS debt.
Revision to LTDP Path	On 1st July the previous year's actual level of net debt is known. (Conversely, any persistent asset/liability balance within CMP can be quantified.)	A one-off internal transfer of cash-like assets between CMP and LTDP is required to unwind the persistent asset/liability balance within the CMP and to get the LTDP back to a level consistent with net CGS debt.	LTDP will not be representing the current forecast of trend path for net CGS debt portfolio. A persistent net asset/liability balance will be residing in the CMP.
Bond maturity / repurchase	This event causes LTDP to fall below the target path. An internal transfer is required to offset the effect.	Internal transfer of cash-like assets from LTDP to CMP.	LTDP will fall despite no corresponding change in the level of net CGS debt.
Bond issuance	This event causes LTDP to rise above the target path. An internal transfer is required to offset the effect.	Internal transfer of cash-like assets from CMP to LTDP.	LTDP will rise despite no corresponding change in the level of net CGS debt.

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DEBT MANAGEMENT IN THE CZECH REPUBLIC: FORMATION IN THE NINETIES AND THE CURRENT STATE

Ivan Matalík and Michal Slavík[*]

Introduction

The state debt management has undergone a lot of substantial changes in the course of the economic transformation in the Czech Republic. The outstanding amount of the initial debt was very small at the beginning of the Nineties, reaching less than 16 per cent of GDP in 1993. Consequently, the attention of policymakers to state debt management was rather low at that time. The main focus was directed towards setting economic transformation policy. However, the increase in the outstanding debt for the last five years and the negative outlook for the future has led the policymakers to increase their interest in this area and has also contributed to the continuous modification and improvement of the debt management procedures aiming to bring the current Czech practice closer to the standards common in the EU.

Debt management in the Czech Republic has been a subject of many changes and is still "a work in progress". This topic is very broad due to specific features of the Czech economic transformation. Therefore, we will focus on just two fundamental issues in this paper. In the first part, we will discuss broader issues connected to debt management focusing on the interaction and the institutional arrangement of the fiscal and monetary policies. The passive coordination of the fiscal and monetary policies and the creation of the State Treasury management are the current topics frequently discussed in the Czech Republic. The Czech State Treasury and debt management is not a completed task, but it is both continuously developing and subject to many structural and institutional changes. The second part of the paper deals with the state debt development during the years 1993-2003 and describes the main features and factors standing behind debt development, giving a deeper insight about the currently-used debt management setting and instruments.

Our aim is to stay close to the practice of debt management in our country; leaving untouched the wide theoretical literature about this topic. The reader of this paper should be able to find herein basic knowledge about the current state of debt management in the Czech Republic with a particular accent on the broader economic transformation issues.

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1. Coordination of monetary and fiscal policies in the state debt management

One of the most relevant questions, that is particularly important for transforming and "catching-up" economies, is the passive coordination between monetary and fiscal policies in the debt management issues. The coordination of policies is crucial because the policy objective of monetary authorities, fiscal authorities and debt managers may conflict and may require the articulation of shared objectives respecting the independence of the monetary and fiscal authorities at the same time.[1] Fiscal policy is usually used for the allocation and redistribution of resources and the stabilisation of the economy. In some countries, the stabilisation task is also delegated to the monetary policy authority that can react faster and usually in a less distortional way. The basic aim of the passive coordination of the monetary and fiscal policies is reaching a long-term balanced economic growth. In practice, this condition implies setting a fiscal deficit at such a level that can feasibly be financed – on the one hand, using capital market operations that do not lead to a creation of an unbalanced allocation of resources in the economy – and on the other hand, avoiding the creation of the need of direct lending from the central bank to the government and at the same time not generating excessive foreign debt. In the short run, it is necessary to focus our attention on the combination of the monetary policy and the state debt management to achieve and maintain stable financial conditions (including also the price stability).

The passive coordination of the monetary and fiscal policies is also very important in the small open economy for the development of the domestic financial and capital markets. The existence of well-developed, domestic financial and capital market is a necessary condition for the effective realisation of the monetary and fiscal policies. On one hand, this is because it provides sources of financing the fiscal deficit at the market (and therefore not distorted) prices; on the other hand, it allows for the central bank to carry out the monetary policy using indirect and market-oriented monetary operations. Moreover, the existence of a developed financial market imposes self-discipline on the monetary and fiscal authorities in their responsibility of assuring the stable financial environment and leads to maintaining effective and stable conditions on these markets. For example, the necessity to pay the full market price for debt servicing may work as an effective limit to excessive fiscal deficit growth.

The state debt management, therefore, represents one of the key areas of the fiscal and the monetary policies. The meaning of this task follows not just from the crucial impact of the state debt management on the financial market development, but also on the most important macroeconomic variables. In economies with less developed financial markets or in an earlier stage of transformation, a relatively consistent coordination of the monetary and fiscal policies targets with the debt

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[1] For a more details about this topic see, for example, Sundararajan, Dattels and Blommestein, *Coordinating Public Debt and Monetary Management*, IMF (1997).

management targets is required. The imperfect or absent coordination of these targets may even lead to an emergence of the macroeconomic instability in developing economies. In contrast, in a case of developed financial markets the mutual coordination of the above-stated targets is assured to a certain extent (under careful institutional separation of the individual policies) by the market forces. However, the passive coordination is still essential at some level.

Generally speaking, it is possible to identify in the transforming or catching-up economies the following basic phases of the coordination process development:

- *non-existence of domestic market for government debt*, when the central bank finances the fiscal deficit or it is fully or partially financed from borrowings abroad. The "Broad money programming" system is usually used for setting a balanced mix of monetary and fiscal policies,
- *creation of the short-term government bond markets*, when the financial market is still underdeveloped and the interest rates are regulated administratively by the central bank; indirect (market-oriented) monetary policy tools are gradually introduced,
- *early stage of the domestic financial market development*, when there is already a space for the central bank to affect the interest rates using market instruments. In the setting of the monetary policy, the so-called "reserve money programming" plays a substantial role, and also the market interest rates carry out progressively a more important signalling function for the economic decision,
- *fully developed domestic financial market*, where the interest rates are fully flexible, the liquidity of government debt instruments is provided by market forces and the central bank uses indirect market-oriented tools for influencing the overall banking sector liquidity. The institutional independence of the central bank, which is perceived by the market players as a guarantor against non-balanced or inflationary trends of economic development, is crucial in this phase. The institutional independence that is given by a law has to be backed by the so-called "realisation credibility", that means a practical coordination of the monetary and fiscal authorities activities that is accompanied by a prudent fiscal discipline. No matter how independent the central bank seems to be according to the central bank law, in practice, the central bank is allowed to push forward only a monetary policy that is transparent and accepted by the government and the public.

The need for the coordination between monetary and fiscal policies in the area of debt management follows from the interaction and general influence of monetary policy on the state debt management and vice versa. The central bank influences the state debt management in many ways. One of the most obvious one is the setting and concrete *direction of the monetary policy and the monetary tools and operations used* to reach the monetary policy objectives. A relaxed monetary policy allows the debt financing at low interest rates, but increases the probability that interest rates will be increased in the future as a reaction to growing inflation

pressures. On the other hand, a restrictive monetary policy may increase to an excessive degree the debt-servicing costs; harm the economic growth perspectives and lead towards higher fiscal deficits.

Contrariwise, the state debt management influences the monetary development. If the market players perceive the debt accumulation as disproportionate, the credibility of the fiscal and monetary policies mix is endangered and an increase in interest rates naturally follows. If the capital account is fully liberalised, higher interest rates attract the inflow of the foreign liquidity. This inflow has to be consequently sterilised by the central bank's operations to stem the inflation pressures in the economy. The sterilisation operations are costly to the central bank and may negatively affect its profits and hence also directly the government budget if the central bank's profit is a common-budget revenue source.

One of the possible solutions for monetary policy and debt management policies is a *sufficient passive coordination of both policies*. There are two ways of financing a government deficit: one is through a debt issuance; the other is through an increment of the central bank monetary base. We can therefore speak about the debt- or the monetary-financing of a government deficit. In addition to these two ways of a debt financing, there exists another possibility[2] – that has been substantially used by the transition economies – namely selling government assets.[3] The privatisation revenues have played or are still playing a very important role in practically every transforming economy. The standard way of describing the interaction between fiscal, monetary and debt management policies can be simplified in the following equation:

$$\underset{\text{fiscal policy}}{D_t} = \underbrace{(B_t - B_{t-1})}_{\text{debt management}} + \underbrace{(M_t - M_{t-1})}_{\text{monetary policy}}$$

This relationship is often stated as a starting point for the discussion about the public debt management and monetary policies. We can derive several basic situations that can – assuming the existence of a fiscal deficit – emerge. These situations depict the basic foundations for the policies coordination. The fundamental features are whether a central bank can provide a direct lending to a government or not, and what is the degree of the financial market development. If

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[2] We ignore the other theoretical "solution" – outright or partial repudiation – as depicted in, e.g., Gray (1996), since it is not the case feasible for a stabilised economy. However, Gray (1996) lists some of the possible ways of repudiation: devaluation of the currency in the fixed exchange rate system, enforced unilateral extension of the short-term debt instruments maturity, introduction of a general prohibitive tax on financial assets or interest profits and a restriction of capital flow mobility.

[3] At the beginning of the transformation from a planned to a market economy, the vast majority of the real capital stock was owned by the state – including all factories and their equipment, land and existing agriculture producers and, in the case of the Czech Republic, also the majority of housing. The Czech governments substantially used the revenues from the privatisation to cover current or capital expenditures. The existence of privatisation receipts that improved the budget revenues is the main reason why there is not so direct a link between actual fiscal deficits and the outstanding debt in these economies.

the central bank can provide a direct credit to the government, as is common in the early stages of transformation, we can identify two basic scenarios:

- in the *first case*, the central bank is fully independent in its monetary policy, which means that it can freely decide (and then influence) the change in its monetary base. This monetary base increment – unless it is covered by a foreign currency accumulation – creates a space for the direct credit to the government. This situation calls for an intensive coordination between fiscal and monetary policies,
- in the *second case*, it is a matter of the relatively less autonomous central bank and the government having relatively open possibilities to finance the debt by direct lending. The central bank doesn't set up autonomously its target for monetary base and the effort for the price stability could be endangered if the fiscal deficit is higher than would be consistent with the prevailing economic conditions.

  These two scenarios are connected to the situation in developing countries without a suitably developed financial market, where the state debt financing using the financial/capital markets is somehow limited. In both cases the central bank isn't fully autonomous and doesn't have its clear target expressed in the price-stability terms. The danger of political pressures to favour short-term gains or objectives rather than long-term ones is relatively high. It is necessary to solve the conflict between monetary and fiscal policies by reaching agreements, for example, on limits of direct lending to government and/or about the maximum budget deficit,
- the *third case* is currently the most relevant for the Czech Republic, when the direct lending from the central bank to government is subject to a strict institutional separation of fiscal and monetary authorities. The monetary policy cannot legally provide a credit to the government and therefore the fiscal deficit has to be financed using market issues of state debt. An excessive debt increase may influence the interest rates and trigger certain crowding-out effects.[4] An increase of domestic interest rates may not be fully compatible with the given monetary objectives: it can, for example, have significant implications for the exchange rate development. Even when the fiscal and monetary policies are institutionally separated, it is naturally desirable to passively coordinate them in the context of the debt management, in order to prevent the emergence of negative situations that can harm the economic stability.[5]

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[4] However, in the case of the Czech Republic the link between an increment of the outstanding debt and interest rates may be disrupted by the existence of an excessive liquidity in the banking system. This fact is one of the limits for the development of the crowding-out effects in the Czech economy.

[5] The Czech Republic has a very good experience in this field so far. The practical fulfilment of this coordination is done in the official working group for debt management issues where experts from both institutions – the Ministry of Finance and the Central Bank – can discuss actual problems and topics (more details will be given later in this paper).

2. State debt management as a part of the State Treasury management

One of the clearest definitions of the debt management states that *"... [the] sovereign debt management is the process of establishing a strategy for managing the government's debt in order to raise the required amount of funding, to achieve its risk-and-cost objectives, and to meet any other sovereign debt management goals the government may have set, such as developing and maintaining an efficient market for government securities."*[6] The economies which are subject to substantial institutional and structural changes, such as the transition economies, should take into account the possibility to include this task into the system of the State Treasury management in fulfilling the general definition stated above. This opinion doesn't reflect just the experience of many developing economies, but also the Czech transformation experience from the Nineties. Continuous modification of the state debt management in the Czech Republic was connected to the changes in the overall system of the State Treasury management.[7]

The State Treasury management is a topic that is closely related to the debt management – at least in the Czech Republic. Therefore, we find useful to sketch the basic functions of the treasury management and the relevance of the State Treasury as they pertain to the debt management issues.

The State Treasury Management can be broadly characterised as a system of effective control and management of government finance. Among its main functions could be included budget execution, cash management, debt management, accounting and financial information systems and some other functions (for example a formulation of the budget and tax policies in the context of the overall macroeconomic policy). The main functions of the State Treasury are usually institutionally implemented in the Ministry of Finance. However, certain functions can be delegated to different institutions that are not directly influenced by the government (or by politicians). Some of them – for example, issues connected to the state debt management – can be delegated to a Central bank or other independent agency or body (the Debt management office). The institutional setting is determined by the history of the individual country and differs significantly among countries in the definition, structure and explicit target of a State Treasury management.[8]

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6 IMF-WB: *Draft Guidelines for Public Debt Management* (2000), p. 4.

7 During the transformation process there was, unlike for other countries, no one-shot substantial reform of the State Treasury management system. At the beginning of the Nineties, the original State Treasury management was already in many aspects modern and it was not necessary to built a completely new system.

8 Several basic State Treasury systems can be identified – among the best known ones are the British, the French, the continental (German, Italian, Dutch), the American, the Latin American, the Far Eastern and the system of formerly centrally-planned economies – more detailed treatment can be found, e.g., in EC: *Comparative Review of the Hungarian State Treasury*.

Looking closer at the individual functions of the State Treasury, it is obvious that practically all of them have a direct or intermediated relation to the debt management.

The implementation of the government budget includes a wide process starting with a financial planning and following a drawing of the allocated financial sources that are approved by the valid budget act. This process can be carried out centrally at the Ministry of Finance or at corresponding competent ministries or decentralized bodies at lower levels of government, and includes the phases of breakdown, checking and drawing of the allocated financial sources. In the Czech Republic, the Ministry of Finance in Cupertino with individual government departments provides the implementation of the government budget. The Czech National Bank is involved in keeping the government's accounts and maintaining the banking payment system. The implementation of the government budget has a direct link towards the state debt management because it includes providing of sufficient financial sources for the realisation of the approved government expenditures.

The cash management is another function of the State Treasury. Activities that are connected with the cash management include monitoring of state revenue and expenditure flows and outstanding amounts of the government accounts. This function is primarily linked to the existence of a single treasury account (STA). The single treasury account is usually kept by the central bank, and so it is in the Czech Republic. The daily Cupertino between the Ministry of Finance and the Czech National Bank leads to predictions of the STA positions and also the liquidity development is continuously checked on a daily basis. CNB carries out free cash market operations based on the instructions from the Ministry of Finance and on the Ministry's behalf to manage the liquidity on the STA (to cover the deficit or to use the surplus). The cash management has therefore the direct relations to the state debt management.

An accounting and financial information system function is another task of the State Treasury. It consists of monitoring of the treasury operations development using an accounting system that is the core element of the effective financial information system of the government. Also this area – namely the accounting part – is a standard task for the central bank that helps with the fiscal administration. The accounting function is related to the other State Treasury functions; the most obvious one is the implementation of the government budget and of the cash management, however – vicariously – also of the debt management issues.

The last but not least function of the State Treasury is the debt management. The main task, as it has already been stated above, of the debt management strategy is the debt cost minimization at acceptable risk level (some of the ways of reaching this target are described, for example, in Leong, 1999). Besides this main objective in debt management, other alternative goals can be found in developing or transition economies. Their importance is given, for example, by the degree of financial market development, the level of monetary and fiscal policies coordination, etc. The debt management is closely linked also to the state guarantees management and the

so-called government's hidden debts. This area is very important in the transition economies and the Czech Republic is no exception.

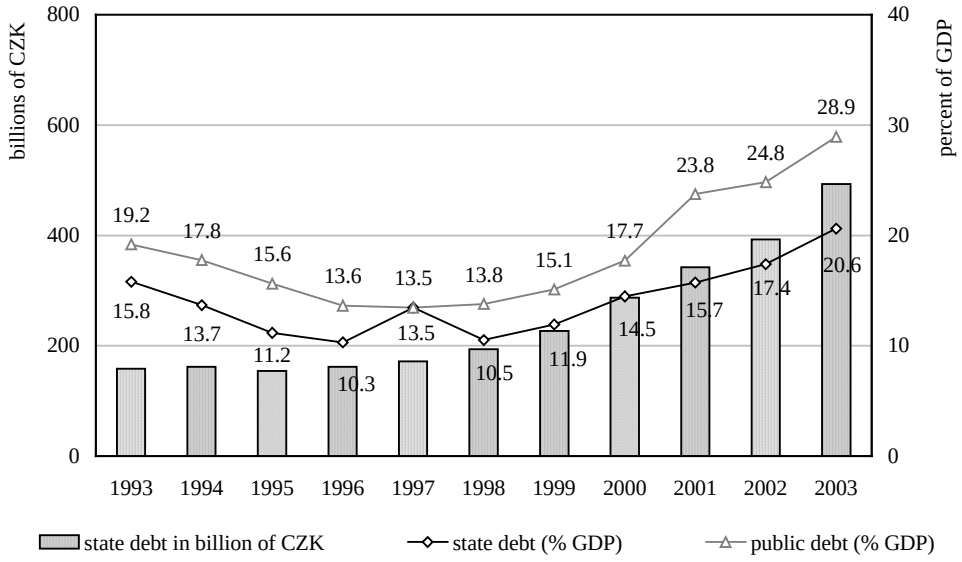
The perception of the state debt management as a part of State Treasury system is primarily important in the economies that undergo fundamental changes. This importance follows from both the direct and the indirect relation between the state debt management and the other functions of the State Treasury. The fundamental changes, or the continuous improvement of the debt management system, should be assessed taking also into account the other functions of the State Treasury and vice versa. Otherwise, it couldn't be guaranteed that the basic functions and objectives of the debt management will be effectively implemented.

3. State debt development in 1993-2003

When we look at the state debt evolution in the economic transformation in the Czech Republic from 1990 to the present, we can identify two basic periods that influenced the overall outstanding state debt, the debt management procedures and the level of the refinancing (roll-over) risk. The declining state debt volume relative to the GDP can be characterized over the first period from 1990 to 1998. This success was reached in a period of economic growth by keeping the nominal amount

Figure 1

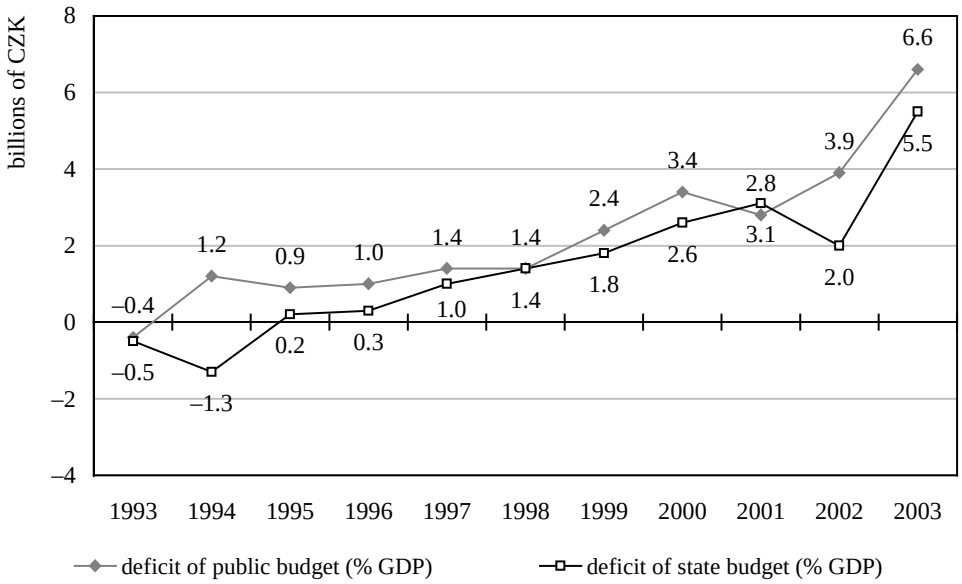
Public and State Debt Developments in the Czech Republic, 1993-2003



Source: CNB, GFS (cash) methodology (IMF).

Figure 2

State Budget Development
GFS adjusted cash data, 1993-2003



Source: CNB, GFS methodology (IMF).

of the outstanding debt almost constant. The Czech governments tried to implement a policy of *balanced state debt* in practice. However, they wasn't able to push it through the Parliament and also make it legally binding for the following governments. After the elections in 1998, the new left-wing oriented government preferred to play a more active role in the economy. The new government also started a policy of revealing the hidden debts that were connected to previous government guarantees as problematic assets in the banking system that were created during the phase of the privatisation. The growing debt dynamics, apparent in Figure 1, demonstrate these facts. In the last couple of years there also has been, as a major force in debt dynamics, the inability of the government to consolidate the budget and significantly reduce the expenditure dynamics that move away from the budget revenue side development. Another point that can be made, based on the following figure, is that the state debt represents the main part of the public debt in the Czech Republic.

Looking at this in closer detail, we can stress the following factors that determine the state debt volume and its structure in the Czech Republic:

a) the different fiscal policy setting between the first years of the transformation and the present:

The Czech Republic has a relatively very low level of state debt. Also the foreign debt was very low in contrast to many other transforming countries at the beginning of the Nineties, and created a positive environment for the start of the process of economic reform. The outstanding amount of the Czech debt was influenced by a prudent fiscal policy in the first years of the economic transition. The aim was to reduce the role of government in the economy and expenditure cuts were a necessary tool to achieve this goal. The fiscal policy concentrated, during the period 1993-98, on building a standard market economy framework, on liberalising the economy and on privatising the state property. The year 1998 represents a change in this effort and from that year the government's action was oriented more to the recovery and, later, to the maintenance of the economic growth, letting the public finances deteriorate from their balanced path. A deficit-oriented fiscal policy has been pursued since 1999.

The development of the state budget deficit and the general government deficit is depicted in the following figure. The prevailing methodology of accessing the fiscal policy in the Czech Republic is based on the GFS statistic cash data (according to the IMF methodology) that is adjusted for the privatisation revenues and transfers to transformation institutions.[9] The public budget has displayed a deficit since 1994 and the state budget since 1995.

b) the increase of the state debt as a result of revealing the hidden government debts and postponing the solution to built-in structural budget problems:

The financing of the hidden government debt is one of the biggest fiscal issues in the transition economies. The governments used to record the government statistics according to the cash principle. Some operations that did not include a cash transfer at the time of the operation (for example the government guarantees) weren't fully represented in the deficit numbers. A substantial part of the hidden government debt is related to a Czech banking system consolidation that preceded the banks' privatisation in the second half of the Nineties. The government and some public or semi-public bodies (e.g., the Czech Consolidation Agency) cleared the portfolio of commercial banks to a large extent and moved bad loans from their balance sheets into special bodies and consequently covered the costs accruing therefrom. We can estimate the total effect of these losses around roughly 5 per cent of GDP in the period 1997-2003. If there had been no such transformation operations, the state outstanding debt would have reached only 15.6 instead of 20.6 per cent of GDP in 2003. The impact on the public debt is even higher and we can estimate the cumulative effect of these operations around 10 per cent of GDP during the referred period. The overall outstanding public debt would have reached, having had no losses

[9] The idea behind this adjustment is an attempt to get a better picture of the fiscal development – how the balance would look like if there were no one-shot operation connected to the transition.

from the transformation institutions, only 18.9 instead of 28.9 per cent of GDP at the end of 2003.

The field of the "hidden debts" is however a broader topic in the Czech Republic. Except for the usual government liabilities, we also have to include the potential liabilities created in off-budget institutions, in the National Property Fund, in the commercial companies where the government is the majority or a substantial shareholder (e.g. the Czech Railways, the aircraft manufacturer Aero Vodochody, etc.). The outstanding amount of the classified government guarantees reached approximately 12 per cent of GDP at the end of 2002. One can increase the official public debt figures by this amount to obtain a clearer picture about the current state of the outstanding debts.

Besides these hidden debts, another future fiscal risk also stems from the postponing of the built-in structural features of public finances that pushed the government balance into deficit even in periods of solid economic growth. In the Czech reality, the main problems on the expenditure side are connected to the so-called mandatory expenditures – with prevailing socially-oriented expenditures. The big issue is the pension-related expenditure and the fact that the PAYG state pension system has been deficient since 1997. A substantial change of the Czech society leads towards lower birth rate that is combined with a rapid rise of the life expectancy (due to sizeable improvement of the health care system). The combination of these factors makes the current pension system imbalance the main medium-term fiscal challenge. The cumulative deficit of the Czech PAYG pension system between 1997 and 2003 reached 5 per cent of the GDP,

c) *the atomisation of the central government finances and its potential risks:*

The side effects of the state decentralisation create some obstacles to the more effective debt management in the Czech Republic. At the beginning of the Nineties, the general government balance was identical to the state budget balance. During that decade, the public finances were atomised to several institutions that are more or less controlled by the government. They consist of the state budget, state financial assets and liabilities, the National Fund as a special body for transfers from and to the EU budget, the State land fund and the Czech Consolidation Agency – naming just the most important at the central government level. Moreover, there are the other seven off-budgetary funds with the dominant position (in terms of expenditure spending volume) of the Transport Infrastructure Fund and Housing Fund. These bodies are linked to the central government and directly or indirectly influence the government debt. The atomisation of the central government complicates the debt management and the regulation of the overall debt dynamics. Some of the off-budgetary institutions are not under the control of the Ministry of Finance and they could therefore carry out expenditure policies that stimulate the debt accumulation. The main risks are connected to the covering of defaulted guarantees of the National Property Fund, losses of the Czech Consolidation Agency and excessively expansionary expenditure policies.

d) the change in the state debt duration:

One of the state debt characteristic features had been the increasing ratio of the short-term instruments used in the debt financing until the year 2000. The short-term treasury bills represented almost 60 per cent of the overall outstanding state debt in the year 2002 and it exposed the government to a considerable refinancing risk. This fact can also be illustrated using the debt duration that was far from values observable in other similar countries. At the end of 1999, the state debt duration amounted to only 0.65 years. However, the government was more or less aware of possible difficulties and has been trying – as one of the key debt management objectives – to substantially increase the debt duration since 1999.

The reason justifying the low duration during the Nineties was also a restrictive monetary policy combined with a positively sloped yield curve. The government simply stayed on the shorter side of the yield curve to minimise the debt servicing costs.

e) the minimal role of the foreign borrowing and the future outlook:

Interesting conclusions about the Czech debt strategy can be derived from Table 2. The share of the foreign debt has been continuously decreasing since 1994. However, we can observe a break of the trend between 2002 and 2003. In 1993, when the Czech Republic was established, the share was almost half of the state debt was financed by foreign borrowings. This situation was the consequence of foreign loans made by the G24 countries and the EBRD. The justification or purpose of these loans was provided not to serve to the fiscal deficit financing, but to support the balance of payments and to strengthen the internal convertibility of the domestic currency (the economic reform strategy had intended to reach as soon as possible a full external convertibility of the ČZK). At the end of 2003, the foreign debt represented only approximately 9 per cent of the outstanding debt volume. However, we assume that this situation will be changing during the year 2004. The Ministry of Finance has announced that it has plans to enter the foreign markets with Czech government bond issues (more details are given in Chapter 6).

The Czech Republic started a fiscal consolidation process with the aim to push the general government deficits below 4.0 per cent of GDP in 2006. The first phase of the consolidation was implemented in 2003 and started effectively from 1.1.2004. It consists of several revenues and expenditures measures. Now the government discusses the second phase, where some of the basic structural budget problems (e.g. the pension one) should be solved and the aim is to decrease the deficit further to 3.0 per cent of GDP before entering the EMR II. This consolidation effort will affect the debt development, too. As a result of generating government deficits in the following years, the outstanding debt will rise further. However, the debt dynamics should decline. We expect that the public debt will be 36 per cent of GDP and the state debt just 25 per cent of GDP at the end of 2006. The precise denomination is, however, still unclear. Compared to the situation ten years ago, the state debt has already reached a significant outstanding amount. We are moving

Table 1

Time Structure and Duration of the State Debt

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Short-term instruments *(% of total debt)*	10.7	14.7	24.2	42.7	44.1	51.6	57.3	57.5	54.5	41.8	32.4
Debt duration *(years)*	0.83	1.17	1.09	0.97	1.12	0.99	0.65	1.27	2.38	3.11	3.40

Source: ČNB.

Table 2

Foreign Financing of the State Debt

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Absolute volume *(billions of ČZK)*	75.7	81.9	71.3	50.5	50.5	39.3	29.5	29.9	21.3	27.2	45.7
Relative volume *(% of total debt)*	47.7	50.7	46.2	31.3	29.3	20.3	13.0	10.4	6.2	6.9	9.3

Source: ČNB.

closer to the Euro-zone countries in this aspect. The existence of Maastricht's 60 per cent debt criteria even seems to do a disservice since some Czech politicians almost understand it as a "targeted ratio". They tend to postpone necessary fiscal measures pointing out that we are still far enough from this number and can live a couple of years with fiscal deficits.

4. Basic framework and the debt management target in the Czech Republic

The basic state debt management framework is subject to a permanent improvement in the Czech Republic. The main responsibility for the debt management rests on the Ministry of Finance that tries to fulfil its basic objectives

and functions. The fundamental objective is defined similarly as in many other countries – it is providing sufficient borrowings for the central government and fulfilment of its payments obligations, trying at the same time to reduce the costs of the debt service in the medium- and long-term at an acceptable level of risk. In addition to the realisation of this fundamental aim, there is also a subsidiary objective – common also to many other transition economies – to develop the domestic financial and capital market infrastructure and its liquidity.

In the process of practical implementation, the Ministry of Finance technically cooperates with the central bank – the Czech National Bank (CNB). The CNB carries out the role of government fiscal agent, which means that it tries to support the primary state bond market development, executes financial operations on the primary and secondary markets according to the needs of and on the Ministry of Finance behalf, provides connected activities in the accounting area, and manages the system of payments and settlements. Important, also, is the regular consulting and advising role of central bank's experts in the formulation of the debt strategy and in the following realisation of this strategy in practice. This role is nowadays shown in the cash management and in the risk management activities.[10] One of the reasons why the CNB carries out the role of the fiscal agent instead of delegating it to a separate debt management office, as is common in many developed economies, is rather practical – the current setting takes advantage of the experience and knowledge of the bank's experts and does not create an additional cost burden that would be connected with establishing and running a new government institution and training its experts.

The institutional framework of the Ministry of Finance and the central bank is set in the legal agreement on the Cupertino in the state debt management that was concluded in the middle of the year 2001 and updated at the end of 2003. The agreement touches the following topics:

- setting the debt strategy and interchange of information,
- specifying ČNB tasks in the fiscal agent role,
- allowing the entry of the Ministry into the short-term bond settlement system,
- primary treasury bills market,
- the liquidity management of the single treasury account,
- administration of the treasury bills issues,
- primary medium- and long-term government bonds market,
- administration of the government bond issues,
- secondary government bond market,
- risk management of the state debt.

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[10] This includes management of all potential risks, e.g. the market risk (interest and exchange rate risks), the credit risk, the operational and settlement risk, the liquidity risk and the refinancing (rollover) risk.

According to this agreement, the Ministry of Finance formulates the debt strategy. During the process of the formulation of the debt strategy aim definition, a regular cooperation and information exchange between the Ministry and the central bank proceeds. The responsibilities for the debt management and fiscal policy on one hand and for the monetary policy on the other hand are strictly separated. The final proposal of the debt strategy is submitted to the ČNB prior to the government's approval. The bank then has the possibility to officially express its views and deliver them back to the Ministry of Finance. The contents of this opinion or statement include the bank's view on potential conflicts with the monetary strategy that could emerge in the realisation of the suggested debt strategy and possible macroeconomic impacts. However, the final decision about the debt strategy is fully the competence of the Ministry of Finance, which is obliged to inform the ČNB within 10 days after the decision is taken.

Said agreement also defines the activity and responsibility of a stable coordination working group for debt management issues. The relevant experts from both institutions – the Ministry of Finance and ČNB – participate in the working group activities and meet regularly once a month. During these consultations are solved questions related to:

a) a conceptual framework of the debt management, for example an issue strategy, time-structure of debt, type of debt instruments, treasury bills and government bonds issue calendar, other relevant parameters of the state debt portfolio and ways for these to be achieved,

b) actual market situation and partial technical matters – for example the primary issues organisation, the legal framework, the cultivation of the domestic government bond market.

There is a strong preference to reach conclusions satisfying experts from both institutions. If this is not possible and different opinions are sustained during the discussion, they are explicitly stated and depicted in detail in the working group meeting minutes. The Finance Deputy Minister takes the final decision on these disputes. This joint body represents a very concrete form of the fiscal and monetary policies coordination in practice within the Czech Republic. Its functioning has been very useful during the last three years.

Another area where the Ministry of Finance and ČNB intensively cooperate is the risk management. The Ministry of Finance is the institution primarily responsible for the state debt risk management. The Ministry conducts the activities in setting the risk strategy, building internal regulation and limits for each type of risk, a regular monitoring, assessment and inspection of the existing risks, preparation of underlying legal documents and setting prudent principles for accounting. The role of the ČNB is based on delivering regular monitoring reports to the Ministry, that are focused on the development of the domestic and foreign markets, on elaboration of demand structure analyses and on the survey of the bond market players' preferences.

The framework is continuously refined – the procedures that were sufficient in management of a low outstanding state debt aren't always effective in the light of the substantial debt dynamics the Czech Republic has faced in the last couple of years. There was also a discussion about the separation of the debt management administration from the Ministry of Finance, entrusting it to a more independent institution, as is the Debt Management Office in many countries. This idea seems to have its pros and cons, but from today's perspective the burden of additional costs from the establishment of such an office seems to exceed potential profits. The government needs to consolidate the public finance rapidly and cannot afford an unnecessary increase in expenditures. The government prefers to keep the debt management administration within the Ministry of Finance. However, a new and more independent division has been established there. It seems to be a good compromise that withdraws the debt management from possible political pressures and at the same time does not create an additional expenditure burden to the government budget. Compared to the situation of three or four years ago, the main debt strategy target (at given risk level to minimize debt service costs) is more precisely defined and dominates the secondary aim that tries to support the development of the domestic financial market.

5. Core instruments currently used in the Czech Republic's debt management

A well functioning and liquid financial market is a natural condition for the effective state debt management. The development of the Czech financial market was tightly connected to the debt market instruments in the past and to the overall liberalisation during the economic transformation. We have to bear in mind that there was no real market for debt instruments before 1989 in the Czech Republic/Czechoslovakia – the planned economy simply did not need them. Its creation and further improvement was one of the necessary steps at the beginning of the economic transition. We use two basic types of instruments – the short-term treasury bills and the medium- and long-term government bonds. The beginning of the transition in the early Nineties can be characterised by a very liquid treasury bills market and (as a consequence of the low state debt) a rather limited market with government bonds.

At present, there exists a sufficiently liquid and developed market for both types of instruments. The overall outstanding volume of these state debt instruments amounted to 479 bn. ČZK (of which 160 bn. ČZK (6.7 per cent of GDP) were the treasury bills and 319 bn. ČZK (13 per cent of GDP) the government bonds) at the end of 2003. According to the central bank act, there exists a legal prohibition to finance the government by loans, so the domestic securities market finances the

whole central government debt.[11] The government's issue program is in the form of an act – so it has to be approved by the Parliament before it comes into force. The Ministry of Finance publishes an assumed volume of new issues of government bonds and treasury bills in a range of +/–10 per cent for the given fiscal year. The detailed issue timetable is released for each quarter in advance. It includes all necessary information as dates of issues, maturity of the issued instruments and proposed orientation volumes of both – the treasury bills and the government bonds.

Thanks to the fact that the Ministry delegated the role of fiscal agent to the ČNB, the primary issue auctions are technically organised by the central bank. The role of the bank is concentrated on the arrangement of auction rules, on the preparation, announcement and administration of the auctions and on the announcement of the auction results.

There are stable groups of the primary auction participants who can enter the treasury bills and the government bond issue auctions. The other investors can place their orders for the auction only through a group member. Participation in the group is open to every legal entity meeting certain criteria. The biggest commercial banks and investment companies that have a full licence to trade securities in the Czech Republic are among the members. The ČNB prepares a proposal of criteria and their *ex post* evaluation. The existence of certain limits has only practical reasons – there is an effort to include all investors who actively participated in the past auctions and eliminate those of them who did not. The following factors are among the most important ones: the credibility of a candidate, a certain turnover of its operations on the secondary market, and a minimal subscribed amount in a previous decisive period.[12] The Ministry of Finance makes the final decision about the criteria and the involvement of one or both groups. The criteria are flexible enough be modified if one of the groups – the issuer and the investors – suggest improvements.

5.1 Treasury bills

The treasury bills are issued to cover a government deficit in the given fiscal year. They are issued as discounted instruments in the nominal face value of ČZK 1 million within these maturities: 13, 26, 39 and 52 weeks. The volume issued in one auction is usually comprised within the 8-20 bn. ČZK range. The Ministry of Finance sometimes buys a part of the offered amount into its portfolio for better cash management. For the cash management purposes, treasury bills with other (non-standard) maturity can also be issued. The auctions are the "Dutch"-type and they have usually a weekly periodicity. The current auctions are usually

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[11] There is also some small fraction of past loans that were provided by the domestic and international financial institutions and that are not matured – therefore have not been repaid, yet. But their outstanding volume is marginal.

[12] The current rules require minimal 1 per cent turnover on the secondary market and to subscribe at least 3 per cent of the offered volume in the previous decisive period. The last rule is applicable only to current group members and is targeted toward passive members.

over-subscribed and the yield is slightly under the corresponding money-market interest rates.

They are issued in the form of dematerialised securities and are registered in the separate electronic registry system (called System of Short-Term Bonds, STD). The registry, which is intended for bills with maturity of less than 1 year, was built and is maintained by the central bank. The participants who can use this registry system are domestic and foreign banking and non-banking institutions. The clients can have a direct terminal connection to the registry, or they can use a terminal connection of special agents. The system works on the Delivery-Versus-Payment basis (DVP).

The secondary market with the treasury bills is a quite advanced segment of the money market. The trading is carried out Over The Counter (OTC) and the settlement is made using the STD system. The Ministry of Finance's operations on the secondary market are carried out by the central bank, but fully on account and on the Ministry's behalf. They usually consist of daily repo-operations, sell-and-buy-back operations and straight bid and sells of the bill for the cash management purposes.

5.2 Government bonds

Compared to the treasury bills market, the government bonds market used to be less developed throughout the Nineties. The reason was a relatively low need to develop this market at the beginning of that decade because the fiscal deficits were very low (actually, the government balance had been in surplus for a couple of years). The first instruments that were issued on this market were the two- and five-year state bonds. The usual issue volume was five bn. ČZK and the auctions proceeded quarterly. Later on, the yield curve was supplemented by other bond maturities as well. The longest existing bond maturity is 15 years. We can also observe substantial shift from issuance of short- and medium-term debt instruments to long-term ones.

The Ministry of Finance announced a new issue strategy in the year 2000. The target was to gradually reduce the short-term debt instruments in the portfolio from 60 to approximately 30 per cent. The first phase included new issues of the government bonds with maturities of 3, 5, 7, 10 and 15 years to create a liquid yield curve of the Czech government bonds with benchmark titles. Recently also a reopening of old issues was set up. Individual issues included bonds in 4-5 bn. ČZK and the issue was later reopened until the total volume reached 20-25 bn. ČZK.[13] After 2002, the newly-issued bonds have all previously stated maturities except for the 7-year ones and the swap yield curve was extended to 20 years. The Ministry of Finance had taken the decision to decrease the total number of outstanding issues

[13] The current upper limit is even higher, reaching 40-60 bn. ČZK.

and at the same time to increase the volume of each issue by reopenings, making the secondary market more liquid.[14]

Also, the government bonds are dematerialised, but they are registered in the Prague Securities Centre,[15] bear a fix coupon interest and their nominal face value is only 10,000 ČZK. The current debt management strategy is to promote benchmark issues with maturities of 5, 10 and 15 years. The primary "American"-type auctions take place on a monthly basis – usually on Wednesday, with a settlement on the following Monday. Also the technical implementation is done by the central bank, using the BBG-Bloomberg system. The coupon rate is announced before the new issue takes place depending on the actual financial market conditions, but the maximally accepted yield is not. After collecting all orders, ČNB delivers to the Ministry a suggestion of possible cut-off yield, but the final decision rests with the Ministry of Finance again.

The trading volume of the state bonds represents around 90 per cent of the total trade turnover of all bonds registered by the Prague Stock Exchange. The vast majority of bond dealing on the secondary market isn't made at the Prague Stock Exchange, but on the OTC market.[16]

Generally speaking, the choice of debt instruments primarily depended on the structure of "debt needs" and on the degree of financial market development. One of the key factors was a stable, continuous and predictable financing of the government's need and, as first-choice, bonds with a fixed coupon come to mind. The inflationary stable environment (or, more precisely, the economy with substantially declining inflation), the sufficient absorption capacity of the domestic market, and the lower costs and risks of domestic financing led to bond issues denominated in the domestic currency on the domestic market. There existed a strong resistance against issues abroad, mainly justified by possible negative impacts on the exchange rate stability. Another and also important reason for home issues was an effort to use a credible benchmark and cultivate the domestic bond market, which can lead in return to the further reduction of the refinancing costs.

Rapid progress was also apparent on the derivatives market. The Czech Republic, as one of the transforming countries in the region, significantly liberalised not only the current, but also the financial account of the balance of payments. A liberal environment allowed the creation of a very liquid forward rate agreement and interest rate swap market. The liquid swap market has an important consequence for the risk management. The yield curve of the interest rate swaps is listed daily and the ČZK swap market is highly correlated to the euroswap market. Thanks to the

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[14] More details about accessible tools to encouraging the market liquidity can be found, e.g., in Bloommestein (2002, pp. 35-36).

[15] The Prague Securities Centre (Středisko cenných papírů) is a state-owned registry for dematerialised securities (for shares and bonds with original maturity greater than 1 year).

[16] The Prague Stock Exchange just registers all transactions: they can be settled there or by a special settlement stock exchange centre (UNIVYC). The information is then passed to the Prague Securities Centre and recorded also there.

liquid swap market, the bond/swap market players can also easily obtain liquid hedging instruments.

The development of the essential segments of the financial and capital market in the Czech Republic during the economic transformation brought the basic precondition for a more effective state debt management. However, the continuous increase of the outstanding volume of the state debt is calling for a permanent fine-tuning of the state debt risk management.

6. Current issues of the Czech debt management

The Ministry of Finance announced its strategy for the year 2004 at the end of 2003. As a part of this strategy, the Ministry declared some medium-term targets – such as decreasing the refinancing and interest rate risks, broadening the investors base, increasing the transparency and credibility of the state debt management policy and a further solicitude for the development of the domestic bond market.

In the area of the refinancing risk, the target, which was set already in the year 2000 for decreasing the ratio of the treasury bills to 1/3 of the overall state debt, was reached at the end of 2003. A new target is to decrease the ratio of outstanding state bonds and treasury bills with the residual maturity lower than 1 year to 25-30 per cent (this ratio was 42 per cent at the end of 2003). The Ministry of Finance is also going to smooth out the distribution each month by raising the funds from the domestic capital market within the year. The Ministry is going to use 13, 26, 39 and 52 weeks treasury bills and 3, 5, 10 and 15 years government bonds with a priority given to the 10 years bonds. It also plans to make the reopenings more frequent and run 1 bond issue and 3 treasury bills issues every month.

The previous interest risk management aim was to attain a debt duration of around 3 years during 2003. The new target wants to increase the duration further to 3.3-4.3 in the year 2004. The long lasting preference of fix coupon bonds hasn't been changed and all bond issues should be fixed. The Ministry is going to use the interest rate swaps more intensively to decline the interest risk.

The Ministry of Finance is considering entering the foreign markets with euro-denominated bond issues and to buy back some of the existing issues before their maturity is due. The Ministry already spoke about issues of non-ČZK-denominated debt abroad in the past, but these plans were always evaluated as more costly than issues on the domestic market. The growing amount of the outstanding debt increases the refinancing risk for the issuer on the domestic market. On the day that some of the existing bonds are due, the Ministry of Finance is liable to pay the face value and the interest of the bond. Due to reopenings, the outstanding amount of an issue increases and the amount of repayment on the due day grows and increases the refinancing risk and the pressures on the cash management. Issuing longer-term bonds cannot solve this problem and the Ministry is, therefore, trying to open other financial sources that could decrease its dependence on the domestic bond market. The profitability of this step is

nonetheless rather questionable: possibly lower interest rates abroad could be fully or more than fully offset by the exchange rate movements (in the case of a non-hedged issue). If the Ministry will decide to cover against the exchange rate movements, this hedging will be costly and the total cost of the issue will be higher than in the domestic market. We perceive this strategy (to borrow abroad in foreign currencies) as problematic and possibly conflicting either with macroeconomics stability or with the long-term debt strategy that should try to minimise debt costs.

A completely new feature in the Czech bond market is the so-called reversed issues of government bonds – the Ministry tries to buy-back some of the existing issues with the remaining maturity below 1 year to decrease the refinancing risk. The pressure on the cash management in the times of issues' maturity is therefore reduced, because the remaining outstanding amount of due bonds is smaller. This procedure brings liquidity to the secondary market (the bonds with a very low remaining maturity used to be illiquid). There is not enough experience with this type of operation – the first one was executed on January 21, 2004 and the obtained amount was rather symbolic.[17] We will see in the near future whether the investors change their current attitude towards this innovation or not. Notwithstanding the low success at the first reversed issue, the Ministry is going to carry on over a certain period.

7. Conclusions

Debt management in the Czech Republic is an area of dynamic development that reflects the specific influence of the economic transformation from a centrally planned economy towards a modern market-oriented one. In the first instance, the analysis of this evolution may be useful for the countries that are in economic conditions similar to those of the Czech economy 10-14 years ago. The description of the debt management evolution may provide inspiring ideas for economies where the fundamental segments of the debt market have to be built.

The specific transformation of the Czech economy was influenced by the relatively very low initial level of state debt at the beginning of Nineties. The non-existence of fundamental segments of the financial market at the beginning of the transformation and the absence of basic debt instruments combined with no or low fiscal deficits led to the need to establish the treasury bills and government bond markets and to ensure and promote their liquidity.

It was also very important for the developing economy to define the debt management policy and its relation to fiscal and monetary policies. The institutional separation between fiscal and monetary policies can be implemented only after the basic segments of the market economy are built up. Building a liquid financial market isn't any easy task and requires a certain time and effort. Transition

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[17] The Ministry tried to buy back some of the 2 bn. ČZK issue of one government bond (this bond matures within 1 year), but actually obtained just 70 millions.

economies had to build or substantially renovate the State Treasury system. Debt management should be included as one of the parts of the State Treasury management.

There is no debt management agency in the Czech Republic and the responsibility for the debt management issues is delegated to the Ministry of Finance. The central bank acts as fiscal agent – it executes transactions on the financial market on the account and behalf of the Ministry of Finance, keeps the accounting, maintains the payment system, and arranges the settlement of the transactions. The current framework of the debt management is already comparable to similar systems in the developed economies.

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BROADENING THE APPROACH FOR ITALIAN DEBT MANAGEMENT

Maria Cannata, Davide Iacovoni, Stefano Scalera and Manuel Turco[*]

Introduction

In the late Nineties public debt management returned to the spotlight due to the challenges posed by the Maastricht Treaty. Since, Euro area governments have been looking more closely at ways of containing public fiscal unbalances and thus at debt management, which has become crucial especially for largely indebted countries where interest expenditures account for a considerable share of public spending.

For some countries, lowering debt interest costs was made easier by the entry into EMU itself. Indeed, before the Euro advent, countries belonging to the European Monetary System could be split in two groups according to their interest rate levels:

1) the "core countries", e.g. France and Germany,
2) the "high yielders", *i.e.* countries issuing at higher interest rates than the core countries due to both exchange rate and credit risk.

The "high yielders" enjoyed a sudden reduction in interest rates from joining the Euro area, given the vanishing of exchange rate risk and a decrease in credit risk due to an enhanced credibility. The pace at which such a decrease in interest rates materialized into less interest payments depended on the velocity at which the debt was refinanced.

Exhausted the "Euro" effect, countries were left with more traditional ways of reducing interest expenditure. One was that of exploiting the steepness of the yield curve by issuing more short-term debt.[1] However, such a strategy may turn out disastrous for two reasons. First, the expectation hypothesis may prove false: indeed, short-term rates may increase more than what long-term rates initially portend. The failure of the expectations' theory means that intertemporal decisions matters. Hence, shortening maturity exposes debt servicing to greater roll-over risk and eventually to financial instability that, harming credibility, may ingenerate self-fulfilling crises. Secondly, a massive increase in short-term instruments well above investors' demand (supply shock) would trigger an immediate rise in short-term rates[2] that would vanish the expected cost reduction. The unfeasibility of

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This work has been the result of a joint effort of the authors. However, the Introduction and Section 6 were written by Maria Cannata, Section 1 and 2 by Stefano Scalera; Section 3 is a condensed version of a broader work carried out jointly with the "M. Picone" Institute for application of calculus (CNR); Section 4 by Davide Iacovoni; and Section 5, Appendix A and B by Manuel Turco.

[1] See Campbell (1995).

[2] For a thorough discussion, see CBO (1993).

strategies that set cost as the only relevant parameter is at the heart of this work. The focus here is, indeed, to explain that it is risk rather than cost that plays a central role at determining the optimal issuance strategy. Moreover, we will focus on the possibility of setting debt management strategies that look at relaxing budget constraints at times when room for countercyclical fiscal policy is limited as it is nowadays.

1. Private and public debt management: many differences, but same trade-off

How governments perceive risk can be inferred from the vast amount of literature on portfolio management employed by the private sector. However, prescriptions need to be adjusted as to take into account the differences between the public and the private debt managers.

A first difference is that private financial institutions are characterized by a short-term investment horizon together with a very high frequency of both buying and selling operations.[3] The public debt manager has, instead, a much longer-term perspective and participates to financial markets mainly in one way, *i.e.* on the selling side. Therefore, except few buying back or exchange operations, debt managers are bound to the cost undertaken at issuance and bear the risk of future changes in interest rates.

A second difference is that the strategy adopted by the public debt manager differs from that of the private for the budget accounting criteria. Specifically, the latter has a total return approach, while the former measures the cost in real terms.[4] Indeed, despite public accounting is made in nominal terms, debt managers look closely at the trend of the debt ratio, which approximates a measure in real terms.

A third difference is that the public debt manager is not only running the risk of higher debt servicing costs, but also that of impairing the achievement of government's public finance targets with negative consequences for taxpayers. Reducing such risk implies lengthening the effective maturity of debt.[5] However, such strategy may turn more expensive if the expectations theory fails. Indeed, the positive slope of the yield curve can result from an expected increase in higher short- term rates, and also by a premium for higher uncertainty. A trade-off then

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[3] This refers to the frequent buy and sell operations of private debt managers who take account of the changing conditions of financial markets. Those transactions are often impossible for the public debt manager mainly because of the consequences they exert on financial markets.

[4] Total return calculates the market price variation of both the principal and the coupon of security. Public accounting, instead, considers only the coupons paid and the issue differential (the difference between the redemption price and the issue price. Debt managers are not interested in the change of portfolio's market value due to interest rate variations. In other words, debt managers do not have to mark-to-market public debt. For a discussion, see Modigliani, Baldassarri and Castiglionesi (1996).

[5] Confirmation that this risk is crucial for public debt managers stems from the medium/long-term duration of the main OECD debt structures. Some countries explicitly advocate this strategy in their public debt management guidelines (see the Dutch ones of 2002).

emerges between cost and risk: the debt manager can save money by shortening the maturity, but such reduction is certain only for the short-term. Indeed, such debt, in case it has to be renewed at redemption, may be refinanced at higher interest rates than those embedded in long-term rates. It is, thus, only in a context of great confidence about positive primary budget balances in the close future, allowing the repayment of maturing debt, that such strategy would not harm public finances. If governments do not have those expectations, shortening maturity will definitely increase risk.

2. A simple way of identifying the cost/risk trade-off

Among debt managers the most popular measure of risk is Budget-at-Risk[6] (B-a-R), *i.e.* the maximum increase in interest expenditure over a predetermined level in a given period. B-a-R is a function of the debt structure and interest rate volatility. Once the annual target for interest expenditure is set, the job of the debt manager is to limit debt cost fluctuations around that target.

The Italian Treasury used the following as a measure of B-a-R:

$$BaR = D_t \cdot \delta \cdot X_a$$

where:

D_t = stock of debt at time t;

δ = portion of the debt refinanced in one year (principal and coupons) calculated as the reciprocal of the Maculay's duration of the portfolio. In other words, the latter is an estimate of the average portion of debt which matures in a year. More appropriate measures can anyway be used, as the exact amount of debt to be refinanced in a certain period.

X_a= the maximum adverse variation of expected rates in a year which could occur in a given confidence interval, based on the level of present rates. Different interest rate variations can be, of course, considered.

B-a-R methodology may be implemented in different ways. For example, it can be implemented by changing the confidence interval or by simulating the effect of an interest rate shock on individual securities, rather than on the entire portfolio.

Looking at Figure 1, one can see that debt managers should lengthen debt maturity, if they want a lower B-a-R. By doing so, debt managers lock-in their debt at rates for a time equal to the maturity of the securities issued. After the issuance of long-term securities, the only remaining element of uncertainty relates to the financing needed to refund the maturing coupons (unless zero-coupon securities are used).

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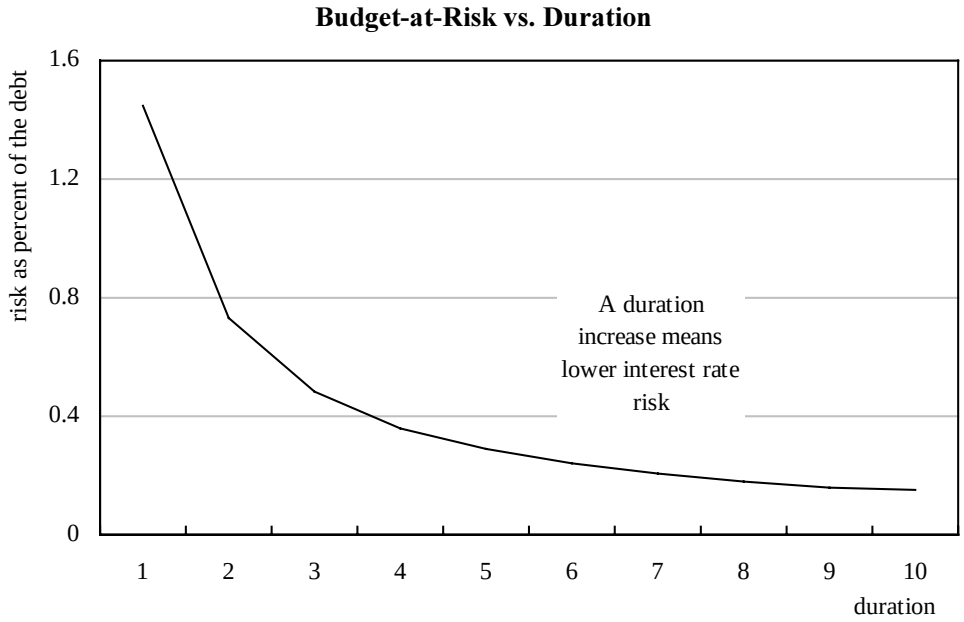
[6] See Pecchi e Scalera (1997).

Figure 1



The cost associated with long-term issuing depends on the slope of the yield curve. Normally, interest rates increases as time increases: various theories explain why the yield curve is upward sloping. One is that the longer the time for which present consumption is deferred, the higher is the interest rate demanded as to compensate for not disposing the money. Another explanation is that of credit or default risk, *i.e.* the possibility of the debtor to repudiate her liabilities; or the inflation risk as the uncertainty about future purchasing power increases with maturity and a premium to protect from such risk is therefore demanded.

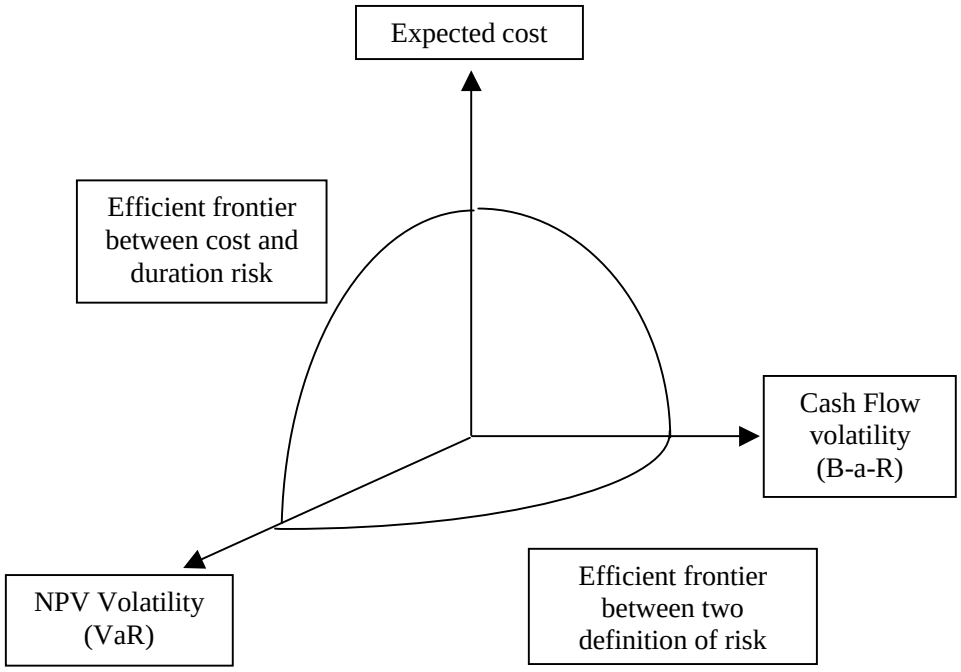
If one were to adopt only the B-a-R rule to determine her issuance strategy, the prescription for the debt manager would be that of issuing exclusively fixed-rate long-term securities. However, issuing these securities inhibits the potential debt servicing cost reduction coming from a lowering of future interest rates.

As to measure such a potential loss, another indicator needs to be implemented beside B-a-R. One could be the market value, *i.e.* the present value of future cash flows. An increase in the interest rate determines a decrease in the market value: the longer the maturity of the instrument, the bigger the loss. This exposure can be measured using the V-a-R methodology.[7] Therefore, if the public

[7] VaR methodology is closely related with the Modern Portfolio theory which measures the trade-off between risk and cost. See also Lamourex e Lastraper (1993), Morgan's RiskMetrics and Bartumek and Mustafa (1994).

Figure 2

Efficient Frontier Defined According to B-a-R and V-a-R Concepts



debt manager were to issue only long-term bonds as to reduce the B-a-R value,[8] the market value of her debt would be very sensitive to variations in market rates (*i.e.* a high V-a-R). A fall in long-term interest rate would increase the market value of debt: the difference between this value and the one prevailing before the interest rate shock represents the "loss"[9] suffered by the sovereign issuer to limit its exposure to interest rate volatility. Setting a ceiling for this "loss" is equivalent to setting a maximum duration for the portfolio.[10]

The use of the two concepts (B-a-R and V-a-R) may be represented in Figure 2.

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[8] See Bohn (1988) for a discussion from a different viewpoint.

[9] The word "loss" is used to highlight the fall in the market value of the portfolio of the public manager. In reality this "loss" indicates that long term securities have been issued at lower than current rates.

[10] For a discussion regarding the definition of the optimal maturity for public debt see Missale and Blanchard (1994).

3. A more sophisticated approach: a predictive control strategy

When using the "B-a-R/V-a-R" approach to define the optimal strategy, the debt manager assumes that the risk embedded in the current structure of the debt is fixed. Hence, such methodology is valid only in the short-term to highlight the trade-off between cost and risk, but looses its attractiveness to define a long-term strategy.

The objective for a debt manager is to minimize some measure of the expected financing cost in the long run while keeping the risk under control.[11] From a pure mathematical point of view, this problem is a stochastic optimal control problem with several constraints imposed by the Growth and Stability Pact (GSP), market practice and the need to control for portfolio risk. Given a system (the outstanding public debt) governed by random forces (interest rates, government borrowing requirement, macroeconomic scenario) the debt manager needs to find the appropriate control (issuance strategy) that optimises her variable of interest (debt cost) over a time interval.

The stochastic components of the problem are represented by the evolution of both interest rates and Primary Budget Balance (PBB).[12] Once a scenario for the evolution of these variables is set-up, the portfolio optimisation may be formulated as a finite dimensional Linear Programming problem, neglecting some non-linear effects of the bond issuances (for instance, a variation of the portfolio composition might, by market reaction, trigger a change in the term structure of the interest rate). By means of standard methods (*i.e.* the simplex)[13] we determine an optimal issuance strategy for each scenario.

3.1 The cost function

The first step of the optimization procedure is to define the cost function to be considered. A reasonable one is the yearly cost of the Public Debt calculated according to the ESA95 criteria.[14]

Roughly speaking, the ESA95 criteria consider for each bond its total cost (coupons plus the difference between nominal value and issuance price) distributed over its existence period, namely, from issuance to maturity. Thus, the cost over a given year is measured by the cost of bonds only for the days that fall within the year considered.

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11 See Bolder (2003).

12 See Maggi, Ginebri and Turco (2002).

13 See Dantzig (1963).

14 See Jackson (2000).

At present, the Italian Treasury issues twelve different types of securities. We order the bond types, according to their maturity, with an integer k, taking values in K=1,..,12.

Analytically, the ESA95 cost for the time period $[t_1, t_2]$ (where t is discrete and corresponds to months) can be expressed as follows:

$$ESA\ 95_{(t_1, t_2)} = \sum_{k \in K} \sum_{t = t_1 - m_\kappa}^{t_2} \frac{u_k(t)}{100}$$

$$\left\{ (100 - p_\kappa(t)) \frac{[t_1, t_2] \cap [t, t + m_\kappa]}{[t, t + m_k]} + \sum_{l=1}^{m_k/6} c_k(t; l) \frac{[t_1, t_2] \cap [t + 6(l-1), t + 6l]}{[t + 6(l-1), t + 6l]} \right\}$$

where, for every $t \in [t_1, t_2]$,

$m_k(t)$ stands for the maturity of the k^{th} security (in the formula m_k is divided by 6 as Italian securities pay coupons every six months).

$u_k(t)$ and $p_k(t)$ stand respectively for the nominal amount issued and the issuance price collected, at time t, of the k type.

$c_k(t; l)$ stands for the coupon percentage at time t for the same bond.

3.2 Interest rate modelling

The second step of the optimisation procedure is to define one or more interest rate scenarios.

The simplest approach to build an interest rate scenario is to describe the evolution of the short rate only, while a more sophisticated one is to model the whole term structure of rates $p(t, T)$, where T represents the maturity.

In the literature, there are a number of possible models for the description of the instantaneous short rate.[15] The most known is the Cox-Ingersoll-Ross (CIR) mean-reverting model.[16] The CIR model is quite simple and it is feasible to apply to a given dataset of the short rate. The results obtained by applying the CIR model to Italian interest rates are contained in James (2000). Since the CIR model has a single factor of uncertainty, it leads to perfect correlation among the bonds regardless of their maturity. It is widely known that, in reality, such perfect correlation is not true.

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[15] See James *et al.* (2000).

[16] The CIR model describes the dynamics of a short rate by a stochastic differential equation as:

$$dr(t) = k(\mu - r(t))dt + \sigma\sqrt{r(t)}dz$$

where k represents the speed of adjustment, μ the long-term average interest rate (mean reverting), $\sigma\sqrt{r(t)}$ the implied volatility and dz the standard brownian motion.

A more complete description of the yield curve is therefore needed. For instance, we can adopt the Heath-Jarrow-Morton description of the term structure (HJM).[17] Such model considers more factors of uncertainty. It is based on a differential stochastic equation which describes the evolution of the forward yield curve. Since the HJM model could consider several factors influencing the behaviour of the yield curve, it is possible to spot only the main elements driving the evolution of the term structure using the principal component analysis.[18] It is well known indeed that few factors (three can be a good approximation: level of interest rates, slope and convexity of the yield curve) can explain a large component of the volatility structure across maturities, since the forward rates at different maturities are highly correlated.

3.3 The model's constraints

The optimisation process is not free of boundaries: debt managers face a series of constraints when trying to allocate their liabilities. Some of those are "hard constraints" as imposed by law while others are "soft constraints" as imposed by market practices.

In the Italian context, a "hard constraint" is that of maintaining a monthly buffer of 15 billion euro on the Treasury Cash Accounts (TCA) that serve all government's payments and revenues. Another "hard constraint" is that of not overcoming the yearly net issuance amount (*i.e.* the amount that could be issued beyond redemptions) imposed by the budget law. On a supranational level, the "hard constraints" are those imposed by the Growth and Stability Pact (GSP): *i.e.* a debt-to-GDP ratio decreasing at a fast pace to the 60 per cent level.

Among the "soft constraints" a relevant one is that of imposing a minimum outstanding volume[19] for each security issued or, more important, the level of the interest rate risk debt managers are willing to run. Such risk may be measured via the average refixing period (ARP), *i.e.* the average time to maturity of the portfolio with weights proportional to the quantities issued.

3.4 Optimisation and linear programming

We are now ready to start the optimization. We indicate by X_t the total amount of bonds that have not yet matured at time t (*i.e.* the stock of debt outstanding at a certain point in time). Thus X_t must contain, for every $k \in K$, at least one component (*i.e.* type of bond) for every interval $s \in \{t - m_k, \ldots, t - 1\}$. The evolution of X_t is determined, at each step of the optimisation process, by cancelling

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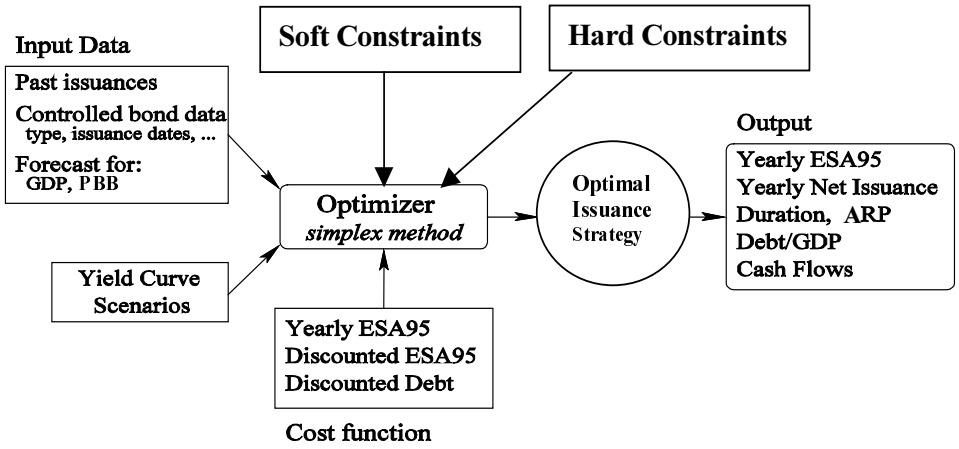
17 See Heath *et al.* (1992).

18 See Avellaneda and Laurence (2000).

19 See paragraphs 5.2 and 5.3 for a thorough discussion.

Figure 3

Block Diagram of the Optimisation Package



the bonds reaching maturity and adding those that have just been issued. For example, for $k = 1$, one has to remove from X_t the quantity of 3-month BOT issued at time $t - 3$ and insert those issued at time t. Clearly this can be done by shifting the components of X_t and adding the new issuances.

We can therefore write:

$$X_{t+1} = A\, X_t + B\, U_t$$

where A is a shift matrix, $U_t = ([(u_k(t))/100])_{k \in K}$ is the vector of the new issuances and B is a "sparse matrix".[20] Hence, we get a linear discrete time control system. Eventually, the Optimal Issuance Strategy (OIS), as calculated in the above equation, consists of an optimal control problem with the constraints described in 3.3; the cost function is defined according to the ESA95 specified in paragraph 3.1. Both constraints and the cost function depend on the stochastic exogenous variables $PBB(t)$ and $P(t, T)$.

The block diagram in Figure 3 represents all the phases of the optimisation.

A wide literature for stochastic optimal control problem is available.[21] We *choose to follow a p*robabilistic scenario optimization.[22] With this approach, the generated interest rate and PBB scenarios are given the same probability. Given that

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[20] A "*sparse*" matrix is characterized by a large presence of zero values.

[21] See Yong and Zhou (1999).

[22] For more details see Amadori *et al.* (2003).

interest rate models perform poorly at forecasting interest rate behaviour, we decided that was not appropriate to assign a different probability to interest rate scenarios generated by such models.

The optimiser determines the OIS for each scenario. This is then tested against all the other interest rate and PBB scenarios generated as a measure of risk.

To sum up:

1. The optimiser implements a strategy according to market interest rates.
   a) The model generates n interest rate scenarios.
   b) Each interest rate scenario generates an optimal portfolio.
   c) The risk of each optimal portfolio is measured by the variation in cost obtained by running the portfolio on the $n-1$ interest rate scenarios.
2. A "cluster portfolio" is defined in a cost-risk space.
3. The issuance strategies that satisfy the cost/risk trade-off chosen by the debt manager are selected.

At the end of the optimization process the model delivers anyway more than one optimal portfolio, *i.e.* the debt manager has a number of issuance strategies available, all compatible with the constraints mentioned in paragraph 3.3. Which one should be followed?

Beyond the risk/cost considerations previously mentioned, two other factors should enter in the decision process. First of all, a debt manager should consider the interactions between her issuance policy and the secondary market. Secondly, the concept of risk may be enlarged as to consider the budget as a whole.

4. Relevant factors for the choice of an issuance strategy

This section is devoted to all those elements that are impossible to model in a quantitative fashion and on which debt managers spend most of their working time. Those are the organisation and monitoring of both primary and secondary markets and the continuous efforts to smooth and remove market imperfections.

4.1 The primary market

The primary market is where bonds are first generated, therefore an efficient placing of the bonds is of crucial importance for debt managers. Bonds can be either placed via direct bargaining with the counterparts, as in syndicate operations, or via auctions. Different auction methods are available and the design of the optimal method is a key issue for the debt manager.

The Italian Treasury resorts to a discriminatory kind of auction for bills (BOT) as to take into account the rigid demand characterising those instruments. For

all the other instruments, instead, the Treasury uses a uniform price kind of auction in order to stabilise demand by reducing the winners' curse. Although, the Treasury can always switch to syndicates if it wishes. The rationale for such flexibility is to exploit at best the distinguishing features of the two alternative methods.

Syndication is, indeed, preferred for the launch of new securities. The bargaining process, a feature absent in auctions, enables the Treasury a better placement as it allows the following results:

- accuracy at determining the interest in the demand for the new instrument,
- large issuance size from the beginning (secondary market liquidity immediately assured),
- a broader distribution and of higher quality: the total control of the book-building process allows the Treasury to have complete discretion at selecting final investors, achieve a satisfactory placement in terms of both geographical distribution and type of investors.

The bargaining process benefits investors as well (and thus the Treasury). Indeed, the possibility of pricing the instrument at its fair value (rather than price being the outcome of a competitive game as it is in auctions) attracts more demand from final investors. Moreover, a syndicated operation, being a one-off decision, creates a "momentum" that is very functional for the good marketing of the new instrument.

On the other hand, auctions are preferred for ordinary debt issuance, being an extraordinary tool for fast and efficient price discovery. Moreover, their simplicity allows the Treasury to easily provide a calendar and hence satisfy two highly desirable needs of the investor community: transparency and predictability.

4.2 The importance of transparency

Transparency is crucial to build investors' trust and thus to lower risk premium. Consider a government that issues for the first time a security promising it will reopen tranches of the same bond so as to assure investors on the future tradability of the specific market. Such promise is more credible if an issuance calendar is out. This enables the government to save on risk premium. Calendars are important for investors who need to plan their investments, especially when they are not aware of the Treasury's financial needs. Calendars, however, limit the scope of tuning the portfolio consistently with unexpected financial and economic scenarios. The trade-off between transparency and flexibility, however, is minor as the information provided concerns only the kind of instruments to issue and not the size. Hence, debt managers are usually prone to run the risk of limited room to manoeuvre.

4.3 The secondary market

Limitations to flexibility also arise when debt managers are committed to a highly liquid secondary market. To build a reputation for high liquidity and, thus, save on liquidity premia, a predictable issuance is needed. Investors should thus rely on the fact that each instrument, before being replaced with an analogous one, will be issued until a liquid amount is reached. Ensuring a high level of liquidity for most of the security's life is crucial for investors as it reduces the possibility of losses when trading. Moreover, large issuance is a necessary but not sufficient condition for secondary market liquidity as this depends also on the nature of allocation made on the primary market. Indeed, if a large volume is allocated to "buy and hold" investors (those keeping the security until maturity), the amount susceptible of trading will sensibly shrink. In other words, before offering an analogous security, debt officials have to ensure that an efficient trading level has been established. No golden rule exists to set the optimal amount. The issuer should reoffer the security whenever its liquidity is showing signs of decline. This requirement alters the issuance policy, as it determines the time during which the bond remains on the run before being replaced. The need to maintain a sufficiently high level of liquidity across time requires a constant effort to monitor market conditions and, if necessary, the possibility to take action to reissue the security.

Liquidity also depends on the efficiency of the secondary market and debt managers, when deemed necessary, can enact rules as to improve this. A secondary market is efficient when transaction costs are low, trading executions are fast, prices are in real time, large volumes are traded, risk of error is small and trading hours allow continuity to the market. The market is transparent when all relevant information are provided in real time (two way prices, volumes traded, purchases and sales).

4.4 The role of "Specialists"

In order to improve both primary and secondary market performance, the Italian Treasury set up a class of Primary Dealers (PDs), so called "Specialists" who, in exchange of some privileges, are committed to a set of obligations. For the primary market, those obligations regard the regular subscription of auctions, whereas for the secondary market, they pertain to the daily trading volume, bid-ask spread and the period at which two-way prices are actively posted. Some of the privileges are granted according to the evaluation Specialists get on the basis of the above parameters. The value of bonds at the auctions, therefore, exceeds their real value, because of the potential profits coming from privileges granted to the Specialists. The opportunity of benefiting from such privileges enhances competition and induces Specialists to have virtuous behaviour. This helps the Treasury at eliminating the risk of auction uncoverage, having a positive impact on issue price, having an efficient and liquid secondary market and, last but not least, having a continuous grasp on financial markets via the day to day interactions with this special class of PDs.

5. Broadening the approach of the debt manager

The PBB enters in the optimisation model as an exogenous stochastic variable as it depends on the evolution of real GDP and inflation. To endogenise this variable, a study was commissioned by the Italian Treasury (see Ginebri *et al*., 2002) with the aim of empirically investigating the historical relation between budget items, real growth and inflation.[23]

The PBB forecast is relevant for the debt manager, not only to figure out what will be the borrowing requirement in the future, but also in case the government wishes to set up a different approach to debt management. Governments can, indeed, give mandate to debt managers to carry out debt portfolio strategies that can help at smoothing taxes or deficit across time. If so, debt managers should structure public debt in order to reduce tax pressure variations (upwards or downwards)[24] or, in case of deficit smoothing,[25] to keep the deficit-to-GDP ratio below a target value (the latter being the 3 per cent for Euro area countries). Debt managers' goal, then, would be not to minimise the cost, but to contribute to the stability of the budget outturn as a whole.

This can be achieved by choosing a set of debt instruments whose interest payments decrease at times of unexpected budget deterioration. If it were possible to index debt interest payments to output or spending (explicit state contingent debt), this would be an easy task to achieve. However, this kind of instruments never encountered the favour of debt managers for moral hazard problems, difficulty of indexation[26] and innovation costs.

The task, in absence of explicit contingent debt becomes very complex. Indeed, replicating the performance of explicit state contingent debt by means of denomination, indexation and maturity of traditional instruments means to correctly forecast the kind of macroeconomic shocks occurring and their impact on the interest rate term structure. The latter is gauged by forecasting the price movements determined by both the macroeconomic shock itself and the Central Bank reaction. If one were to experience a negative productivity shock, *i.e.* a shock where a recession is accompanied by high inflation, nominal long-term debt would be optimal as no roll over is required. This would lead to an overall decline in real debt interest payments. If, instead, one were to experience a negative demand shock, hence deflationary, short-term debt or price indexed debt would be the optimal choice. Deflation, indeed, by pushing nominal interest rates down would make the roll over of short-term debt very convenient.

An optimal hedging debt structure would then be characterized by instruments providing the following covariance:

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[23] See Appendix A for an extended version of this paragraph.

[24] Bohn (1990) and Missale (1997).

[25] See Missale (2001).

[26] See Calvo and Guidotti (1990) and Bohn (1990) for difficulties at implementing such instruments.

- Cov(GDP_t , real interest expenditure$_t$) > 0
- Cov(public spending$_t$, real interest expenditure$_t$) < 0

Given the tight link between GDP and unemployment, thus on tax revenues via tax base reduction and on public spending via the increase in automatic stabilisers, an other covariance proving hedging may be the following:

- Cov (unemployment$_t$, real interest expenditure$_t$) < 0

According to Turco (2001), no countries out of a wide OECD sample exhibited the covariances listed above.[27] Indeed, interest rates seemed to be significantly affected only negatively by inflation and positively by world interest rate. GDP, unemployment and public spending only in few cases turned out to be significant and almost always with the wrong sign. This might reveal either the lack of interest of governments to such goals or the inability of debt managers to accomplish it. The former appears to be the most probable given that in the strategic guidelines for debt management of the main OECD countries, no mentioning is made to tax or deficit smoothing.

6. Conclusions

The very high number of random forces entering debt official's decision process render optimal debt management a very complex task to be accomplished. Indeed, almost all variables relevant to debt managers show to have a stochastic behaviour; to cite a few: interest rates, macroeconomic variables driving the PBB, the domestic and foreign monetary and fiscal policies and their inter-connections.

The long-term horizon, peculiar of public debt management, makes the job of the debt manager even harder, given that the probability of bad forecasting increases with time. Models can help at forecasting, but they cannot capture all the elements debt managers need to face. This does not mean that they are useless, on the contrary they represent valuable inputs.

Therefore, the debt manager cannot stick to a single model as a solution to her problem. She needs to interpret all of the models' outcomes at her disposal and combine them together with the information flows she receives. Moreover, caution at choosing a strategy is imperative, because of market practice constraints (market oriented strategy). Market constraints do not allow the Treasury to implement such strategy as this implies a frequent change of the issuance policy. This is, indeed, unfeasible as it is in conflict with the regularity and the transparency needed by investors to invest in Italian securities (so called market oriented approach). Finally, debt managers need also to consider that their actions not only produce effects on financial markets, but have also great welfare implications. It is therefore recommended to consider, beside optimisation models, more qualitative aspects that can only be grasped and tackled by debt managers directly via their experience and sensibility.

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[27] See Appendix B for an extended version of this paragraph.

APPENDIX A[28]

THE SENSITIVITY OF THE ITALIAN PRIMARY BUDGET BALANCE TO INFLATION AND OUTPUT

Budget evolution depends on both the economic cycle and the fiscal policy actions implemented by the government and the interrelations between the two. Each item of the budget can, indeed, be disentangled into an automatic and a discretionary component. The latter depends on a specific decision of the policy maker and, therefore, is completely under her control. The automatic component, on the contrary, hinges on predetermined rules set up by the policy-maker and therefore varies inertially according to macroeconomic conditions. A more accurate study on the Italian case is that commissioned by the Italian Treasury (see Maggi, Ginebri and Turco, 2002) where the sensitivity of the Italian Primary Budget is estimated to both real growth and inflation via a strong budget itemization.

The methodology used is straightforward. First, when possible, a macroeconomic base was associated to each public finance item, typically a tax base for each tax. Second, each tax base was regressed on the driving economic variables, *i.e.* real growth and inflation. Third, each item of the government budget which were supposed to include an automatic component was regressed either on its own base or directly on the economic variables affecting the automatic components.

As a consequence of the estimation strategy, the elasticity of the government budget to macroeconomic variables will typically be the product of two coefficients: the elasticity of each public finance item to its own base and the elasticity of the base to the driving economic variables.

As reasonable as the estimation procedure can be, it contains a major drawback. It correctly identifies the automatic component, provided that the discretionary component is independent on the core macroeconomic variables. However, that is a binding assumption. The discretionary component expresses the policy-maker preferences, and those are probably related to the macroeconomic conditions. As a consequence, the estimated elasticities of government budget capture both its automatic component and the policy-maker reaction function to macroeconomic variables.

The knot between automatic component and policy-maker's reaction function is, evidently, more relevant in the case of expenditures: public investments, transfers to households and companies, public wages and employment. Even in the case of revenues, some overlapping between them occurs. However, the frequent reforms of fiscal laws and rules occurred in the last 30 years, rendered prohibitive the removal of the effects of those from the time series and therefore the isolation of the automatic components from the political reaction function. Anyway, despite elasticities do not exactly identify the automatic component, elasticities still measure

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[28] This appendix is extracted from Maggi, Ginebri and Turco (2002).

the relationship between macroeconomic aggregates and government budget. On those grounds, elasticities were also estimated for the expenditure items whose discretionary components are larger: public consumption and wages, investments, transfers to companies were therefore estimated. The use of estimated coefficients has to be cautious. If interested only to the automatic reaction of government budget to the economic cycle, then overall budget sensitivity is that arising from the items whose components are strictly automatic: most of revenues, unemployment benefits and pensions. While, if interested in the budget reaction when also not strictly automatic expenditures are included, results (see Table 1) show indeed semi-elasticities to reduce consistently. Indeed, the impulse of both inflation and real growth on public finances appears to be positive, but when public consumption, investment and transfers to both private sector and households are included, this decreases dramatically to reach almost zero when the reaction to inflation is examined. This is due to the fact that pensions enter in the estimation only when inflation sensitivity is estimated, being those indexed to consumer price index. The strong dynamics of the time horizon stem from the advance and balance mechanism of some taxes (e.g., tax on business profits-Irpeg).

Table 1

Semielasticities of the Primary Budget with Respect to Inflation and Real Growth[*]
(percent of GDP)

		t	*t*+1	*t*+2	*t*+3	*t*+4
Strictly automatic	Inflation	0.18	0.27	0.18	0.17	0.18
	Real Growth	0.33	0.42	0.32	0.30	0.31
All components	Inflation	0.01	0.10	0.00	–0.01	0.00
	Real Growth	0.16	0.24	0.14	0.12	0.13

[*] Semielasticity stands for the change of the primary budget ratio for a 1 per cent change of inflation/real growth.

The great difference between the first and the second row figures point to the delicacy of the issue. Strictly automatic figures are more reliable as they only identify the reaction of automatic components, but less comprehensive as they leave almost all of the expenditures out.

APPENDIX B[29]

DID TAX SMOOTHING OR DEFICIT SMOOTHING EVER DRIVE DEBT MANAGEMENT POLICIES?

In order to answer this question, a time series analysis was run for a sample of 16 OECD countries (Austria, Belgium, Canada, Spain, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, Norway, Portugal, Sweden, UK and United States), the specification being the following:

$$d(ra_t)=\alpha_t+ \beta\ ln(GDP_t/GDP_{t-1})+ \varepsilon_t \quad (1)$$

$$d(ra_t)=\alpha_t+ \beta\ d(ur_t) + \varepsilon_t \quad (2)$$

$$d(ra_t)= \alpha_t+ \beta\ d(spt)+ \varepsilon_t \quad (3)$$

The dependent variable ra_t stands for the average annual real interest rate paid on debt, calculated as the ratio between debt interest payments (on a cash account basis) at time t and gross debt at time $t-1$ minus the change in the consumer price index at time t.[30] Since gross debt figures refer to the end of the year, rather than an yearly average, it was preferred to consider the interests paid on inherited debt, rather than actual debt. The rationale for this was to avoid situations where debt variations are accounted while corresponding movements in interest payments not yet.[31]

With regards to the independent variables instead:

- GDP_t stands for the volume of gross domestic product at market prices.
- sp_t stands for the ratio between current government disbursements excluding interests and the value at market prices of gross domestic product.
- ur_t stands for the unemployment rate.

Differences for both dependent and independent variables are taken to avoid problems of non-stationarity. The regressions, whose Durbin-Watson test delivered

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[29] The appendix is extracted from Turco (2001).

[30] The analysis could improve if a different inflation measure than *cpi* is implemented. The latter is indeed inefficient as a relevant measure for inflation when assessing the impact price movements exert on government budget. *cpi* is probably not a reasonable price index to measure real term costs for government debt. The latter is indeed designed as a compensation index to measure how the capacity of a representative household is affected by general price changes. If, instead, the aim is to measure in a corresponding way how the government's real costs are affected by inflation, the relevant index must have a structure equivalent to that of the government's price level-dependent expenditures. However, when assessing risk, it would be misleading to consider Government consumption price index. Indeed, the Government has other kind of expenditures that are dependent on other price levels, especially transfer payments. The same applies to Government income, especially tax revenues. The Government should then spot an ad-hoc price index that better captures the effects of price movements on public budget as a whole.

[31] This is the case for zero coupon bonds which determine an increase in debt stock at issuance but have their interest payments accounted only at maturity date.

insufficient values, were run again with an autoregressive term. Endogeneity may be a problem given that real interest rates do play a role at explaining movements in the independent variables. However, this problem arises only when our independent variable ra_t (being calculated as the ratio between debt interest payments and gross debt) performs well as a proxy for real interest rates, *i.e.* when debt maturity is short.

For the debt structures to provide insurance then, we expect coefficients to be positive for *GDP* and negative for both *sp* and *ur*. However, very few regressions were significant[32] and all presenting a non-hedging sign. The poor explanatory power of the regressors points directly to the scarce consideration of debt managers at providing a procyclical behaviour to debt structures.

Given the poor performance of the variables above, other specifications were tested in search for more explanatory factors:

$$d(ra_t)=\alpha_t+ \beta\ d(cpi_t) + \varepsilon_t \quad (4)$$

$$d(ra_t)=\alpha_t+ \beta\ d(wr_t) + \varepsilon_t \quad (5)$$

$$d(ra_t)=\alpha_t+ \beta\ ln(rer_t/rer_{t-1}) + \varepsilon_t \quad (6)$$

$$d(ra_t)= \alpha_t+ \beta\ ln(ner_t/ner_{t-1}) + \varepsilon_t \quad (7)$$

where:

- cpi_t stands for inflation,
- wr_t stands for the world interest rate calculated as the average of US, UK, Japan and Germany long-term interest rates weighted for their relative 1990 GDP values, and
- ner_t and rer_t stand respectively for the nominal and real effective exchange rate.

Differently from the independent variables of specifications (1), (2), (3), the above variables do not directly detect hedging as their variations do not necessarily correspond to a primary budget deterioration.

To clarify, consider specification (4). Inflation can arise from either a negative supply shock (oil shock) or a positive demand shock (rise in consumption levels), only the first though leading to a budget deterioration. Thus, a negative β can be interpreted as a sign of hedging only when the correlation of inflation with output is negative and with public spending is positive.

Inflation and world interest rate appear to be very significant at affecting debt servicing costs, while exchange rate regressors much less.

As to corroborate this analysis, multivariate regressions were also run as to test the explanatory power of the variables when combined together. Provided that

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[32] The coefficient is deemed significant when the P-value of the *t*-stat is below 0.01.

debt costs' fluctuations critically hinge on the debt structure put in place by each country, it was not appropriate to test a single specification,[33] but all the following:

$$d(ra_t) = \alpha_t + \beta\,(x_1) + \gamma\,(x_2) \tag{8}$$

$$d(ra_t) = \alpha_t + \beta\,(x_1) + \gamma\,(x_2) + \lambda\,(x_3) \tag{9}$$

$$d(ra_t) = \alpha_t + \beta\,(x_1) + \gamma\,(x_2) + \lambda\,(x_3) + \zeta\,(x_4) \tag{10}$$

$$d(ra_t) = \alpha_t + \beta\,(x_1) + \gamma\,(x_2) + \lambda\,(x_3) + \zeta\,(x_4) + \varpi(x_5) \tag{11}$$

$$d(ra_t) = \alpha_t + \beta\,(x_1) + \gamma\,(x_2) + \lambda\,(x_3) + \zeta\,(x_4) + \varpi(x_5) + \delta(x_6) + \varepsilon_t \tag{12}$$

where x_1, x_2, x_3, x_4, x_5, x_6 are all the possible combinations taken from the following set of independent variables:

$$\begin{pmatrix} ln(GDP_t/GDP_{t-1}) \\ d(ur_t) \\ d(sp_t) \\ d(cpi_t) \\ d(wr_t) \\ ln(rer_t/rer_{t-1});\ ln(ner_t/ner_{t-1})^{34} \end{pmatrix}$$

This implied a total of 1,520 regressions. Such approach was not chosen with the intent of searching for a "true" model. Indeed, as mentioned earlier, the truth of the model is a dynamic concept, as it depends on the country's debt structure and not on the legitimacy of the regressors. The objective was, then, to investigate in depth the significance of the variables and to what extent they affect debt servicing costs. This was done in two steps:

1) All non-significant regressions, *i.e.* those having a P-value of the F-test above the 10 per cent threshold, were removed.
2) The remaining 1,063 regressions where then grouped by variable. The group of *cpi*, for example, consists of all the regressions from (8) to (12) where $d(cpi_t)$ is found significant, *i.e.* where its P-value is below 10 per cent.

In Figure 4 we present the robustness of each variable, measured by the number of regressions for each group.

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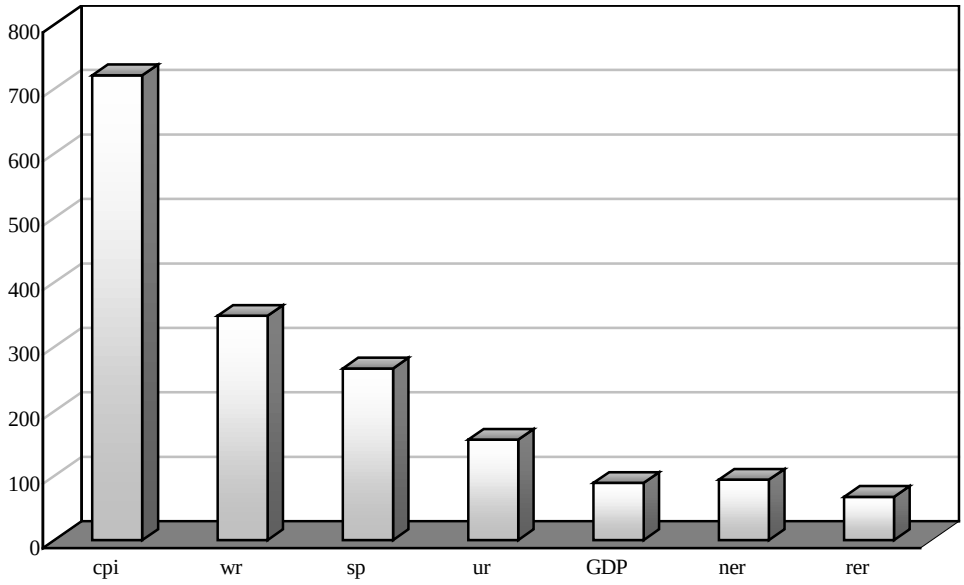
[33] Sala-i-Martin (1998), in his attempt to explain growth, run all possible combinations of a large set of variables. Such procedure represents a solution in case the exact specification is unknown. Indeed, in multivariate regressions one can often find variable x_1 to be significant only when paired with x_2 or x_3, but not with x_4.

[34] Nominal and real exchange rate do not enter together in the regression as they are considered substitutes.

Figure 4

Robustness Analysis



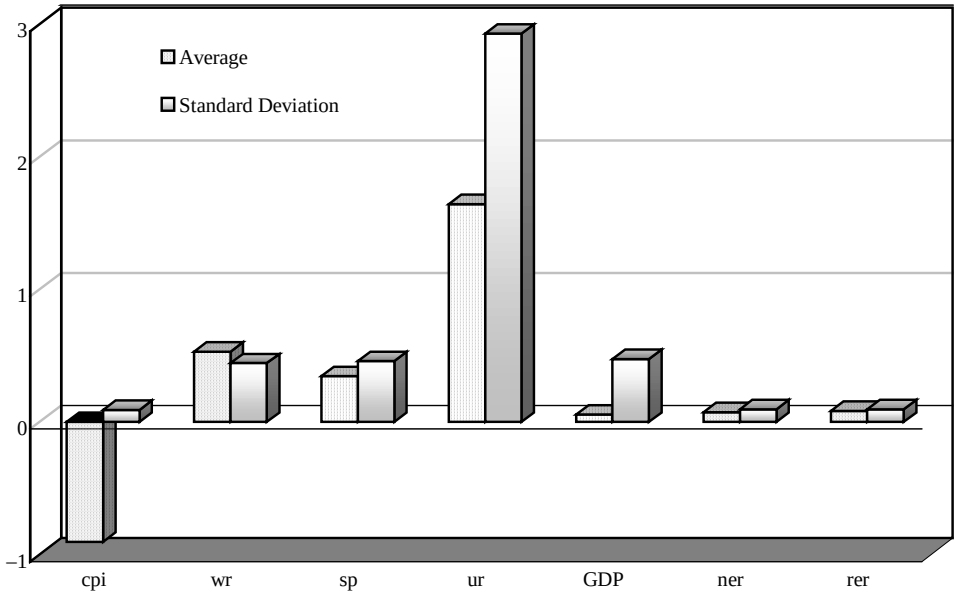
Results show that movements in debt costs are mainly explained by inflation and world interest rate. The implicit state contingent variables such as spending, unemployment rate and GDP (*i.e.* whose coefficients directly detect hedging) are much less significant pointing to their marginal influence at affecting debt costs. *ner* and *rer* also show not to be so robust due to the marginal role played by foreign currency denominated debt across nations.

The direction and extent of the effects on interest payments is presented by analysing the average and standard deviation of each coefficient. As Figure 5 shows, inflation, and to some extent world interest rate, are the only variables that present a definite behaviour. The high standard deviations of the other variables, instead, point to a rather heterogeneous scenario, signalling substantial differences across countries.

Results at a country level are, instead, presented in Tables 2 and 3. With regard to the variables potentially detecting hedging, *i.e., GDP*, *ur* and *sp*, results somehow confirmed those of simple regressions (it is for this reason that we prefer not to present simple regressions' results). Italy, Spain, Finland Austria, Spain, Norway, the Netherlands, the United Kingdom, Germany and Portugal exhibited countercyclical behaviour of debt servicing costs. Contradictory results are those of Canada, United States, Japan, France, Ireland and Sweden: indeed some coefficients point to hedging and some others not.

Figure 5

Average and Standard Deviation of the Variables



With regards to *inflation*, regressions are all very significant and presenting a negative coefficient approximately equal to one for every country. This implies that every country reduced the value of its real liabilities in the same proportion as the inflation experienced, meaning that the latter was almost always unexpected.

With regards to the *world interest rate***,** all countries except Spain exhibit a positive coefficient. The influence of this variable on debt servicing costs is overall substantial: coefficients indeed vary from a minimum of 0.20 for Germany to a maximum of 1.27 for Japan.[35] The variability of those results derive from the kind of debt structure implemented. Countries with a long debt maturity, being less exposed to interest rate innovations, should exhibit low β's. The high degree of financial interdependence, clearly stemming from the results, calls then for an issuance strategy that looks carefully at the policies of the leading economies' central banks, as all countries, although to different extent, import the consequences of such actions.

Regarding the *exchange rate* regressions, it seems that both nominal and real exchange rate are almost irrelevant at affecting debt costs. Coefficients for both *rer*

[35] Given that on average the share of long-term debt in Japan is high, such a high coefficient is counterintuitive. The explanation resides on the fact that in the first half of the Seventies the maturity was much shorter and debt servicing costs recorded higher swings compared to the world interest rate. Indeed, by taking out those outliers, the simple regression coefficient jumps from a coefficient of 1.6 to 0.8.

and *ner* are, compared to the other regressors' coefficient, very close to zero. With regard to the nominal exchange rate the sample is split in two. The UK, Portugal, Italy, France and Finland seem to have somewhat benefited from appreciations. However, such outcome can be attributed to the presence of foreign currency denominated debt just for Finland. In the last thirty years, those securities accounted on average for 49 per cent of Finnish public debt. As for the others, given the marginal or null presence of foreign currency denominated debt, the negative coefficient can be ascribed to the price effects accompanying the swings in the exchange rate. Indeed, regardless of the causality order, if PPP holds, deflation should correspond to nominal appreciations. If so, when a high share of deflatable securities (*i.e.* securities whose real value is negatively affected by inflation) is in place, real interest rates will increase substantially. This seems, indeed, to be the case as all those countries exhibit the highest shares of short-term and variable rate debt of the sample. Conversely, countries with high shares of long-term debt exhibit a positive coefficient. Moreover, results highlight that even when the share of foreign currency debt is substantial, as in Austria and Sweden, the impact on debt interest payments is small because outperformed by that exerted by other debt instruments. In Goldfajn (1998), the optimal share of foreign currency debt depends on the covariance between nominal exchange rate and inflation. Foreign currency debt can play as a substitute for long-term debt in case PPP does not hold, *i.e.* when Cov(*ner*, *cpi*)>0. Vice versa, foreign currency may be used as to limit the risk exposure when nominal debt is in place. Indeed, when unexpected deflation occurs, the loss determined by long-term nominal debt is balanced out by foreign currency debt via nominal appreciation. The same, of course, applies for price indexed debt. However, beyond the covariance of exchange rate with output and spending, one should also look at the exchange rate variance as to evaluate the optimal share of foreign currency denominated debt. In Missale (1999) *rer* variance was found much higher than that of inflation, suggesting price-indexed debt as a better form of hedging compared to foreign currency denominated debt.

Conclusions

In absence of explicit state-contingent debt, an optimal hedging portfolio should be chosen on the basis of the covariances between variables affecting real interest rates, *i.e.* inflation and real exchange rate, and variables affecting government financing needs, *i.e.* output, spending and unemployment. One point of departure to minimise budgetary risk could be that of exploiting historical covariances. However, nothing ensures that those covariances will last in the future. Covariances, indeed, change according to the nature of the macroeconomic shock occurring and both the central bank and government reaction to that. Thus, particular attention should thus be devoted to the interrelation between monetary policy and fiscal policy with debt management. In other words, depending on the specific characteristics of the economy and the monetary regime in place, say whether the central Bank targets inflation or nominal exchange rate, different covariances should be expected between inflation and the variables affecting public budget. More

research is then needed in case debt managers were given the mandate of targeting macroeconomic risk in their strategy.

One should, anyway, bear in mind that such objective should never be pursued when in conflict with cost minimisation. Indeed, the approach should be that of moving towards the optimal risk-hedging portfolio until a trade-off between cost and risk emerges. A trade-off may even not arise at all: indeed, if negative shocks are mainly demand driven, one expects to have recessions coupled with deflationary phenomena. In this case, the use of price-indexed debt allows debt managers to minimise both cost (via a positive inflation premium) and risk.

With such a background, security diversification is crucial as allows debt managers to be better equipped to face the challenges of an ever changing world. It is also for those reasons that the Italian Treasury decided to enter the inflation-linked bond market.

Table 2

Multivariate Significant Regressions Grouped by Country*

	AUT			BEL			CAN			ESP			FIN			FRA			GER			IRE		
Var	No	Avg	Dev.	No	Avg	Dev.	No	Avg	Dev.	No	Avg	Dev.	No	Avg	Dev.	No	Avg	Dev.	No	Avg	Dev.	No	Avg	Dev.
GDP							7	**0.487**	**0.24**	11	–0.41	0.13	15	–0.31	0.12	**10**	**0.297**	**0.05**	4	–0.1	0.00			
sp	41	0.318	0.12	5	0.171	0.02				28	0.76	0.21	20	0.301	0.09	18	0.438	0.14	24	0.169	0.01	9	0.172	0.02
ur	24	1.288	0.58				6	0.631	0.35	15	0.43	0.17	5	0.579	0.11	3	0.939	0.02	2	0.421	0.00	**7**	**–0.24**	**0.07**
cpi	48	–0.89	0.03	48	–0.87	0.02	48	–0.81	0.04	48	–0.9	0.05	48	–0.94	0.04	48	–0.96	0.07	48	–0.74	0.03	48	–0.96	0.03
wr	28	0.316	0.10	24	0.565	0.04	28	0.412	0.25	19	–0.31	0.07	6	0.484	0.08	48	0.492	0.21	17	0.208	0.01	33	0.545	0.28
ner	4	0.15	0.09	9	0.19	0.02							2	–0.12	0.01	4	–0.06	0.00	27	0.09	0.04			
rer	2	0.07	0.00	9	0.20	0.02				1	0.11								8	0.08	0.00			

* Column “Var” represents the independent variable on which the filtering has been made and thus the group. “No” stands for the number of the group’s regressions, while “Avg” and “Dev.” stand respectively for the average and standard deviation of the independent variable.
- Boxes are empty when no significant coefficient was recorded.
- Coefficients are in bold when pointing to hedging.

Table 3

Multivariate Significant Regressions Grouped by Country*

	ITA			JAP			NET			NOR			PRT			SWE			UK			US		
	No	Avg	Dev.	No	Avg	Dev.	No	Avg	Dev.	No	Avg	Dev.	No	Avg	Dev.	No	Avg	Dev.	No	Avg	Dev.	No	Avg	Dev.
GDP	8	–0.61	0.15	**18**	**0.477**	**0.36**										**3**	**0.69**	**0.04**				**12**	**0.202**	**0.40**
sp	40	0.664	0.40	25	0.328	0.21	15	0.133	0.01				19	0.745	0.23							**21**	**–0.67**	**0.69**
ur	12	1.493	0.19	23	6.513	5.29	29	0.233	0.08	1	1.19					3	1.42	0.05	1	0.993		24	1.15	0.94
cpi	48	–0.88	0.08	48	–1	0.02	48	–0.87	0.02	48	–0.98	0.02	48	–1.06	0.01	47	–0.84	0.01	1	–0.92		48	–0.89	0.07
wr	48	0.701	0.38	30	1.268	0.60	6	0.236	0.01							11	0.484	0.05	1	1.129		48	0.591	0.42
ner	4	–0.06	0.01				8	0.12	0.01				8	–0.11	0.01	4	0.13	0.00				23	0.09	0.05
rer							10	0.12	0.01				1	–0.48		7	0.05	0.00	1	–0.18		27	0.07	0.04

* Column “Var” represents the independent variable on which the filtering has been made and thus the group. “No” stands for the number of the group’s regressions, while “Avg” and “Dev.” stand respectively for the average and standard deviation of the independent variable.
- Boxes are empty when no significant coefficient was recorded.
- Coefficients are in bold when pointing to hedging.

Table 4

Breakdown of Central Government Public Debt*

	Non-Deflatable Securities (Short-term + Variable rate + Price Indexed Debt)			Medium-term Debt (2-5 yrs)			Long-term Debt (>5 yrs)			Long + Medium			Foreign Currency Denominated Debt		
	Avg	Dev	Yrs	Avg	Dev	Yrs	Avg	Dev	Yrs	Avg	Dev	Yrs	Avg	Dev	Yrs
AUT	9%	3%	22			0	51%		30	51%		30	16%	3%	22
BEL	14%	10%	23	26%	7%	23	32%	7%	23	58%	13%	23	4%	2%	20
CAN	64%	5%	21	9%	2%	21	26%	3%	21	35%	5%	21	3%	2%	21
GER	9%	3%	22	26%	7%	22	40%	14%	22	67%	20%	22	-	-	-
ESP	33%	18%	22	21%	9%	21	19%	17%	21	41%	25%	21	3%	1%	13
FIN	26%	7%	12	33%	4%	12	32%	6%	12	65%	9%	12	37%	16%	12
NOR	24%	6%	20	23%	6%	20	26%	6%	20	49%	6%	20	12%	10%	20
FRA	59%	24%	26	23%	1%	10	52%	3%	10	75%	4%	10	5%	1%	7
UK	59%	5%	12	22%	6%	12	13%	3%	12	35%	5%	12	-	-	-
IRE	17%	10%	7	17%		1	29%		1	46%		1	19%	13%	7
ITL	57%	13%	22	17%	5%	17	14%	10%	17	31%	15%	17	4%	2%	20
JPN	17%	3%	22	25%	4%	22	39%	5%	22	64%	6%	22	0%	0%	7
NET	8%	5%	20	34%	6%	9	50%	11%	22	63%	17%	22	-	-	-
PRT	48%	30%	25	12%	7%	14	21%	18%	9	26%	23%	14	6%	1%	2
SWE	31%	4%	22	64%	7%	22			0	64%	7%	22	21%	6%	22
USA	41%	5%	22	30%	3%	22	23%	2%	22	53%	4%	22	1%	0%	2

* Source: All data are elaborations from the 2003 Central Government Debt statistical yearbook – OECD except some figures of Portugal, France and Austria that were kindly provided by Missale.

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DEBT MANAGEMENT IN JAPAN: HOW TO COPE WITH INTEREST RATE RISK

Mariko Fujii[*]

Introduction

Currently Japan is the largest net issuer of sovereign bonds in the world. Aspects of managing the debt are the topic of this chapter. In particular, the focus is on the issue of possible variations in future interest payments. Because the amount of the central government public debt outstanding is close to 100 per cent of GDP in the fiscal year 2004, even a small increase in interest rates can lead to a considerable impact on interest expenditures. This chapter argues that, given the probability of higher interest rates, the debt structure should be properly managed with due consideration to refinancing and interest rate risk.

In the fiscal year ending 31 March 2004, bonds worth 101.3 trillion yen were issued as marketable debt in Japan. Of that, 38.3 trillion yen (about 421 billion USD at 110 yen per US dollar) was the net increase in national government debt outstanding. Because of past large fiscal deficits, especially in the late Nineties, the ratio of central government debt to GDP has been increasing, reaching approximately 96 per cent at the end of the fiscal year 2004.

Until 1975, debt financing of current expenditures was needed only once in post-war Japan. Then, in the fourth quarter of 1973, the Japanese economy was hit by the oil crisis and the economy experienced a deep recession in 1974 and 1975. Against these developments, a substantive debt policy was introduced in the fiscal year 1975 to finance the high level of public expenditures. It was a major change in fiscal policy. Japanese law follow the UK Treasury's "Golden Rule" (see Woods' paper above), stipulating that the central government borrow only for investment purposes. To make it possible to finance current expenditures in excess of current revenue (that is, run a deficit), specific legislation to override the golden rule had to be approved by the Diet. This has been done on a temporary basis. And, every year since 1975, such legislation has been enacted. The amended budget of 1965 is the one exception to deficit financing before 1975.

From the mid-Seventies until the late Eighties, and again in the mid-Nineties, the annual budget has required debt financing of more than 20 per cent of total expenditures of the general account of the central government. (In addition, there are a number of special accounts to record and manage specific categories of outlays and revenues).

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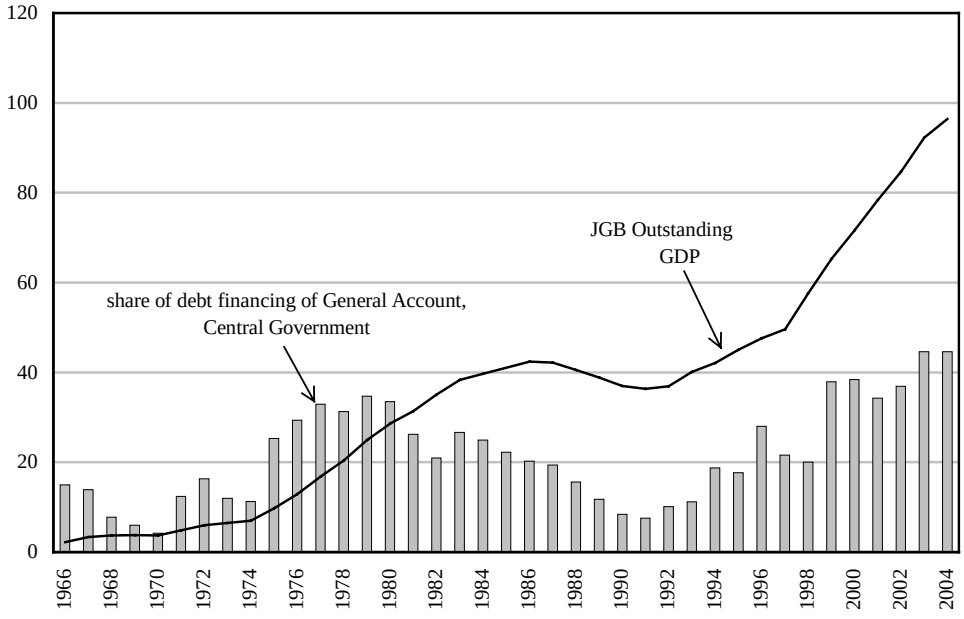
A remarkable accumulation of debt occurred during the period between the fiscal years 1997 and 2002: the increase in central government debt outstanding was about 163 trillion yen, going from 258 to 421 trillion yen. Figure 1 shows the percentage of the general account financed with debt, and the resulting accumulation of debt as a percentage of GDP. The sharp rise in debt outstanding from 1997 to 2002 should be emphasized. In formulating the general account budget of the central government in the fiscal years 2003 and 2004, an unprecedented 45 per cent of total expenditure is being financed by issuing debt.

The general government balance, which equals the sum of central and local governments, plus social security funds, also shows severe deterioration in the late Nineties. The above deficit figures of the central government correspond to a structural fiscal balance of 6.3 per cent of GDP on average for the years 1997 to 2003, according to OECD general government data. Historically, social security funds have been in surplus. However, in 2003, they turned into a deficit. This implies further acceleration in the speed of accumulating general government debt.

Figure 1

Debt Financing and Debt Outstanding
(percent)



Note: The line plots outstanding central government debt as a percentage of GDP. The bars plot, for the General Account of the central government, the share of debt financing as a percentage of expenditures. Data for the fiscal year 2003 are estimates and those for the fiscal year 2004 are as budgeted.

Table 1

Trends in Fiscal Balance and Changes in Financial Position, General Government, 1987-2003

	Structural financial balance	Social security fund	Changes in net financial liabilities	Changes in gross financial liabilities
1987/92	1.02	2.96	–52.6	–6.7
1992/97	–3.94	1.92	+20.7	+31.5
1997/03	–6.27	0.49	+43.9	+54.7

Note: Entries are annual averages of percentages of nominal GDP for the period indicated. Liabilities include the debt of the Japan Railway Settlement Corporation and the National Forest Special Account from 1998 onwards.
Source: Calculated from OECD fiscal balance and financial position data.

In terms of the primary balance, the general government deficit equals 5 per cent of GDP. Trends in the fiscal balance and changes in financial positions of the general government are shown in Table 1.

The saving or investment balances of the major economic sectors are shown in Figure 2. In Japan, the household sector has always had high savings, and its accumulation of financial assets stood at more than 2.6 times GDP at the end of the fiscal year 2003. It should be noted that the size of savings has been declining since the early Nineties. In fact, the savings rate was 6.2 per cent for the fiscal year 2002, down from 6.5 per cent in 2001. For the corporate sector, we observe a great change. The corporate sector used to be a constant net investor: however, since the mid-Nineties it has repaid debt as firms restructured their balance sheets. Thus the sector was not a competitor for funds with the government in the capital market during the late Nineties.

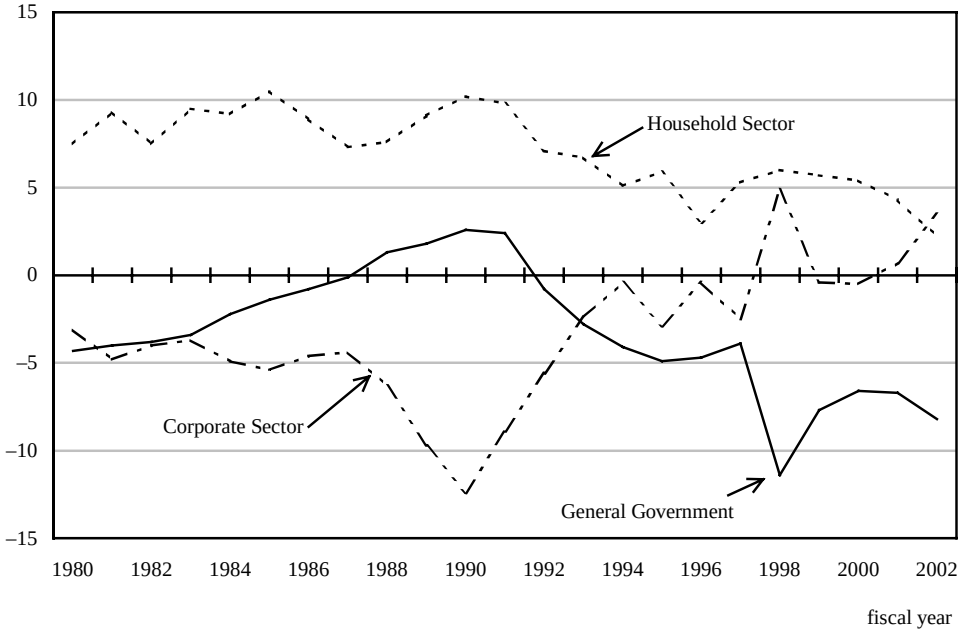
Because of stagnant private investment and the relatively high savings rate of the household sector, further supported by loose monetary policy in the late Nineties, the long-term interest rate has come down to below 2 per cent by 1998. Accordingly, the share of interest payments in the total expenditures of the general account of the central government has stayed at approximately 10 per cent in the Nineties despite the sharp rise in government debt outstanding. It constitutes the second largest item in the budget.

In Figure 3, the 10-year JGB (Japanese Government Bond, which will be precisely defined in Section 1) yields and 6-month bill rate since 1986 are shown. These are on declining trends. The 10-year JGB was issued as high as 7.9 per cent in 1990; however, in 2003 it was issued at less than 1 per cent. In the fiscal year 2002, the average coupon of all outstanding JGB was approximately 2 per cent.

Figure 2

Sectoral Savings or Investment Balances in the SNA Accounts

(percent)



Note: Data are shown as percentages of nominal GDP, measured using 93 SNA. This plots only three of the four components of the National Income Identity. During the period, the Japanese economy had excess savings (net exports) of about 2 per cent of GDP.
Source: *Annual Report on National Accounts 2004*, Cabinet Office.

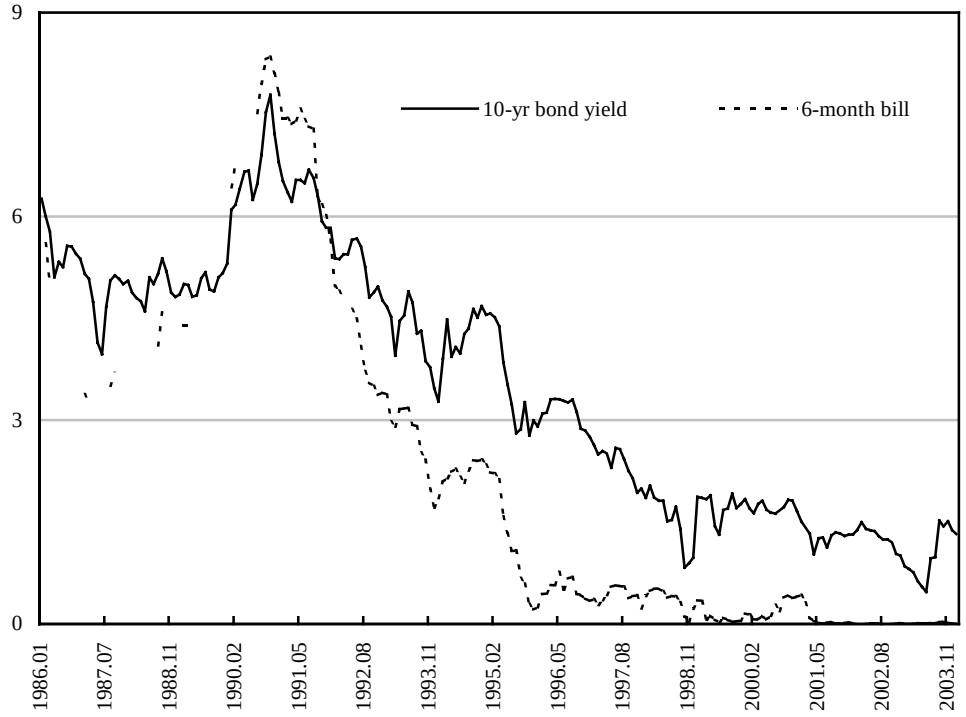
It is obvious that the situation described above will not continue for long, as the economy has been picking up since late 2003. As real economic growth changes, interest rates may begin to rise, and eventually the resulting increase in debt service costs may be a great threat in managing the government budget. Most short-term effects arising from interest rate changes should be analyzed from the viewpoint of macroeconomics. However, it also is important to evaluate the long-run implications associated with changes in interest rates, based on the debt structure and the choice of strategy in debt management policy.

In this paper, we focus on the issue of possible variations in future interest payments. As noted, since the amount of the public debt outstanding of the central government is close to 100 per cent of GDP, even a small increase in interest rates can lead to a considerable impact on interest expenditures, depending on the debt structure.

Section 1 briefly discusses the concept of government debt in Japan. The current debt structure and other characteristics of Japanese debt management policy

Figure 3

10-Year JGB Yields and 6-Month Bill Rate since 1986
(percent)



Note: Yields to subscribers of 10-year JGB and 6-month bill.
Source: Bank of Japan.

also are explained. Some European debt authorities have developed a stochastic simulation technique to analyze the effects of fluctuations in interest rates. In Section 2, the analytical framework for simulation exercises and major results are presented. The method used in this paper is in line with the concept of Cost at Risk formulated by the Danish authority and others. Based on the results of simulation exercises using the stochastic modelling of the interest rate, implications for policy alternatives are given in Section 3.

1. Current debt structure

1.1 Defining government debt

It is common to define the government as the general government, consisting of the central and local governments, and the social security fund. Total gross

liabilities of the general government in Japan equalled 808.2 trillion yen, equivalent to 162 per cent of GDP, at the end of the fiscal year 2002 according to data in the System of National Account (SNA). Of this, the gross liability of central and local governments together is 781.6 trillion yen (157 per cent of GDP).

In economic terms, the net financial position of the broad-based government appears more relevant. Data are in Table 2. The net financial position of the general government is 359.7 trillion yen, or 72 per cent of GDP. However, this figure is misleading. In consolidating the social security fund, only existing financial assets are counted, without any countervailing item from the liability side of either the social security fund or the central government. As shown in the table, the social security fund holds financial assets of 237.3 trillion yen at the end the fiscal year 2002. On the other hand, there exist current and future promised payments of benefits which do not appear in current SNA data.[1]

By excluding the social security fund, the net financial positions of the central and local government is 570.4 trillion yen, which is 115 per cent of GDP.

Table 2

Gross and Net Financial Position of General Government, End of Fiscal Year 2002
(trillion yen)

	Central Government	Local Government	Social Security Fund	General Government
Gross Liabilities	600.0	181.6	26.7	808.2
Net Financial Position	–451.3	–119.1	+210.7	–359.7

Source: Annual Report on National Accounts 2004, Cabinet Office.

Regarding the local governments, it turns out that to include them is not useful given the structure of local government in Japan. There are of more than three thousand entities and exact outlays and revenues are calculated with long lags after the end of the accounting period. Local governments conduct their own debt management under supervision of the Ministry in charge and such policies are not able to be captured in an operational manner.

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[1] Since the social security fund is managed, in principle, as pay-as-you-go, it is not necessary to count these future obligations as contingent claims. Under the official forecast, the current contribution level is insufficient to sustain the current benefit level in coming years and future increases in contribution and transfer payments from the general account to pension special accounts and cuts in benefits are scheduled.

In view of the purpose of analyzing debt management policy, the discussion here should focus on marketable, central government debt issued in the general account, which is called JGB (Japanese Government Bonds). Furthermore, for debt management policy, the gross figures attract more concerns and appear to be relevant for the analysis.

First, in order to know the size of debt servicing, it is necessary to calculate the size of the gross liability. It is worth noting that most of the changes in the net financial positions of the government arise from changes on the liability side as is shown in Table 3 which decomposes the financial position of the government in SNA data. It also is true that not all government financial assets accrue regular returns. An example is investments in government-affiliated agencies. Second, in a financial sense, the gross size of outstanding – as well as the gross size of issuance – appears to be an important indicator. Government securities held by the public sector may be subtracted from the gross total to obtain the net position of the government as an issuer. However, in so far as these securities are marketable, their potential impact should be considered based on the gross figures.

Table 3

Decomposition of Government Financial Positions in SNA Data
(trillion yen)

	1992-97	**1997-2002**
Financial Assets	+107.4	+78.4
Central Government	+36.2	+48.7
of which: other financial assets	+20.7	+25.4
Local Government	+5.7	+0.4
Social Security Fund	+65.5	+29.3
Liabilities (central + local)	+221.7	+278.0
Central Government	+152.2	+234.8
Local Government	+69.5	+43.2
General Government		
Net financial Position	–124.6	–204.6
Gross financial Position	–232.0	–283.0

Source: Cabinet Office.

1.2 Outline of JGB

Hereafter, the principal focus is on the gross amount of JGB. JGB currently includes bonds issued under the Fiscal Loan Funds Special Account that was established as a result of institutional changes in the Fiscal Investment and Loan Program in 2001. The funds raised through these special account bonds are used to extend loans to public corporations. Because these special-account bonds are excluded from general government liabilities and their debt service is an obligation of the special accounts, most calculations in this paper are conducted based on a general-account JGB basis. (Regarding the financial characteristics of the special-account JGB, they are the same as general-account JGB).

Until the late Eighties, most public funds were raised through 10-year bonds. This was because the government was expected not to issue short-to-medium term

Table 4

JGB Varieties and Outstanding Amounts

Type of Debts	**Maturity**	**Outstanding** ***(trillion yen)***	**% share**
Interest-bearing	2-4-year	39.9	9.5
	5-year	50.1	11.9
	6-year	14.8	3.5
	10-year	230.5	54.7
	20-year	34.9	8.3
	30-year	2.1	0.5
Floating-interest rate	15-year	11.9	2.8
	small-savers 10-year	0.4	0.1
Discount Bonds	Less than 1-year	34.4	8.2
	3-year	1.5	0.4
	5-year	0.7	0.2
Total	-	421.1	100.0

Notes:
- Data are as of the end of March 2003, excluding Fiscal Loan Funds Special Account Bonds. The outstanding amount of Fiscal Loan Special Account Bonds at end of the fiscal year 2002 is 75.6 trillion yen. Not all the varieties mentioned above are currently issued.
- The Issuing plan for the fiscal year 2004 has an average maturity of 6.17 years.

Source: Ministry of Finance.

notes in competition with commercial banks. Since then, both the banks and government have diversified offerings. JGB now include 5- and 20- year fixed-rate bonds; 10-year floating-rate bonds specifically designed for individual investors were introduced in March 2003. The latest is a price-indexed bond, introduced in March 2004 and issued by auction. These policy measures brought a variety of notes and bonds to Japan as shown in Table 4. As yet, no foreign-currency-denominated bonds have been issued.

In the late Nineties, many reform measures in debt management were taken, mainly motivated by the consequences of financial deregulation. These measures have led to more market-based placement through auction, in place of a syndicated underwriting system of issuance.

Further steps toward achieving a more efficient and liquid markets have been taken since then. Following are the major actions taken in primary markets since 2000:

1) 15-year floating bonds introduced by the auction method, June 2000,
2) 3-year discount note introduced by the auction method, November 2000,
3) Reopening of an issue started in March 2001,
4) STRIPS introduced in January 2003,
5) 10-year floating-rate bonds for individual investors introduced in March 2003.

In the fourth quarter of 2004, a new system of a kind of primary dealer will be enacted to prepare for any hazardous situations in the markets by enabling closer communications with market participants.

1.3 Structure of JGB

1.3.1 Maturity structure

The average maturity for newly issued bonds was eight to ten years in the Eighties and five to six years in the Nineties. In the maturity structure of JGB, the 10-year bond is still dominant, with a 55 per cent share of the outstanding total. However, average maturity at issue is about 6 years in the 2004 issuing plan. Although the duration is not published, a simple average of the remaining life of existing bonds is 4.92 years at the end of the fiscal year 2001.

The expected redemption profile as of March 2004 shows a relatively smooth picture except for a large increase for 10-year bonds in 2008. To mitigate the hump in redemptions, a buyback of 2 trillion yen is planned in the fiscal year 2004.

1.3.2 Distribution of holders

Table 5 shows the current holders of JGB, inclusive of Fiscal Loan Funds Special Account bonds. Several features warrant attention. First, the share of the

Table 5

Debt Outstanding by Holder

Categories		***(trillion yen)***	**% share**
Public Sector		238	42.8
	(of which) FILP	55	10.0
	(of which) Postal Saving	86	15.5
	(of which) POST insurance	53	9.6
Central Bank		83	15.0
Private Financial Institutions	total	176	31.7
	(of which) Banks	111	20.0
Mutual Funds		8	1.4
Security Houses		7	1.2
Foreign Investors		18	3.2
Households		13	2.4
Total		556	100.0

Note: Figures are at the end of December 2003, inclusive of Fiscal Loan Funds Special Account bonds. FILP refers to the Fiscal Investment and Loan Program.
Source: *Flow of Funds Statistics*, Bank of Japan.

total public sector, including the central bank, is as high as 57.8 per cent. Secondly, only 3 per cent is held by the overseas investors. Private banks are the second largest holders. This is partly due to their redeployment of capital away from lending because the bad-loan problem has reduced their appetite for risk.

It is well recognized that in order to secure financing in the coming years, broadening the investor base is one of the key issues for debt management. Household individuals are the first to be considered as a target, and in 2003 a 10-year floater was introduced. This special bond for individuals has been selling well under the current deflationary economic conditions, and more products specifically designed for individuals may be introduced shortly. Another area to be explored is overseas investors, but it is said that the complicated procedures for exempting tax withholding are possible obstacles to enlarging investment from overseas.

2. Risk analysis

The risk aspects that we focus on are those associated with changes in interest rates and refinancing from a medium to long-term perspective. Since the late Nineties, some debt management authorities have developed a stochastic approach to measure and control these risks. In this paper, the first attempt to apply stochastic simulation to evaluate future variations in interest payments for the Japanese case is presented.

2.1 Analytical framework for the stochastic simulations

In the case of Japan, no foreign-currency-denominated bonds are issued and, because the share of floating-rate notes and bonds is negligible, the most relevant policy option to analyze is the choice among different maturity structures as an issuing strategy.

For this purpose, three patterns of issuance are assumed. These are the short maturity pattern, benchmark, and long maturity pattern. Their details are described below. Since we are interested in the distribution of future interest payments under the three options, a Monte Carlo simulation was conducted based on stochastic modelling of the interest rate.

To perform such simulation, it is necessary to assume the scenario of budget deficits for the entire simulation period. The Ministry of Finance publishes simple calculations of future debt outstanding. The series involves simple budget calculations and is based on the assumption that current policies continue. In addition, there is no allowance for economic feedback, and no macromodelling is used. However, they are the best data available and are a reasonable starting point for our purposes. Thus, in our simulation, MOF's series is used for future deficits. Accordingly, the amount of total debt outstanding is 596 trillion yen at the end of the fiscal year 2007 and 766 trillion yen at the end of 2012, compared with 483 trillion yen as of the end of the fiscal year 2004. The other assumptions are as follows:

1) four types of notes and bonds are available. They are 1-year, 5-year, 10-year, and 20-year fixed-interest rate obligations,

Distribution of Maturity for Each Issuance Option
(percentage and years)

Option	1-yr	5-yr	10-yr	20-yr	Av. maturity
Short	60	30	5	5	3.6
Benchmark	45	25	25	5	5.2
Long	5	10	40	45	13.6

2) the debt structure at the end of the fiscal year 2002 is known precisely from published data, so future interest payments on existing debt can be calculated almost precisely. (The small amount of variable-rate bonds makes little difference, and the scheduled buyback also can be allowed for). The system for calculation is built on a quarterly basis,
3) short, benchmark and long issuing strategies are options for the authority. Benchmarks strategy models recent annual issuing plan with some simplifications,
4) The stochastic process of the short rate is assumed as:

$$dr_t = (\alpha + \beta r_t)dt + \sigma r_t^{\gamma} dz_t$$

where r_t is spot rate and $\alpha, \sigma > 0, \beta < 0$ are parameters and z_t is the Wiener process. In this formulation, when γ is equal to 0, the interest rate process is regarded as the Vasicek model and if γ is 0.5, the CIR model is assumed. (To fit the term structure, nonlinear estimation is used). By discretizing the equation above, and applying the generalized method of moments to estimate the parameters by using past monthly data of 3-month interest rate, the following values are obtained.

Estimated Parameters

	Data period	α	β	σ	γ	α/β
Case 1	Jan. 1996-Dec. 2000	0.106	–0.455	0.11	0	0.234
Case 2	Jan. 1987-Dec. 1992	0.316	–0.078	0.307	0.5	4.04

Note: All values are statistically significant at the 5 or 10 per cent level except for α and β in case 1.

5) For each portfolio strategy, a Monte Carlo simulation has been conducted 5,000 times with an alternative interest rate formulation for the fiscal years 2003 to 2017. In each year, the relevant statistics – such as mean, standard deviation and 95 percentage points value of the distribution of annual interest payments – are calculated.

2.2 Simulation results

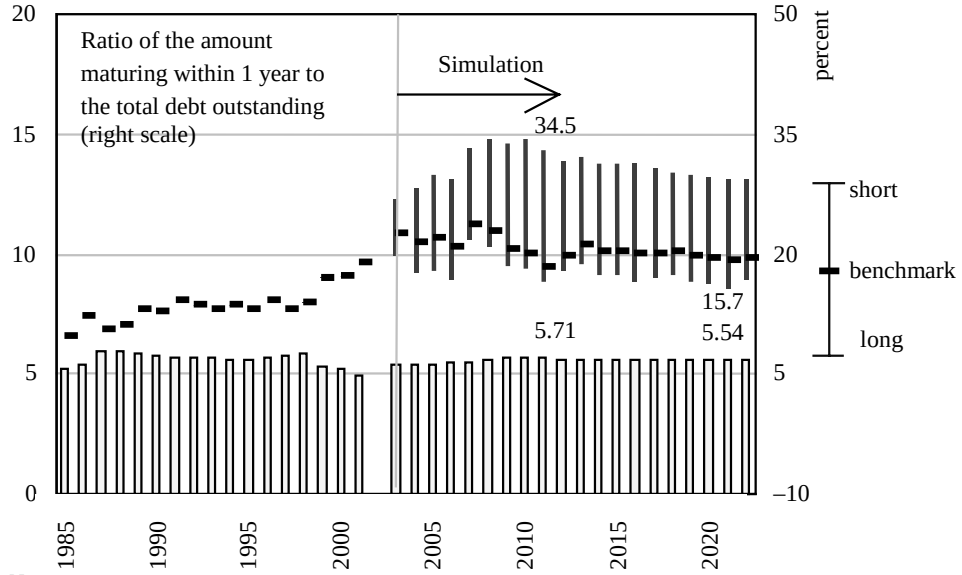
2.2.1 Refixing ratio

Each pattern of the issuance has different implications related to the risk associated with refinancing. Figure 4 shows the ratio of the amount of debt maturing

within one year to the total debt outstanding, often referred to as the refixing ratio, for the three strategies. The result is striking when the authority continues to follow the short pattern: the calculated refixing ratio will quickly rise to a level above 30 per cent. In contrast, the benchmark pattern stays rather on the stable side. Average remaining years of the entire debt would not change very much in the benchmark case.

Figure 4

Simulation Results (1)



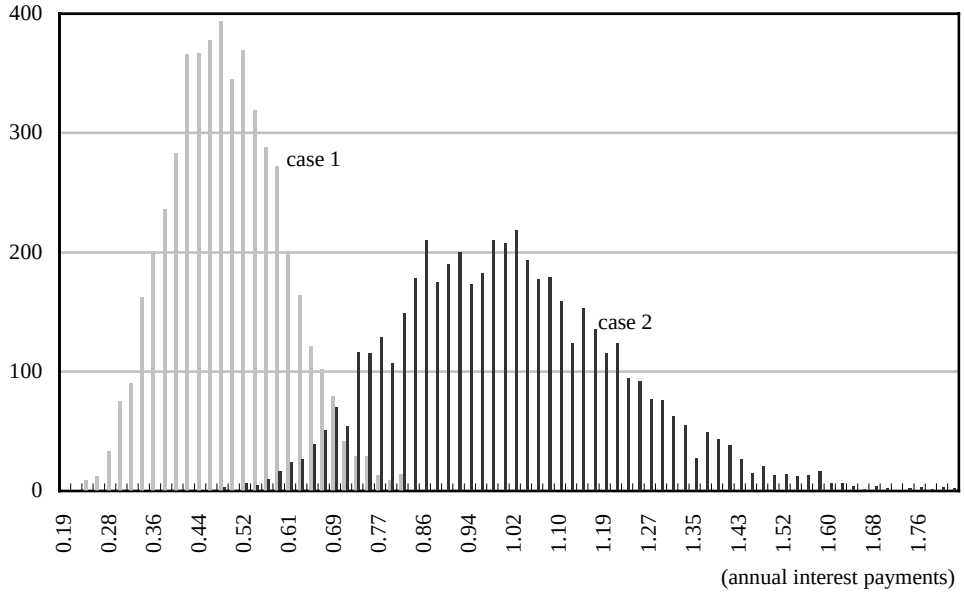
Notes:
- For the ratios of the amount of debt maturing within one year to the total outstanding, the highest value corresponds to the short portfolio strategy and the lowest to the long portfolio.
- Bars show the average remaining years of total marketable debt for the benchmark strategy.
- Data after 2001 are discontinuous because of simplifying assumptions in the simulation.

2.2.2 Distribution of future interest payments

Figure 5 demonstrates how the distribution of the amounts of future interest payments changes under different interest-rate dynamics. As is often pointed out, the exact specification and modelling of interest-rate dynamics are key to obtaining meaningful simulation results. In the figure, the left picture shows the simulation results based on the case 1 modelling of the interest rate and the right picture corresponds to case 2. In both cases, maturity choices are assumed to follow the benchmark pattern.

Figure 5

Simulation Results (2)



Notes:
The picture on the left is the simulated distribution of annual interest payments in the fiscal year 2012 generated by the case 1 formulation of interest rates, and the right is the distribution generated by case 2 formulations. In both calculations, the benchmark scenario is assumed. The size of annual interest payments are standardized as the mean value of case 2 equals to one.

Since case 1 reflects a period of low interest rates and case 2 reflects one of relatively high yields, the means and standard deviations differ greatly. As a practical matter, the interest rate process may not be stationary for the period of time we are interested in; therefore it is not easy to capture and model the interest rate dynamics with a relatively simple but appropriate formulation.

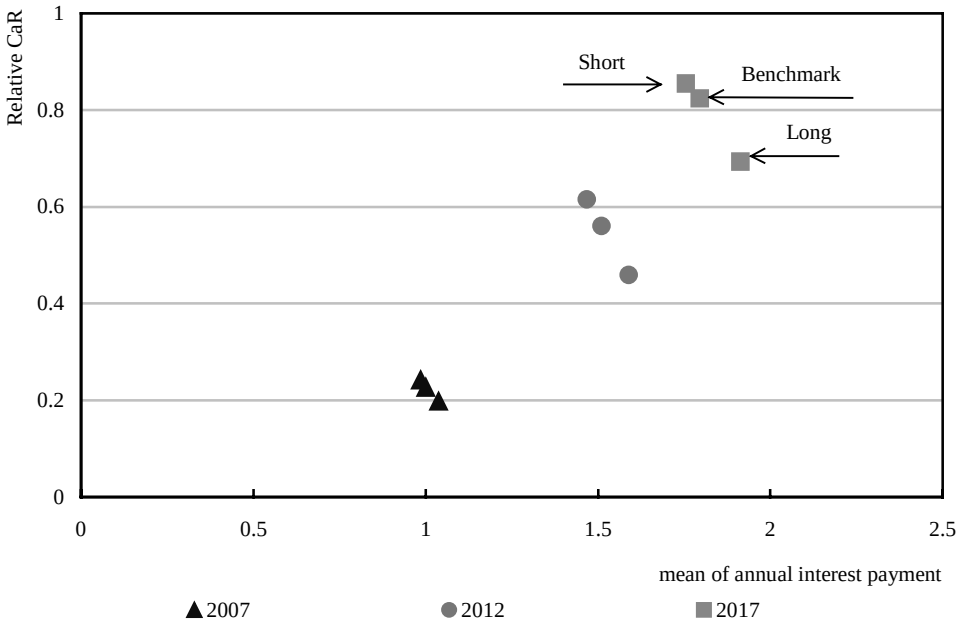
There are also some technical issues that pose problems: first, interest rates were regulated until the mid-Eighties; second, except during the bubble period, rates almost always had declining trends and Japan thus has had only short experiences with rising interest rates under deregulated markets; and third, since the 20-year and 30-year bonds were introduced very recently, their price histories are insufficient to model the whole picture of the term structure of interest rates, especially for superlong ends.

2.2.3 Trade-off between cost and risk

In the present exercise, an upward-sloping yield curve is generated that describes roughly 85 per cent of the past data. With this yield curve, we can confirm

Figure 6

Simulation Results (3)



Note: The horizontal axis measures annual interest payments standardized by the mean value of the benchmark scenario with the case 2 interest rate model. The vertical axis measures the relative CaR, defined as the difference between the 95 percentage points value of the distribution and its mean. For each of the three years, relative to the vertical axis, the data points are the short portfolio, benchmark, and long portfolio. Interest rates are assumed to follow case 2. The size of annual interest payments are standardized as the mean value of case 2 equal to one.

the trade-off between cost, measured by the mean of the distribution, and risk, measured by the size of variations in interest payments, as shown in Figure 6. The figure plots the trade-offs for the years 2007, 2012 and 2017. The simulation results show that the difference in the size of risk measured by the size of deviations among the three issuing patterns increases as time extends. Thus, the short portfolio looks more risky in the sense that its risk grows relatively faster than that of the long portfolio.

3. Policy implications

General caution has to be observed in adopting this type of approach and its preliminary nature. Therefore, the numbers should not be used for actual bets on the

JGB market. However, from the exercises in Section 2, we can derive some implications regarding the direction of debt management policy.

Based on the simulation results, it seems very clear that the relatively short portfolio strategy increases the size of market risk even in the next few years. This basically reflects the high turnover in that strategy. (In the current formulation, expected higher volatility of the short rate may not be precisely modelled.) The ratio of the amount of debt maturing within one year to the total outstanding is expected to surpass the 30 per cent level if the authorities continue to follow this short strategy, given the assumptions and some simplifications made in the calculation. It is also confirmed that the difference in the size of relative CaR between short and long portfolio increases as the simulation period extends.

These results may be obvious intuitively for debt managers; however, the simulation reveals the quantitative aspects of each case. Thus, this kind of exercises should be quite useful in formulating the exact issuing plan.

The modelling of interest rate dynamics is a real key issue that can result in considerable differences in simulation outcomes. In fact, stochastic application in this field is at an early stage and more study on appropriate modelling of the interest rate is necessary to further develop the risk analysis.

In current Japanese capital markets, a variety of financial products with long maturities are not available in sufficient quantities, given the increasing demand of institutional investors who wish to hold liabilities of long duration. Many corporate pension funds also are in favour of such long-term investments. It seems there is more room to issue super-long JGB, not only from market demand but also from the viewpoint of interest-rate risk management. The frequency of 20-year and 30-year JGB issuance, as well as the size of each issue can be increased.

Last, but not the least: an important aspect is that unless stable macroeconomic performance is achieved, any efforts in the sophistication in the risk management of debt policy may not work successfully. The debt management authority – the Ministry of Finance – intends to enhance the functions of monitoring and analysis of the risk aspects of its policies, as announced in December 2003. These efforts, along with a continuous reform in primary markets, may be most effective in a stable macro economy.

In this regard, the most urgent and immediate task for the Japanese government is to restore the primary balance of the budget as soon as possible. As observed in the Introduction, the declining saving rate of the household sector may be a warning signal to policy makers under the ongoing aging of the population.

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THE MONETISATION OF JAPAN'S GOVERNMENT DEBT

David E. Lebow[*]

Introduction

Japan's prolonged economic slowdown from the early Nineties to 2003 has led the Bank of Japan to attempt to stimulate economic growth through a huge expansion of the monetary base. Moreover, the slowdown, along with an expansionary fiscal policy, has contributed to large fiscal deficits and a ballooning of public debt. This paper presents some simple calculations to quantify one source of interaction between these monetary and fiscal policies, namely the implications of the monetary expansion for government debt.

These fiscal effects can be divided into two components. First, by purchasing large quantities of government bonds, the Bank of Japan has monetised a notable portion of the debt: therefore, the net debt of the consolidated general government and central bank – the most appropriate measure for analysing the government's fiscal position – is smaller than is the debt of the general government alone, which is the figure most commonly cited. Second, the consolidated debt ratio could fall further depending on the degree to which the monetary expansion to date is reversed to prevent inflation from rising too much. It will also depend on the response of both the exchange rate and nominal interest rates to any temporary inflation that does occur. I conclude that, under reasonable scenarios, the consolidated government/central bank debt position could be noticeably lower than indicated by commonly cited debt statistics.

The intention of this paper is not to minimise Japan's fiscal difficulties, nor is it to argue that Japan should "inflate itself" out of its debt problem. Ongoing budget deficits are very high, and the ageing of the population, and possibly also the needs of the financial sector, are expected to add substantial budgetary strains in the future. As I shall discuss, one could even imagine a situation in which fiscal considerations stand in the way of the Bank of Japan carrying out its desired monetary policy. Rather, this paper is intended to help understand the fiscal implications of the Bank of Japan's monetary policies and to emphasise that such considerations will be an important part of the economic debate.

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The paper proceeds as follows. Section 1 presents standard government budget identities to help illustrate that the consolidated net debt of the government and central bank is the most relevant debt concept for analysing fiscal conditions. Section 2 presents basic data on government debt and the BOJ's balance sheet, and notes that for purposes of this paper one must move away from conventional central bank accounting, which fundamentally obscures the central bank's true financial position by failing to recognise the special nature of its liabilities. Section 3 provides rough estimates of the implications of the monetary expansion for prices and discusses the likely reversal of policy aimed at preventing large price increases. Section 4 calculates the effect of higher prices on consolidated debt/GDP ratios under different assumptions about the accompanying rise in interest rates, and lays out a menu of ultimate debt/GDP ratios that take into account both the central bank net worth position and the price level consequences associated with different degrees of monetary reversal. Section 5 concludes.

1. The central bank and the government

Modern central banks are public institutions that make public policy. They are agents of the government that can be dissolved by the government. The trend towards operational independence for many central banks indicates that, for some purposes, it is useful to treat the central bank as being distinct from the rest of the government. But for purposes of analysing fiscal policy, the definition of the public sector ought to include the central bank. Central bank operations have the well recognised ability to finance government spending, and central banks have explicit rules for how their surpluses must be transferred to the government. Conversely, central bank transfers to the government are sometimes reduced to help support the central bank's finances (as has been done in Japan in recent years), and fiscal authorities at times are called upon to stand behind the finances of the central bank. The fact that some bookkeeping distinctions between the central bank and government – for example, which party holds foreign exchange assets and so bears exchange rate risk – vary across countries highlights the inherently arbitrary nature of the distinction. Indeed, Buiter (2003a) cited the consolidation of central bank and government accounts as one of his "ten commandments" for a fiscal rule in the EMU. Nevertheless, central banks are treated in the international system of national accounts as being part of financial private business, separate from the rest of government.

These considerations rationalise the typical practice of combining the budget identities for the government and central bank to generate one overall public sector budget identity (e.g. Walsh, 1998). Such a budget identity will help demonstrate that the consolidated net debt of the government and central bank is the debt variable of interest; it will also prove useful later in the paper.

The government budget identity can be written as:

$$G_t + i\, BG_{t-1} + \Delta AG_t = T_t + i\, AG_{t-1} + CBT_t + \Delta BG_t \qquad (1)$$

Equation (1) says that all cash outlays – for non-interest government spending (G), interest payments on the total government debt (i times BG), and new purchases of financial assets (ΔAG) – must be funded by some combination of tax receipts (T), interest earnings on government assets (i times AG), transfers from the central bank (CBT), and new debt issuance (ΔBG). Note that I have assumed for simplicity that government assets earn the same rate of return as must be paid on government debt. Taking into account both gross debt and financial assets, the net debt of the government is:

$$NDG_t = BG_t - AG_t \tag{2}$$

The central bank is assumed to hold as assets government debt (BM) plus an alternative asset (AM), and the monetary base (M) is the only central bank liability. The budget identity of this central bank is given by:

$$\Delta BMt + \Delta AMt + CBTt = i\,AMt - 1 + i\,BMt - 1 + \Delta Mt \tag{3}$$

Equation (3) says that central bank purchases of new assets plus transfers to the government must be funded by interest earnings on the central bank's assets plus the expansion of the monetary base (ΔM). The net debt of the central bank – that is, the negative of its net worth – is equal to:

$$NDMt = -BMt - AMt \tag{4}$$

This notion that the net worth of the central bank is equal to the value of its assets ($BM + AM$), ignoring the value of its liability (M), will be discussed in more detail in the next section. For now, the main idea is that the monetary base pays no interest, so ($BM + AM$), rather than ($BM + AM - M$), represents the net interest earning assets of the central bank.

Combining equations (1) and (3) generates the familiar budget identity for the overall public sector:

$$G_t - T_t + i\,(BG_{t-1} - AG_{t-1} - BM_{t-1} - AM_{t-1}) = \Delta BG_t - \Delta AG_t - \Delta BM_t - \Delta AM_t + \Delta M_t$$

or:

$$G_t - T_t + i\,(NDG_{t-1} + NDM_{t-1}) = \Delta(NDG_t + NDM_t) + \Delta M_t \tag{5}$$

Equation (5) states that government spending less tax receipts, plus net interest payments on the consolidated net debt of the government and central bank ($NDB + NDM$), must be funded either by increases in this consolidated net debt or by an increase in base money.[1] This equation highlights the two traditional channels through which central bank actions affect the government budget. First, a monetary expansion (ΔM) can itself fund a government deficit; typically this is done indirectly

[1] The equations assume that all debt and assets carry the same nominal interest rate. Relaxing this assumption complicates the algebra but not the economic meaning of the equations.

through an open market asset purchase that, combined with the additional *BG* sold by the government, leaves consolidated net debt unchanged. Second, a monetary expansion, which provides the public with a non-interest-bearing asset in exchange for an interest-bearing asset, raises the central bank's net worth properly measured and so reduces net interest payments on the consolidated net debt. Again, for present purposes, the key point is that the consolidated government and central bank net debt is the appropriate debt concept for the public sector (Buiter, 2003a, b).

To be sure, in Japan's present low-interest environment, the equation's sharp distinction between interest bearing and non-interest-bearing government liabilities is exaggerated. Nevertheless, the distinction will become more important when interest rates eventually increase. In particular, the calculations in the next section will emphasise that some central bank liabilities are irredeemable, or in other words, they pay zero interest forever.

2. Japanese government and central bank balance sheets

With this as background, Table 1 presents the basic balance sheet information for the public sector in Japan at the end of 2003. Gross debt of the general government – that is, the consolidated central government, sub national governments, and social security system, but not including the central bank – amounted to 157 per cent of GDP according to OECD estimates, the highest in the industrial world. The Japanese government also holds substantial financial assets amounting to some 78 per cent of GDP, mostly in the social security system. Thus, the general government net debt is 79 per cent of GDP, below the levels of Italy or Belgium but still one of the highest in the industrial world. At present, these debt levels do not translate into unusually high debt service costs because of the very low levels of interest rates; the Japanese government's net interest payments as a share of GDP are well below those of Italy or Belgium, for example. But were interest rates eventually to increase substantially, then so would debt service costs.

Furthermore, several factors imply that Japan's debt situation is more serious than the net debt figure suggests. First, the effect of an ageing population on future social security and medical costs is more severe than in most countries. (However, see Broda and Weinstein, 2004, for an argument that the very long-run demographic influences on the budget are more favourable than is commonly supposed). Thus, as the financial assets held by the social security system are earmarked to an unusually high level of future obligations, some analysts view the gross debt figures as being more appropriate for international comparisons. Second, the figures omit what could be substantial contingent liabilities, including the possible need for public support of the banking system and implicitly guaranteed loans of quasi governmental agencies (see Kashyap, 2002 and IMF, 2003a). Third, the quality of some government assets

Table 1

Japanese General Government and Central Bank Balance Sheets, December 2003

¥ trillion *(percent of GDP)*

Assets		Liabilities	
General Government			
Foreign reserves	72 (14.4%)	Gross debt	785 (157.3%)
Other assets	317 (63.6%)		
Total financial assets	389 (78.0%)		
Net debt	**396 (79.3%)**		
Bank of Japan			
LT government debt	64 (12.9%)	Banknotes	77 (15.4%)
ST government debt	29 (5.8%)	Required reserves	4 (0.9%)
Foreign assets	4 (0.9%)	Other current deposits	26 (5.2%)
Other assets	34 (6.7%)	Other liabilities	19 (3.8%)
Total assets	131 (26.3%)	Capital(1)	5 (1.1%)
		True net worth	**86 (17.3%)**
Consolidated Government/BOJ			
Foreign assets	76 (15.3%)	Government debt	691 (138.6%)
Domestic assets	351 (70.3%)	BOJ true liabilities	45 (9.0%)
Total assets	427 (85.6%)	Total liabilities	736 (147.6%)
Consolidated net debt	**309 (62.0%)**		

(1) The Bank of Japan capital includes legal and special reserves.
Sources: OECD; Ministry of Finance; Bank of Japan.

is suspect; in particular, the government's substantial dollar-denominated assets are subject to exchange rate risk and could lose value were the yen to appreciate.[2] Finally, huge government deficits (8 per cent of GDP in 2003) imply that the debts are increasing at a rapid rate.

An important limitation of these government debt figures, however, is that they ignore the wealth position of the Bank of Japan. As can be seen in the middle portion of Table 1, BOJ holdings of short term and long term government securities reached ¥93 trillion in total, or about 19 per cent of GDP, at the end of 2003.[3] To be sure, consolidation of the central bank accounts with the rest of general government must combine liabilities as well as assets, implying that only the BOJ's overall net worth should be relevant. And as conventionally measured, the net worth (or "capital") of the BOJ, as with most central banks, is low – about 1 per cent of GDP.

But this conventional accounting is misleading because it does not recognise the special nature of central bank liabilities. In particular, *fiat currency* is a "liability" that pays zero interest and never need be redeemed (Fry 1993; Buiter 2003a, b); the true cost of this liability, abstracting from the small costs associated with manufacturing and distributing the notes, detecting forgeries, and so on, is zero. Alternatively stated, were the central bank to pay a private agent to take over these liabilities, the fair market price would be close to zero. The same is true for required bank reserves; these central bank liabilities often pay no interest and can also be viewed as only rarely having to be redeemed (such as when a bank ceases operation).

Excess reserves – such as most of the BOJ's current deposits – are an intermediate case. As these are redeemable, they amount to a temporary interest-free loan to the central bank and so represent a liability whose true value is less than reported but is greater than zero. However, the fact that the BOJ is targeting this aggregate could be taken to imply that these deposits do not have to be redeemed unless and until the BOJ changes its targets. Nevertheless, to be conservative in my calculations, I will treat only required reserves – a small portion of overall current deposits – as being similar to currency and representing a zero true liability to the central bank. The remainder of current deposits will be taken to represent only a temporary interest-free loan to the central bank and will be measured, to a first approximation, as representing a liability of full value. In all, I present a more meaningful definition of the BOJ's net worth that includes currency and required

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[2] The data for general government gross debt, net debt, and total financial assets are OECD (2004) estimates. The data on foreign reserves, however, are from the Ministry of Finance (2004), and "other assets", which subtracts foreign reserves from total financial assets, therefore mixes the two data sources. Japan's purchases of foreign reserves, funded by additional gross debt issuance (financing bills), increased notably further in early 2004.

[3] In line with traditional accounting procedures, the assets of the Bank of Japan are valued at historical cost and are not marked to market. At present, this probably does not distort the asset valuation too severely, but, as will be discussed below, asset values are subject to adjustment in response to changes in interest rates.

Table 2

Consolidated Government/BOJ Net Debt
(percent of GDP)

	2000	2001	2002	2003
General government net debt	59.9	65.2	71.4	79.3
BOJ true net worth	14.1	15.4	17.0	17.3
Consolidated government/BOJ net debt	45.0	49.7	54.4	62.0
Domestic net debt	53.8	60.8	66.5	77.3
minus: foreign currency assets	8.8	11.1	12.1	15.3

reserves as well as capital.[4] As shown in Table 1, the BOJ's "true" net worth according to this definition was 17.3 per cent of GDP at the end of 2003.[5] Consolidating this BOJ capital position with the general government data would bring the net debt to only 62, rather than 79 per cent, of GDP in 2003.

Table 2 presents these calculations for each year since 2000, a period during which both debt accumulation and the monetisation of this debt were proceeding rapidly. General government debt rose by 20 per cent of GDP during this three-year period, but the BOJ's true net worth also increased during this period. In all, the consolidated net debt of the general government and central bank increased from 45 per cent of GDP in 2000 to 62 per cent in 2003.

As can be seen in table 3, similar calculations show both the "true" net worth and the holdings of government securities for central banks of other industrial

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[4] As the discussion in the text indicates, this definition is a convenient simplification. A more complete calculation, which generates similar results, might value both assets and liabilities as the discounted present value of expected future interest receipts or payments. To take an example, suppose we hold the size of the balance sheet constant and assume that after two years short term interest rates will rise to 2 per cent and be expected to remain at that level indefinitely (implying that long term rates settle near 2 per cent as well and BOJ earnings gradually rise as the debt is rolled over). On the liability side, assume that excess reserves will need to be replaced with other liabilities costing 2 per cent. Of course, currency will continue to cost the central bank zero. In this scenario, the discounted value of future interest earnings and payments, using a discount factor of 2 per cent, generates net worth of ¥84 trillion, close to that of the simple calculation presented in the text.

[5] Taking into account not the existing central bank balance sheet items, as is done here, but the expected future expansion of central bank balance sheets enabled by inflation and a growing economy, Fry (1993) calculated that the "franchise value" of a central bank's right to issue domestic currency would be worth about 150 per cent of GDP for a typical central bank attempting to maximise seigniorage revenue. Fry calculates that it would be worth about 38 per cent of GDP if combined with the requirement that the central bank pursue zero inflation.

countries to be far lower than for Japan. For most countries, therefore, a consolidation of the central bank with the rest of government would not greatly affect the government's net liability position.

Table 3

Central Bank Assets and Liabilities, 2003
(percent of GDP)

	Date	Total assets	Of which: Gov't securities	Total liabilities	Of which: Irredeem-able liabilities	Capital	Capital plus irredeem-able liabilities
Japan	Dec 03	26.3	18.7	25.3	21.4	1.1	17.3
US	Dec 03	7.0	6.5	6.9	6.4	0.2	6.5
Canada	Dec 03	3.6	3.4	3.6	3.5	0.0	3.5
UK	Feb 03	4.7	1.3	4.5	3.1	0.1	3.3
Euro-system	Dec 03	11.8	0.6	10.8	6.2	0.9	7.1
Australia	Dec 03	8.4	1.5	7.6	4.6	0.8	5.4

Note: "Irredeemable liabilities" comprises currency plus zero-interest required reserves. For the Eurosystem and Australia, where bank reserves pay interest, it comprises currency only.
Source: Central banks.

Parenthetically, this discussion helps shed light on the arguments about the importance of central banks maintaining positive capital (Stella, 2002; Hawkins, 2003). The market value of the Bank of Japan's ¥64 trillion holdings of long-term government bonds could fall substantially if longer term interest rates rise. Concerns about maintaining a positive capital position have led the BOJ to retain a larger share of its profits, rather than turn them over to the Ministry of Finance. More importantly, such concerns may have been a factor influencing the conduct of monetary policy itself (Bernanke, 2003; Zhu, 2004).[6] The discussion above provides two insights into this issue. First, for some purposes the balance sheet of the consolidated government and central bank is of primary concern. (Government debt is a net liability in this consolidated balance sheet. Any reduction in the value of the

[6] Zhu (2004) cites minutes of the BOJ Monetary Policy Meeting in April 2003 to support the view that its capital position has been a constraint on monetary policy.

BOJ's assets were interest rates to rise would be offset by a much larger reduction in the liability of the general government). This is not to say that one should never be concerned about central bank finances in isolation, for perceptions of financial strength may contribute to the viability of an independent central bank. However, the second insight is that, ideally, such perceptions ought not to depend on the measured capital position because this can provide a misleading view of the central bank's true net worth. This true net worth cannot decline as the result of the purchase of new assets through an expansion of irredeemable monetary liabilities; even if these new assets subsequently decline in value, the true net worth will still not be lower than if the monetary expansion and asset purchase had never occurred in the first place.

3. Potential implications of monetary expansion for the price level

3.1 No policy reversal

For a more complete analysis of the effects of the BOJ's monetisation on government debt ratios, I next consider the potential price implications of the BOJ's monetary expansion. I begin by examining the implications for prices under the extreme assumption that the monetary base remains at end-2003 levels, and then, more realistically, discuss the monetary reversal necessary to prevent a large increase in prices.

The top panel of Figure 1 shows how the growth rate of the monetary base has increased sharply over the past several years. Ordinarily, one would expect that such rapid money growth would fuel inflation and therefore raise growth of nominal GDP by a similar magnitude. But as the figure makes clear, this has not occurred. Instead, deflation combined with stagnant real GDP growth has left nominal GDP little changed. Therefore, as shown in the lower panel, the monetary base as a share of GDP has risen to more than 20 per cent – far in excess of the ratios for the other countries shown.

The most straightforward explanation for this sharp increase in the monetary base/GDP ratio (or, equivalently, decline in the velocity of the monetary base) is that Japan is experiencing a liquidity trap.[7] One legacy of the collapse in asset values after 1989 is low investment demand by companies burdened with high debt (Koo, 2003). As a result, even though the Bank of Japan has pushed short-term interest rates to their lower bound of zero, this has not translated into broader monetary aggregates nor provided enough stimulus to aggregate demand to eliminate the output gap or stem deflation. Further monetary expansion in such a situation – unless it can reduce real interest rates by generating higher expected inflation – has difficulty in stimulating aggregate demand, and as a result, the ratio of the monetary

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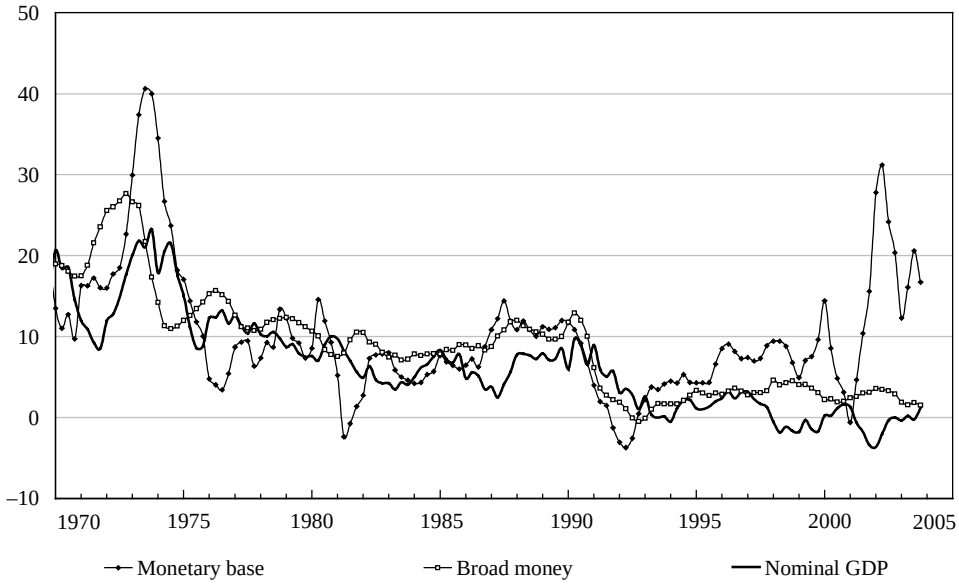
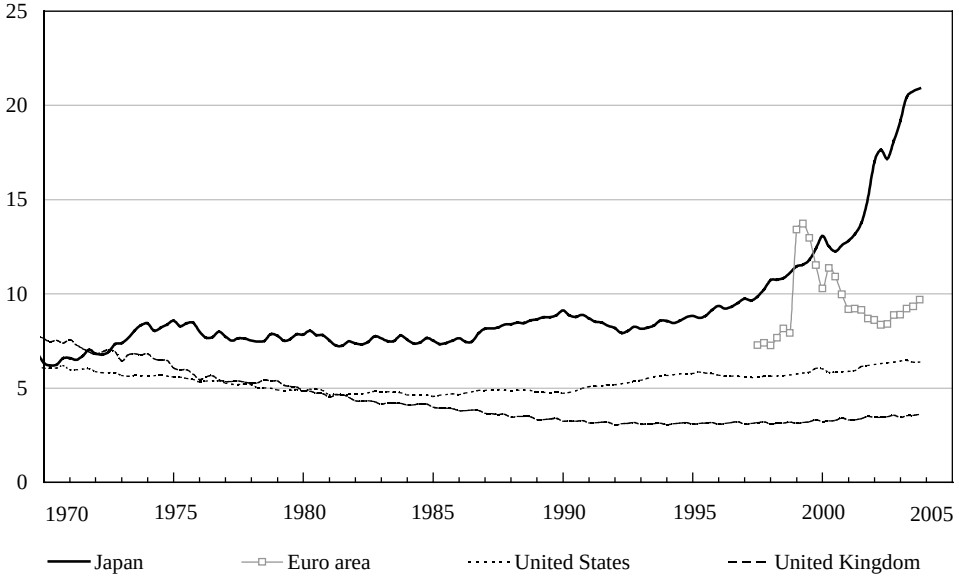
[7] Ahearne *et al.* (2002) provide a useful overview of these issues.

Figure 1

Monetary Base, Broad Money and Nominal GDP in Japan



Monetary Base
(percent of nominal GDP)



base to nominal GDP increases.[8] Structural problems in the Japanese financial system – another legacy of the drop in asset values – could be a contributing factor as well; indeed, in the view of some analysts, this may be the more important part of the explanation (Hutchison, 2000; Morsink and Bayoumi, 2000). According to this explanation, banks are hampered with bad loans that may limit their ability to fund even potentially profitable further lending, resulting in a build up of reserves that does not feed into broader monetary and credit aggregates or aggregate demand.

As economic conditions in Japan improve and the liquidity trap comes to an end, and as the condition of the financial system strengthens, nominal GDP would be expected to rise into more normal alignment with the monetary base. In other words, there is a monetary overhang in Japan that could eventually lead to very large price increases. An estimate of the magnitude of such a price increase can be obtained by assuming that the earlier relationship between the monetary base and nominal GDP will eventually be reasserted. (Such a monetarist approach must be viewed as extremely rough in the light of the well known instability of money velocity). Figure 1 shows that the inverse of base velocity trended gradually higher from around 6 per cent in 1970 to around 8 to 9 per cent in the early Nineties; a ratio of around 10 per cent today would be roughly in line with this earlier trend. Thus, I assume that the existing monetary base is consistent with about a doubling (111 per cent increase) of nominal GDP; such an increase would bring the ratio to 10 per cent from over 20 per cent at present.[9]

The extent to which any such increase in nominal GDP would occur through a price increase versus an increase in real GDP depends on the magnitude of the output gap. Many analysts believe that the gap of GDP below potential GDP in Japan is only about 2 to 3 per cent at present, and that potential GDP is rising only a little more than 1 percent per year (see OECD, 2004 or IMF, 2003b). According to such estimates, if the reversal of velocity were to be achieved over a small number of years, at most several percentage points of the adjustment would occur through real output growth. Even if the output gap and potential output growth were substantially larger (as was argued to be the case by Krugman, 1998, Kuttner and Posen, 2001 and Posen, 2001), the lion's share of a large increase in nominal GDP in a short number of years would need to be achieved by price increases rather than through growth of real GDP. In the calculations in Section 4, I will assume that real GDP rises by 10 per cent with prices accounting for the remainder; one such scenario would involve a five year period during which potential GDP rises 1½ per

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[8] A slowdown in potential GDP growth, which by all accounts has been an important part of Japan's economic slowdown since the Eighties, can contribute to the likelihood of a liquidity trap by reducing the equilibrium rate of interest and so narrowing the scope for stimulative policy given the zero lower bound for the policy rate. See Hayashi and Prescott (2002) and Andolfatto (2003). But see Posen (2001) for an argument that Japanese productivity and potential GDP growth is higher than is commonly recognised.

[9] One caveat is that, in the new steady state, money demand might be higher than suggested by the earlier trend if nominal interest rates are lower than the levels that prevailed during the Eighties. In this situation, base money as a share of GDP may return to a level higher than 10 per cent. Given reasonable elasticities of money demand, however, the difference is unlikely to be large, and for simplicity I retain the 10 per cent assumption in my calculations.

cent per year and a 2½ per cent output gap closes to zero. The calculations will of course be insensitive to small changes in this assumption.

3.2 Future policy reversal

To be sure, the preceding situation is extreme. Such a price increase will not be acceptable to the Bank of Japan, and the monetary expansion will therefore be reversed to some degree. That is, when the economy eventually strengthens, the BOJ will sell some portion of its bond holdings to reverse the expansion of the monetary base. In terms of Figure 1, the larger is the reduction in the monetary base, the smaller is the increase in nominal GDP required to bring the ratio of the two back to 10 per cent.

Although some degree of monetary reversal will surely be necessary, the extent of reversal will need to take into account the various arguments about the desirability of some price increases following a long period of deflation. Many analysts believe that some *temporary* burst of inflation to raise the price level would be highly beneficial. First, much of the academic literature on liquidity traps (Krugman, 1998; Reifschneider and Williams, 1999, Eggertsson and Woodford, 2003, Svensson, 2003) suggests that an important channel through which monetary policy can remain effective in a liquidity trap is to reduce real interest rates by raising expected inflation; that is, the public must believe that the central bank will eventually be successful in raising the price level. Second, Bernanke (2003) argued that an increase in the price level would also be desirable to relieve the burden that deflation has imposed on debtors; this could relieve the pressures on banks as well. Finally, the desire to reduce the value of government debt may itself play a role in determining the desired increase in the price level. To be sure, one must not imagine that such a real debt reduction is painless, for the loss is borne by bondholders. But in evaluating the consequences of the various approaches to reducing the government debt – inflation or outright repudiation on the one hand, and higher taxation or other fiscal policy adjustments on the other – some degree of price increases may well be justified on efficiency grounds, as this would reduce the costs of distortionary taxation (Auerbach and Obstfeld, 2003).[10]

On the other side, one obvious argument against allowing too large a price increase is the fear that a period of inflation would not be temporary but could lead to inflation that is higher than desired on an ongoing basis. Once the desired reflation is achieved, the BOJ, like other central banks, would like to maintain a low and stable inflation rate. But a period of higher inflation could kindle inflationary expectations that would be costly to reverse. Some analysts have suggested that the

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[10] This discussion assumes that the *nominal* value of government liabilities is unaffected by the price increase. In fact, the redistributions caused by an unexpected jump in prices may affect government obligations. For example, they may affect the government's contingent liability for implicitly guaranteed loans. The outcome is especially complicated when one also considers the political economy issue of whether the government may intervene to limit adverse outcomes for some individuals, such as pensioners.

adoption of a price level target or exchange rate target would help prevent such a one-time price increase from engendering expectations of higher ongoing inflation (see Eggertsson and Woodford, 2003, Bernanke, 2003 or Svensson, 2003).

In all, the magnitude of price increase to be desired is far from clear. Krugman (1998) called for a sizable increase of 4 per cent inflation for 15 years, or 60 per cent in all from 1998 levels; given subsequent deflation, this is almost 70 per cent above the current price level. Bernanke (2003) suggested that the price level be brought to where it would have been had prices increased by 1 per cent per year from 1998; this would imply a 15 per cent higher price level by 2003. Of course, many analysts believe that no temporary period of price level reflation is desirable at all. The calculations in the next section will therefore present a range of possibilities.

This discussion presumes that the Bank of Japan will be able to reverse its monetary expansion should it wish to do so. But there is at least a possibility that such a reversal may be difficult unless the government begins to make credible fiscal adjustments at the same time. The argument derives from the literature on fiscal dominance (e.g. Sargent and Wallace, 1981). If Japan's fiscal deficits were to remain large even after an economic expansion has taken hold, then the public could come to fear that the government will not be able to fulfil its obligations without engaging in continued monetisation, and interest rates could move sharply higher. The economic consequences of such high interest rates could generate pressure on the central bank to pursue a larger monetary expansion even at the expense of higher inflation.[11]

Although of some interest from a theoretical/analytical perspective, a situation in which fiscal dominance hampers monetary policy, fortunately, is not likely to occur in Japan. To be sure, the government knows that fiscal tightening would be premature until a recovery becomes self-sustained; in early 1997, a rise in the value added tax proved detrimental to an incipient recovery. Nevertheless, the government has on several occasions stated its intention of adopting a policy of fiscal consolidation – including pension reform – over the medium term. The low yields on JGBs in the face of well publicised levels of government debt suggest that this intention is believed by the public. Furthermore, while the change in the primary balance required to stabilise the net debt/GDP ratio looks daunting at first sight (simple calculations suggest a required adjustment of perhaps 7 per cent of GDP; see Lebow 2004), there may be some attenuating factors. As mentioned earlier,

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[11] There could, in principle, be a technical aspect to this possibility as well. A large increase in interest rates would reduce the market value of the BOJ's holdings of long-term government bonds significantly. If the value of these assets declined by enough, the BOJ could be in a situation where it cannot engage in open market sales on a large enough scale to generate the desired reduction in the monetary base: in the language of Section 2, the BOJ's true net worth could approach zero. In fact, such an outcome seems unlikely. Suppose the BOJ decides that it would like to reduce the monetary base by ¥43 trillion as discussed in the text. The BOJ holds assets of about ¥67 trillion even excluding its holdings of long-term government bonds, including ¥29 trillion in short-term government debt plus another ¥34 trillion in other domestic assets (mostly bills purchased). This amount would appear sufficient to cover the desired monetary reduction.

assumptions about both demographics (Broda and Weinstein, 2004) and potential output growth (Posen, 2001) that underlie many budget projections may be too pessimistic. Furthermore, such an adjustment is by no means unprecedented. For instance, Canada, Italy and Sweden all improved their cyclically adjusted primary balances by more than 7 per cent of GDP over the Nineties. Finally, the central bank's commitment to avoid high inflation can itself provide the fiscal authority with additional incentive to make the necessary fiscal adjustments.

4. Fiscal implications of policy reversal

To assess the implications of such a price increase for government debt ratios, it will be useful to return to the budget identities presented in Section 1. I repeat equation (5) with two adjustments. First, I divide the consolidated net debt ($ND = NDG + NDM$) into two components: domestic net debt (ND^d) less the exchange rate (e, measured as the price of foreign exchange in yen) times foreign denominated assets (A^f). Second, I express all terms in the equation as a share of nominal GDP (Y). Thus, the consolidated budget identity becomes:

$$\frac{(G_t - T_t)}{Y_t} + i\frac{(ND^d_{t-1} - e_{t-1}A^f_{t-1})}{Y_t} = \frac{\Delta ND^d_t}{Y_t} - \frac{(e_t\,\Delta A^f_t)}{Y_t} + \frac{\Delta M_t}{Y_t}$$

or:

$$(g_t - t_t) + i\,(nd^d_{t-1} - e_{t-1}a^f_{t-1})\frac{Y_{t-1}}{Y_t} = nd^d_t - nd^d_{t-1}\frac{Y_{t-1}}{Y_t} - e_t\,a^f_t + e_t\,a^f_{t-1}\frac{Y_{t-1}}{Y_t} + \frac{\Delta M_t}{Y_t}$$

where lower-case letters denote values as a ratio to nominal GDP. Finally, noting that $\Delta nd_t = \Delta nd^d_t - e_t\Delta a^f_t - a^f_{t-1}\Delta e_t$, this equation can be written as:

$$\Delta nd_t = (g_t - t_t) - \frac{\Delta M_t}{Y_t} + \frac{(i - \frac{\Delta Y_t}{Y_{t-1}})}{(1 + \frac{\Delta Y_t}{Y_{t-1}})}\,nd_{t-1} - \frac{(\frac{\Delta e_t}{e_{t-1}})}{(1 + \frac{\Delta Y_t}{Y_{t-1}})}\,e_{t-1} \qquad (6)$$

The third term of equation (6) shows that if the growth rate of nominal GDP increases, and if this increase is not matched one for one by a higher average nominal interest rate paid on the debt, then the consolidated net debt as a share of GDP (nd) will be reduced for any given primary deficit ratio and monetary expansion. And as shown in the fourth term, if the rise in prices leads the exchange rate to depreciate, the net debt ratio will decline further because the government's holdings of foreign denominated assets, unlike the other categories of assets and liabilities, will approximately maintain their value as a share of GDP. Thus, the extent of changes in these three variables prices (nominal GDP), interest rates, and the exchange rate – are the key factors (aside from future primary deficits and monetisation) determining changes in the consolidated debt ratio.

I begin by providing calculations for the case in which the monetary base is reduced enough to limit the eventual price increase to 15 per cent – the amount that Bernanke (2003) implicitly recommended. As discussed above, I assume that real GDP increases by 10 per cent such that the overall increase in nominal GDP is 25 per cent; based on the calculations in Section 3, this would require a reduction in the monetary base of some ¥43 trillion, or about 8.5 per cent of GDP. I further assume that the yen depreciates in step with the price level such that foreign-denominated assets approximately retain their value in real terms. Finally, I assume at first that interest rates are entirely unaffected. Using equation (6) and the balance sheet figures from Table 1, this combination of factors would bring the consolidated net debt to 50.5 per cent of GDP (shown in the penultimate column of Table 4).

This calculation probably generates too low a consolidated net debt ratio because it assumes that the average interest rate paid on the net debt remains unchanged in the face of higher inflation. Gauging the likely increase in interest rates in these circumstances is very difficult, for any increase should depend on how persistent the inflation is perceived to be. (The standard analysis that considers a permanent increase in inflation that is matched by permanently higher interest rates, with debt consequences governed by the maturity structure of existing debt, is not appropriate in this case of an assumed temporary period of inflation).

Therefore, I provide two additional interest rate alternatives. In both cases, short term interest rates are assumed to rise by the same amount as prices over a five-year period (in this case, about 3 per cent per year for five years cumulating to a 15 per cent increase); after five years interest rates revert to their original level. The two alternatives differ in the degree to which this reversion is anticipated. In the first alternative, the rise in interest rates is fully understood to be temporary. In this case, longer term interest rates rise by less than short-term rates and we have a flattening of the term structure. (I assume that the expectations theory of the term structure holds so that, to a first approximation, movements in long-term interest rates are simple geometric averages of expected movements in short-term rates). In the second alternative, the higher short term interest rates are initially believed to be permanent, so that interest rates increase by the same amount throughout the entire term structure. In either case, the new interest rates – higher for five years and the original rates thereafter – are applied to new government debt as it is rolled over, first gradually raising and then gradually lowering the average interest rate paid on the debt (the variable that enters into equation 6).[12] As shown in Table 4, the effect

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[12] The calculation is based on the maturity structure for Japanese government bonds at the beginning of FY 2003 (Ministry of Finance, 2003). As the existing debt comes due during the next five years, the government is assumed to issue new debt, with the same maturity structure as at present, at a higher spot interest rate that varies over the term structure according to either interest rate alternative as discussed in the text. This gradually raises the average interest rate on the debt. After the five year period, new debt is assumed to roll over at the original, lower interest rate, and the average interest rate gradually declines again. The cumulative increase in the average interest rate over the whole period comes to 6 per cent and 13 per cent in the first and second alternatives, respectively. These figures are the ones used in equation (6).

Table 4

Japanese Price Level and Consolidated Debt Ratios under Alternative Degrees of Monetary Contraction

	Monetary Contraction from 2003 Levels ¥trillion *(percent of 2003 GDP)*				
	0.0 (0.0)	25.3 (5.0)	35.3 (7.0)	42.8 (8.5)	50.3 (10.0)
Implied rise in nominal GDP *(percent)*	110.8	60	40	25	10
Assumed rise in real GDP	10	10	10	10	10
Rise in price level	100.8	50	30	15	0
annual increase for five years	(15.0)	(8.4)	(5.4)	(2.8)	(0.0)
Excess reserves (¥ trillion)	25.7	0.4	0.0	0.0	0.0
Consolidated net debt *(percent of 2003 GDP)*	62.0	62.0	63.9	65.4	66.9
Consolidated net debt *(percent of eventual nominal GDP):*					
- With no rise in interest rates	22.1	33.9	42.4	50.5	60.8
- With temporary rise in interet rates, understood to be temporary	32.0	41.0	47.5	53.5	60.8
- With temporary rise in int. rates, initially believed to be permanent	48.9	51.3	54.6	57.5	60.8

of these higher interest costs boosts the consolidated net debt to 53.5 per cent of GDP under the first alternative and to 57.5 per cent of GDP under the second.[13] These numbers compare with the 50.5 per cent debt ratio assuming no rise in interest costs at all.

I view the first interest rate alternative, in which the increase is credibly believed to be temporary, as being the most reasonable of the various possibilities. The Bank of Japan has made it clear that it places a very high value on price

[13] The consolidated net debt figures in Table 4 are only moderately sensitive to the choice of five years over which the inflation and interest rate increase is assumed to occur. In the case where the increases are understood to be temporary, a shorter but sharper increase would generate lower debt figures than reported in Table 4. In the case where the increases are believed to be permanent, a shorter but sharper increase would generate slightly higher debt figures. Note, however, that the shorter the period of elevated rates, the more extreme would be the assumption that the increases are expected to be permanent.

stability, and this may make it more likely that any rise in prices will be viewed as a one time event rather than a signal of ongoing inflation. Certainly, for people to presume, as in the last alternative, that a rise in inflation is permanent despite assurances from the BOJ that they have no such intention would appear to be an extreme assumption. Of course, the larger is the assumed price increase, the larger will be the effect of the different interest rate assumptions on the debt calculations.

Given that the desirable price increase is subject to debate, Table 4 presents a menu of options in addition to the case just discussed. The different columns of the table present different degrees of monetary contraction from current levels, generating different price increases and consolidated net debt ratios. (As before, the table assumes that 10 per centage points of the incipient rise in nominal GDP occurs through higher real GDP, and the remainder occurs through a higher price level).

The calculations are conducted in terms of the monetary base, though of course there will be counterparts to these calculations in terms of the overnight interest rate consistent with any monetary reduction. Of particular note is the fact that substantial excess reserves (the bulk of the current deposits that the BOJ is targeting under the quantitative easing policy) are not consistent with positive overnight interest rates. Thus, a policy reversal that intends to raise the overnight rate above zero will require a reduction in the monetary base from its end-2003 level that is at least as large as these excess reserves, or about ¥25 trillion.[14] This outcome, shown in the second column of the table, would be consistent with about a 50 per cent rise in the price level – for example, inflation near 8 per cent per year for five years – and would leave the consolidated net debt ratio at around 34 to 51 per cent of GDP depending on the reaction of interest rates. The even more extreme assumption of leaving the monetary expansion through the end of 2003 in place with no reversal, shown in the first column, would bring the consolidated debt ratio to 22 to 49 per cent of GDP.

Three examples of monetary contraction beyond this ¥25 trillion lower bound are presented.[15] They correspond to cumulative price increases of 30 per cent, 15 per cent, and zero, respectively. (As the figures are intended to give rough estimates only, the reader of course can interpolate estimates for other price increases as desired). As was already discussed, a price increase of 15 per cent (or, for example, inflation of about 3 per cent per year for five years) would require about a ¥43 trillion reduction of the monetary base from end 2003 levels and would generate a consolidated net debt ratio of around 50 to 57 per cent of GDP – noticeably lower than the commonly cited levels that ignore the central bank (79 per cent for general government net debt). These figures are little affected by the alternative interest rate assumptions as the assumed inflation is small.

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[14] One alternative policy option, however, would be to raise reserve requirements such that a higher level of reserves becomes compatible with positive interest rates.

[15] Among the many practical decisions that must be made in implementing such a monetary reversal is the speed with which such a reversal will occur, for too rapid a reversal may lead to problems at banks or other financial institutions.

Finally, a reduction in the monetary base of about ¥50 trillion from current levels would be sufficient to prevent any price increases at all – a scenario perhaps most consistent with the BOJ's stated intentions. Even in this scenario, including the BOJ's true net worth implies that the consolidated net debt would be 61 per cent of GDP, which again is lower than commonly cited debt figures.

5. Conclusions

Japan's government debt is very high, especially considering the fact that the data exclude likely future liabilities stemming from an ageing population and possible requirements of the financial system. Nevertheless, an offsetting factor is the degree to which the Bank of Japan has already monetised the debt. The monetary expansion up to the end of 2003 has increased the net worth of the Bank of Japan, properly measured, to more than 17 per cent of GDP, directly reducing the debt position of the consolidated government and central bank – the most relevant measure for assessing fiscal solvency. Furthermore, the consolidated debt ratio would fall further if the monetary expansion is allowed to generate a temporary period of rising prices. Even a reversal of the bulk of the monetary expansion (implying only modest price increases) would leave consolidated debt levels noticeably lower as a share of GDP than commonly recognised.

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POSSIBLE POINTS OF CONTRADICTION BETWEEN FISCAL POLICY AND DEBT MANAGEMENT OBJECTIVES (IN DEVELOPING COUNTRIES)

Mariella Nenova and Plamen Kaloyanchev[*]

Introduction

The joint paper of the International Monetary Fund and the World Bank "Guidelines for Public Debt Management" (2001) provides instructions for the implementation of a debt management policy based on the experience of both developed and developing countries. Although economic theory strives to generalize its models and usually avoids differentiations we argue that in the field of fiscal policy and debt management (as a component of fiscal policy for indebted countries) it is necessary to outline the particular features of developing economies and to specify the possible points of contradiction between the implementation of fiscal policy and the achievement of debt management objectives. The governments should know the sources of potential conflicts in order to undertake measures to maintain a stance of fiscal policy which is conducive to successful debt management operations.

Section 1 provides some evidence of a number of differences between developed and developing countries, which create dissimilar conditions for fiscal policy and debt management implementation. These differences are due to two major characteristics of a developing economy – the low income level (higher level of poverty, low saving rate, etc.) and the fragile confidence in the policies commitments and their implementation. A conclusion might be drawn that a developing country is more inclined to maintain fiscal deficits and opt for debt-financing (external) in order to alleviate current social problems and to boost up economic growth. However, the outcome might be a high level of indebtedness and a heavy burden of debt service, which withdraws a growing amount of domestic resources.

Section 2 develops a simple set of equations, based on the considerations of section 1, and used for outlining the patterns of fiscal policy in a developing economy and their relation to debt dynamics. The equations pretend to reveal the asymmetry in government's preferences – its unwillingness (inability) to raise taxes and willingness to satisfy an expanding range of social needs. Due to this asymmetry a commitment of an indebted developing country's government to balance the budget in order to guarantee future debt payments may be implausible. The lack of

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The views expressed in the paper are those of the authors and do not necessarily represent those of the Bulgarian National Bank or of its policy.

confidence is embedded in the risk premium on government debt required by the investors. A growing risk premium may provoke acceleration of debt accumulation.

Section 3 steps on the equations of section 2 and the intertemporal budget constraint in order to consider the debt accumulation process and to discuss the possible points of contradiction between the fiscal policy and debt management objectives. Three phases in the debt accumulation process are considered. They differ by the expectations of investors about the credibility of fiscal policy commitments incorporated in the dynamics of risk premium on debt. The risk premium is a function of investors' expectations about the future fiscal policy stance, their perception of debt sustainability level and their assessment about the ability of the government to fulfil commitments for policy adjustments. The possible conflicts between fiscal policy and debt management objectives arise when the speed of debt accumulation accelerates and investors' claim an increasing risk premium. Even when the government has made the necessary adjustments in the fiscal policy (tightening) and the debt-to-GDP ratio stabilizes it needs years before the risk premium on debt starts to decline. Debt management operations may be effective only under the conditions of a slow rate of debt accumulation and stable risk premium or in the period of risk premium deceleration.

Section 4 provides a brief overview of the Bulgarian experience in the implementation of fiscal policy and debt management in the period 1990-2003 as an illustration of the conclusions in the previous sections.

An indebted country should build up the capacity for effective debt management but before getting involved in any debt operations it should assess the investors' perceptions. The last section based on the findings in the paper gives recommendations about how to identify the position of a country on the debt accumulation path.

1. Debt-financing in developing countries – expectations and outcomes

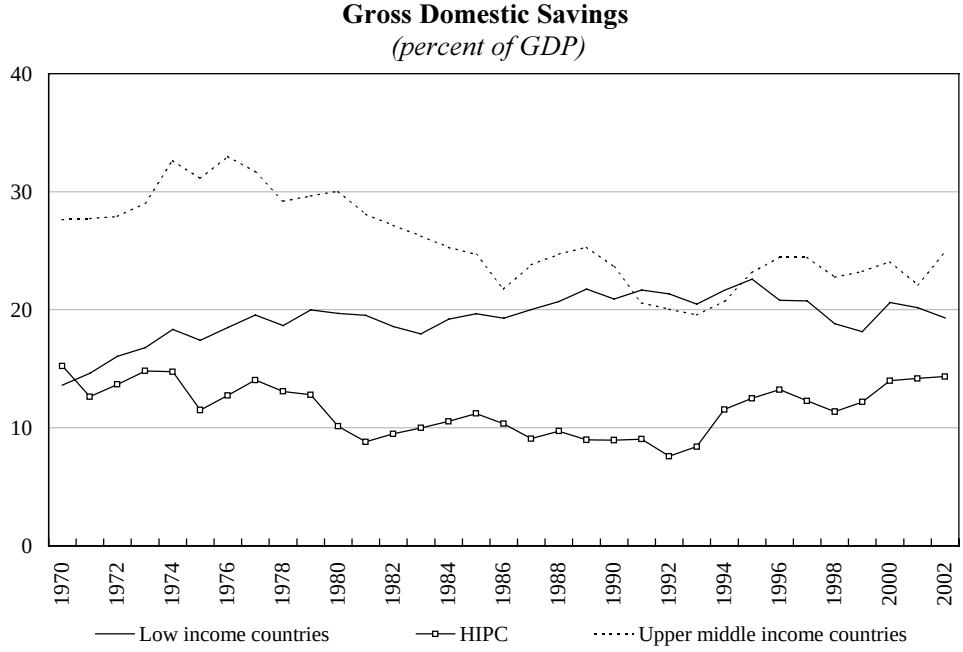
The role of government in the broad sense is a topic of incessant discussions of ideological nature and strong philosophic flavour. The question of the debt-financing of government expenditure attracts even more acute attention. There is a vast and exhaustive literature about the interrelations between fiscal policy and debt accumulation, about the reasons and consequences of debt financing in the developed economies. However, the existing theoretical models should be modified when applied for analysis of developing countries' sovereign debt accumulation process in order to capture in a better way the specific features of a developing country and especially to provide an appropriate set of recommendations on fiscal policy targets and instruments.

Empirical analysis makes open the existing differences in debt management and fiscal policy targets and implementation between developed and developing

economies (Daniel, Callen, Terrones, Debrun and Allard, 2004). These differences are due to two major characteristics of a developing economy – the low income level (higher level of poverty, low saving rate, etc.) and the fragile confidence in the policies commitments and their implementation. The share of population in poverty is relatively high in a developing country and hence, the level of budget revenues is relatively low. As far as budget expenses are concerned governments are much more egalitarian and inclined to alleviate poverty by increasing transfers or implementing other social programs; they are easily persuaded to increase the scope of public goods supplied, too. The infrastructure might be underdeveloped or obsolete while the private sector incapable to launch any important projects for infrastructure building, repair and maintenance. Financing infrastructural projects, and construction projects in education and health care, by debt issue might be considered a reasonable fiscal policy. The last but not the least, developing countries' governments are generally weak, with less experience in sound macroeconomic policy management and feeble political support for radical structural reforms; the fiscal process and framework are quite unstable and vulnerable to reversals and time inconsistencies, which undermines the confidence in economic policy as a whole.

As a consequence the domestic pressure exercised over developing countries' governments to spend more than revenue collection allows for is likely hard to resist

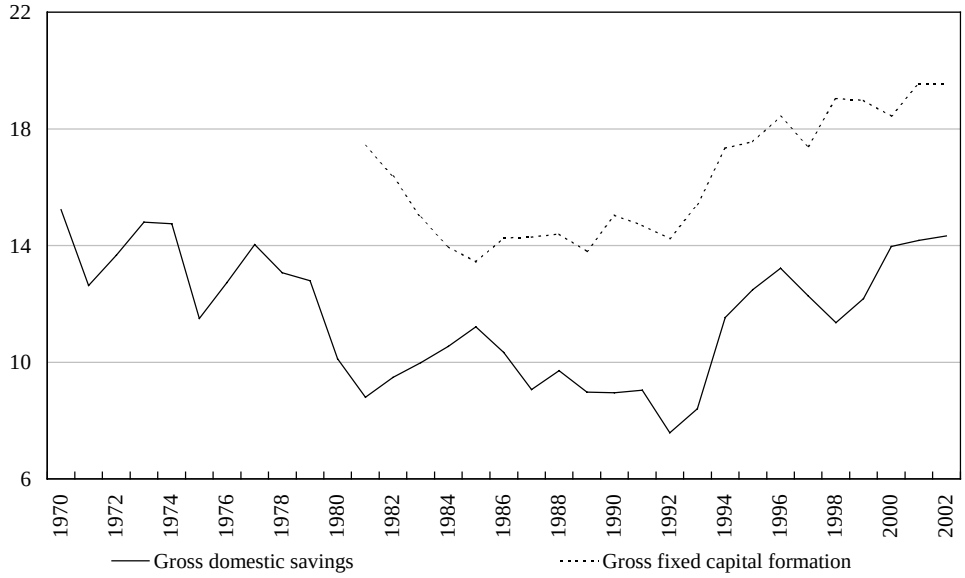
Figure 1



Source: World Bank.

Figure 2

Investment and savings in HIPC
(percent of GDP)



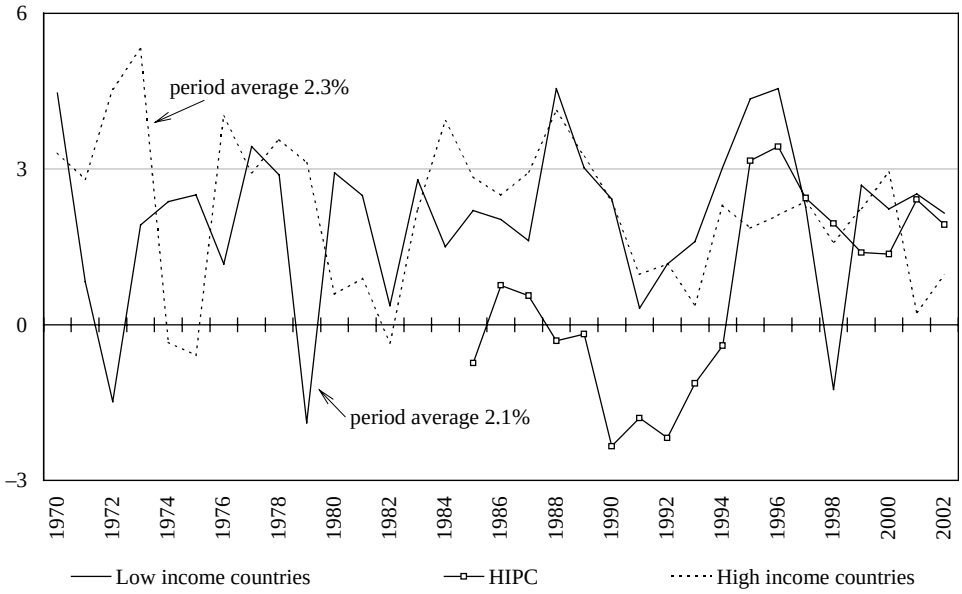
Source: World Bank.

and debt accumulates progressively. Debt service also goes up for two reasons – first, the initial risk premium on debt is relatively high due to frail confidence in developing country's government, and second, as debt accumulates the risk premium on debt goes even higher.

One way to solve the problems generated by low income and backwardness is to make efforts to stimulate the economy to grow faster resorting to external financial resources. In the Fifties, when the International Monetary Fund and the World Bank started their operation they applied a simple growth model – the Harrod-Domar model, stating that in order a developing country to achieve a particular growth rate it needs to make investments corresponding to the incremental capital output ratio (ICOR). If domestic saving rate is not enough to finance the required investment rate then the government may use external resources (grants or loans) to cover the financing gap (Easterly, 1997). Thanks to the foreign resources the economy might be pushed to a higher trajectory of the production function, acquire higher growth rates in the transition period and ultimately ends with a higher income level. By achieving a higher level of income the country will become able to pay back the debt without strong economic tension. Expectations for future economic growth and easier financial conditions prompted developing countries government to sustain fiscal deficits.

Figure 3

GDP Per Capita Growth
(annual percent)



Source: World Bank.

A brief overview of data exhibits that the basic assumption of the above cited model – the relatively low level of saving rate and the efforts to increase the investment rate by indebtedness (Figures 1-2 and Figure 4), especially for the heavily indebted poor countries, have been well secured.[1]

Although the growth rates in less developed countries overran the rates in developed economies as far as the GDP per capita growth is concerned the outcome was quite disappointing (Figure 3). The basic problem of poverty alleviation has not been achieved while the indebtedness of the poor countries mounted up (Figure 4).

Expectations that future growth will improve the fiscal balance and ease financial conditions for debt service came out to be wrong, too. In 1997 the international financial institutions launched the initiative of HIPC debt reduction.

Based on the above considerations a conclusion might be drawn that a developing country is predisposed to opt for debt financing in order to alleviate

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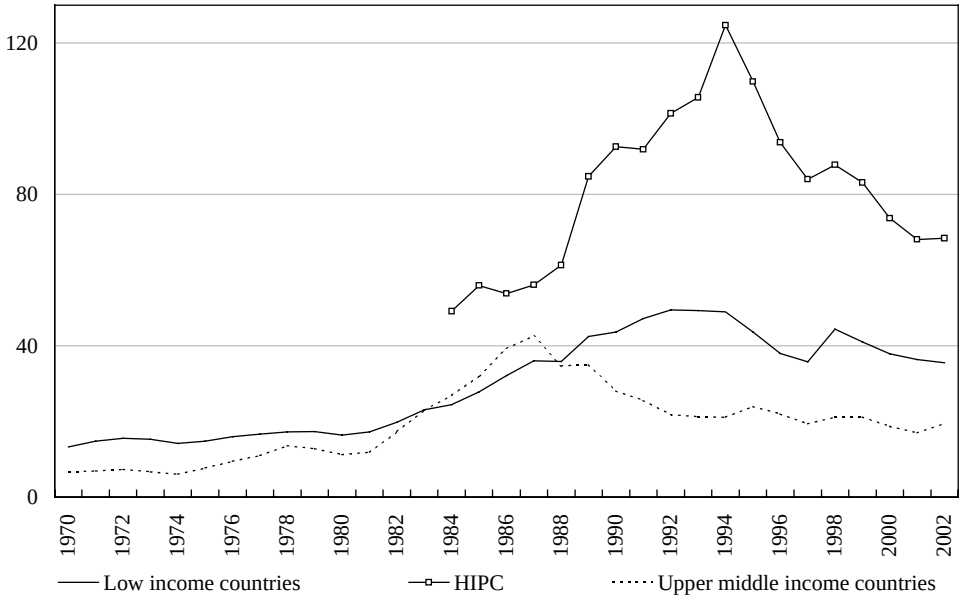
[1] Data extracted from database http://sima-ext.worldbank.org/query/. The groups follow the definitions of the World Bank. Most of the countries in the group of heavily indebted poor countries (HIPC) are part of the group of low income countries.

Figure 4

Public and Publicly Guaranteed Debt
(percent of GDP)



Source: World Bank.

current social problems and to boost up economic growth, most probably by using external sources. The share of external debt to total debt in developing countries is about 50 per cent compared to the structure of developed countries' debt (about 25 per cent is external debt) (Daniel, Callen, Terrones, Debrun and Allard, 2004). However, the outcome achieved has been a high level of indebtedness and a heavy burden of debt service, which withdraws a growing amount of domestic resources.

2. Patterns of fiscal policy and debt dynamics

To outline the possible patterns of fiscal policy, based on the considerations stated in Section 1, and their relation to debt dynamics we use the definition of a primary balance (in real terms):

$$D_t = T_t - (G_t + Tr_t) \quad (1)$$

where T_t stands for tax revenues, G_t indicates government purchases of goods and services and Tr_t represents government transfer payments to households.

We also use the debt accumulation equation:

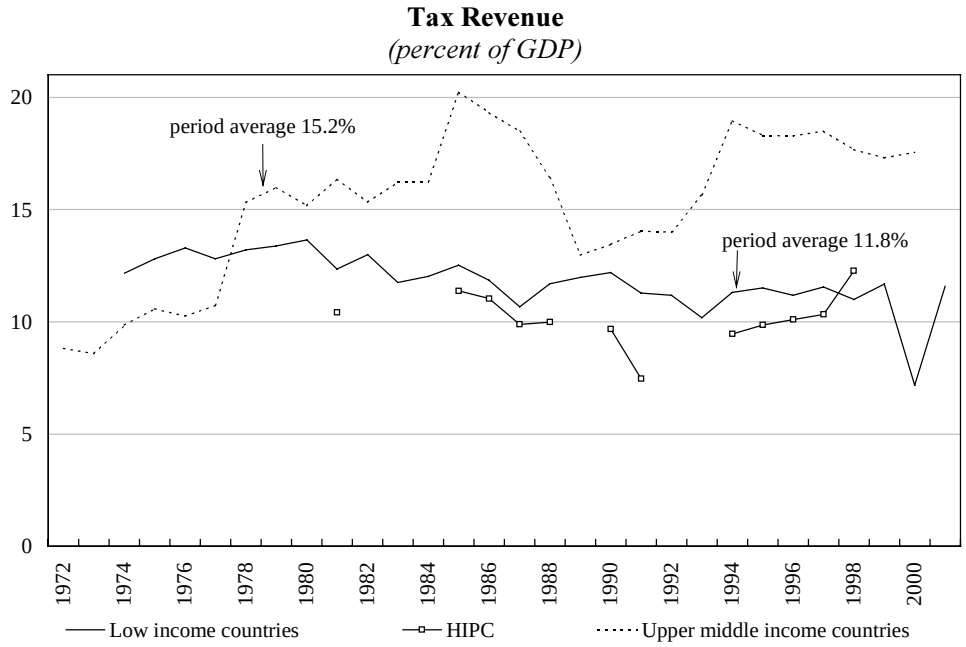
$$Bt+1 = Rt*Bt - Dt \quad (2)$$

where B_t and B_{t+1} stand for debt at the end of the corresponding period, $R_t = (1+r)$, where r is the real interest rate on debt and D_t is the primary balance estimated as the difference between revenues and non-interest government expenditures.

We can describe the possible paths of fiscal policy by making assumptions about the likely dynamics of the different components entering the primary balance equation (1).

Emerging economies are subject to tight constraints in the implementation of their tax policy. Since tax evasion is a wide spread phenomenon (due to low incomes) raising tax rates or making tough efforts to increase tax collection may be politically unacceptable, and it may easily provoke a fresh impulse for tax evasion. It is possible that tax evasion outperforms the expected tax collection or necessitates an escalation of tax collection costs. An important consequence of tax evasion is its significant distortionary impact on economic activity and fiscal policy. Usually renowned firms suffer both from the higher tax rates and the unfair competition of successful tax evaders (with a negative impact on foreign direct investments and the national investment rate). If the government is willing to minimize economic distortions it should be cautious in planning changes in the tax system.

Figure 5



Source: World Bank.

Constraints over the tax systems in low income countries are manifested through the lower tax revenue to GDP ratios (Figure 5).

In modelling tax revenues we may assume that governments are unwilling to increase tax rates and they concentrate their efforts to keep tax revenues in constant proportion to real GDP.

$$Tt = \tau^* Yt, \quad 0 < \tau < 1, \quad \tau = const \tag{3}$$

Equation 3 states that tax revenues in real terms (T_t) will increase during a boom and will decline during recession at the same rate as real output (Y_t).

It is a wide spread practice in emerging markets to impose upon the government (usually by law) obligations for sustaining a high level of fixed expenditures (G_{const}) – spending on wages, defence, internal security, health, education and a contingency fund, which are independent of output variability, and of short and medium term budget revenues fluctuations in particular. The flexibility of the government to implement its own expenditure policy may be constrained to a volatile component ($g^*\Delta Y_t$), which is positively related to economic growth and may be zero in periods of recession. If we do not impose the restriction that $g = 0$ in recession it will mean that the government should reduce G_{const} in order to balance the budget – a not acceptable policy measure.

Under the assumptions made the expenditure equation might look as follows:

$$G_t = G_{const} + g^*\Delta Y_t, \quad g > 0 \text{ when } \Delta Y_t > 0, \quad g = 0 \text{ when } \Delta Y_t < 0 \tag{4}$$

Transfer payments to households usually contain a fixed component (pension schemes and other types of social insurance schemes), not dependent on income fluctuations, and a volatile component (unemployment benefits and income related social aid) sensitive to income fluctuations. Most likely governments are quite constrained by law in any adjustments in transfer payments they may wish to make.

$$Trt = Trconst + s^*\Delta Yt, \quad s < 0 \text{ when } \Delta Yt < 0, \quad s = 0 \text{ when } \Delta Yt > 0 \tag{5}$$

If we assume that the primary balance is zero in the previous year ($D_{t-1} = T_{t-1} - G_{const} - Tr_{const} = 0$) and debt is zero, too, then the primary balance to GDP ratio for the current year is a function of the GDP growth rates and depends on the relations between the coefficients τ, g, s:

$$\frac{D_t}{Y_t} = \frac{\frac{\Delta Y_t}{Y_{t-1}}}{\frac{Y_t}{Y_{t-1}}} * [\tau - g - s] \tag{6}$$

According to our assumptions the term ($\tau - s$) is positive ($\tau > 0$, $s < 0$ or $s = 0$) and whether the primary balance will be on a deficit or surplus depends on the relation between the coefficient g and ($\tau - s$).

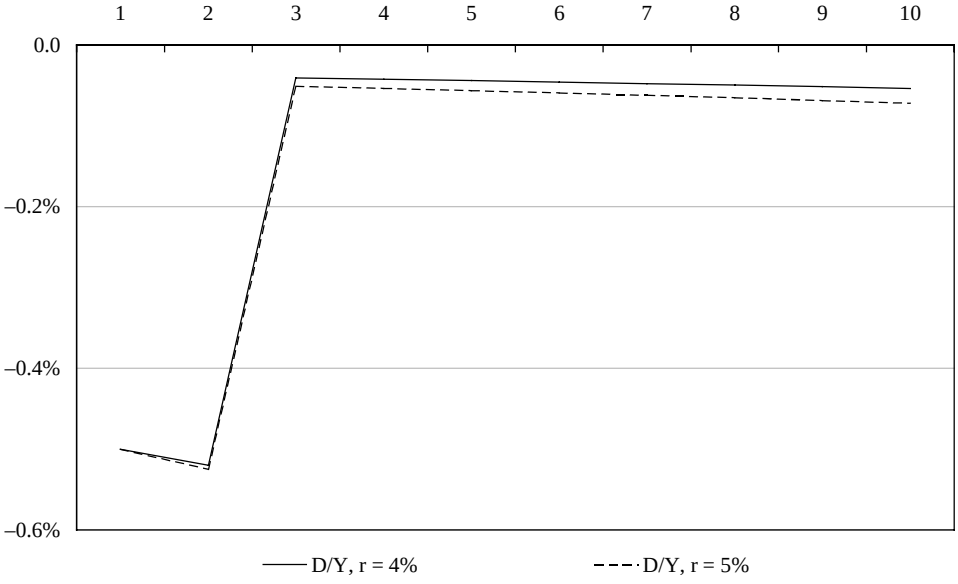
Table 1

Economic Cycle and the Primary Balance

In a boom: $\Delta Y_t > 0$ $g > 0$, $s = 0$ $D_t/Y_t = [(\Delta Y_t / Y_{t-1})/(Y_t / Y_{t-1})]*(\tau - g)$		
Case 1	$D/Y = 0$	If $g = \tau$
Case 2	$D/Y > 0$ (surplus)	If $g < \tau$
Case 3	$D/Y < 0$ (deficit)	If $g > \tau$
In a recession: $\Delta Y_t < 0$, $g = 0$, $s < 0$ $D_t/Y_t = [(\Delta Y_t/Y_{t-1})/(Y_t/Y_{t-1})]*(\tau - s)$		
1	$D/Y < 0$ (deficit)	Since $(\tau - s) > 0$

Figure 6

Budget Balance
(if $dY > 0$ then $g > 0$, $g = \tau$; if $dY < 0$ then $s < 0$, $g = 0$)
(percentage of GDP)

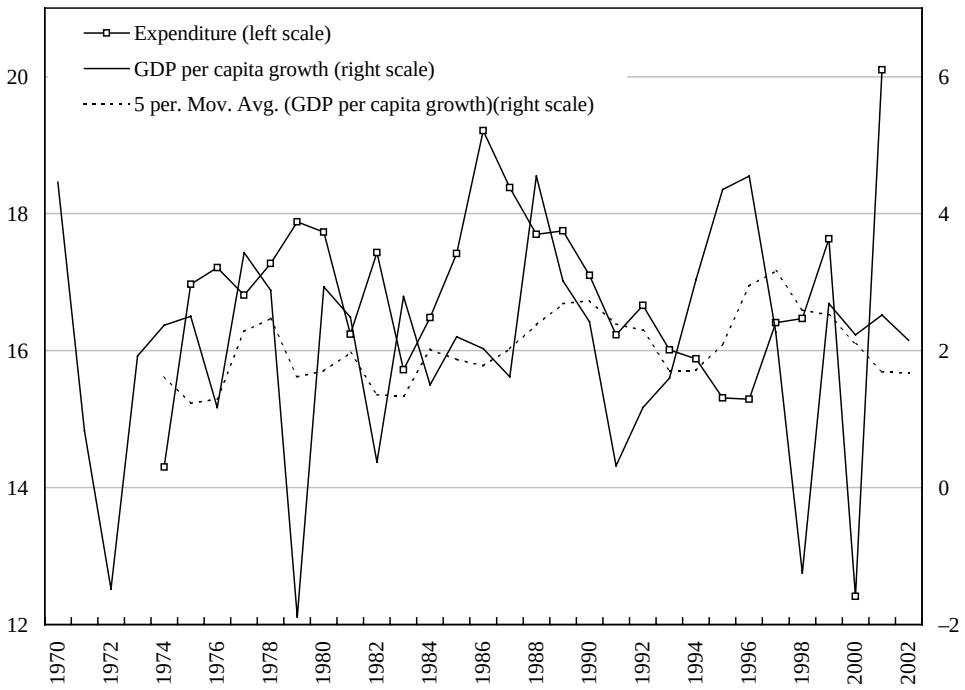


Note: X-axis - Time (recession in periods 1 and 2, growth in the remaining time span).
Source: Authors' calculation.

Figure 7

Budget Expenditures to GDP and GDP Per Capita Growth Rate in Low-income Countries

(percent)

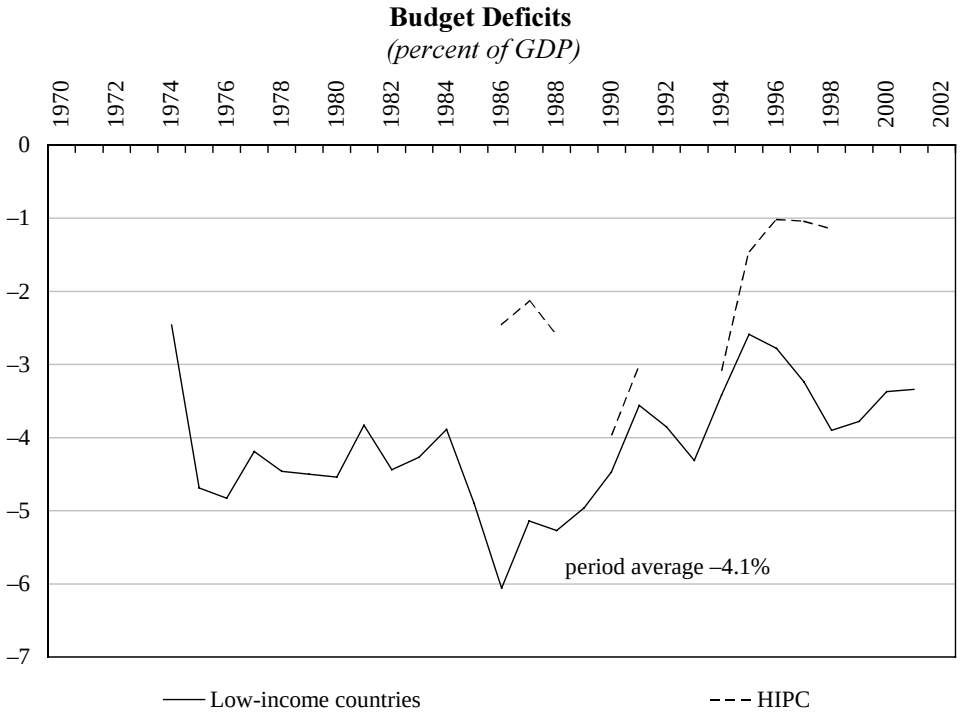


Source: World Bank.

Equations (3) to (6) describe three possible scenarios of fiscal policy during boom and a singular pattern of fiscal policy in recession. Figure 6 illustrates case 1 – a fiscal policy of zero primary balance after two years of recession. Because of interest payments on debt accumulated during the recession the cash balance will be on a deficit and debt will continue to accumulate.

It is obvious that if the government wishes to extinguish the debt accumulated during the recession period it should maintain during the boom period a primary surplus large enough to cover the debt service. However, experience shows that there is an acceleration of optimism in periods of boom. In an environment of economic growth the governments are usually pressed to spend more and even to add resources to the fixed component of expenditures and transfers – increasing wages of government employees, pensions, expenses on education and health care, the level of unemployment benefits and the like. In that case the surpluses (if any) accumulated during economic growth will be much lower than the absolute value of deficits accumulated during recession. The gap might be financed by debt issue even

Figure 8



Source: World Bank.

during boom. Optimism based on expectations for growth persistence may induce the sentiment of easy debt service.[2]

In general, when designing the fiscal policy a government may consider that allowing for a temporary increase of non-interest expenditures today it would be able to reduce their level in the future. For instance, in the future the income level will go up and the share of population in poverty will fall down or the private sector will strengthen enough to engage in the supply of some goods and services produced today by the government. The feeling of higher flexibility of spending today granted by the expectations that adjustments would be made more easily in the future may be a good excuse for resorting to debt financing.

Sometimes in periods of boom the government may even commit itself to huge contingent liabilities, which it assesses as socially and politically beneficial but less likely to be executed in the foreseeable future. Unfortunately, those

[2] Economic history provides evidence that the periods of recession are usually shorter than periods of growth (see Romer, 1996). A developing country may enjoy longer periods of high growth rates.

commitments should be fulfilled in the period of recession or economic turbulence (for instance, Argentina in 1977-82).[3]

It should be admitted that governments demonstrate an asymmetry in their preferences. They are unwilling to raise tax rates while they are willing to satisfy an expanding range of social needs even under the threat of debt accumulation and adjustment costs in the future – an example either of short-sightedness or of ill will (Dornbusch and Draghi (eds.), 1990). In the case of planned debt accumulation the commercial banks will raise the interest on government debt and on private sector lending. The latter may cause a deceleration of growth or even a recession.

We may draw the following conclusions about the fiscal policy patterns in developing countries:

- Governments are unwilling to raise tax rates; at best they may increase efforts for a better tax collection. They may expect an increase in revenues in the future, in particularly based on expectations of better economic performance. This is a reasonable argument to resort to debt financing today and promising to pay back by better tax performance in the future;
- Governments are unwilling to reduce expenditures today, but they may draw a plan for a future reduction of spending. This is another good argument in favour of debt financing. Debt might be paid back by a future reduction in spending.

The elaborated arguments are well founded if the governments finance a temporary gap between revenues and expenditures in a recession and intend to pay back the debt by the surpluses accumulated during the boom. However, as it was stated above, due to the weak institutions and misleading expectations, the volatile component of expenditures (positively correlated to growth), and the risk premium calculated in the interest on debt, future surpluses might not be enough to pay back the debt. The temporary debt financing may turn into a progressive accumulation of debt.

3. Phases in debt accumulation and the possible points of contradiction

If the government decides to run a zero primary balance in a period of economic growth while it has accumulated debt in the recession period, due to interest payments a budget deficit will still persist and will lead to further debt accumulation. The higher is the interest rate on debt, determined to a great extent by the risk premium, the higher will be the speed of debt accumulation.

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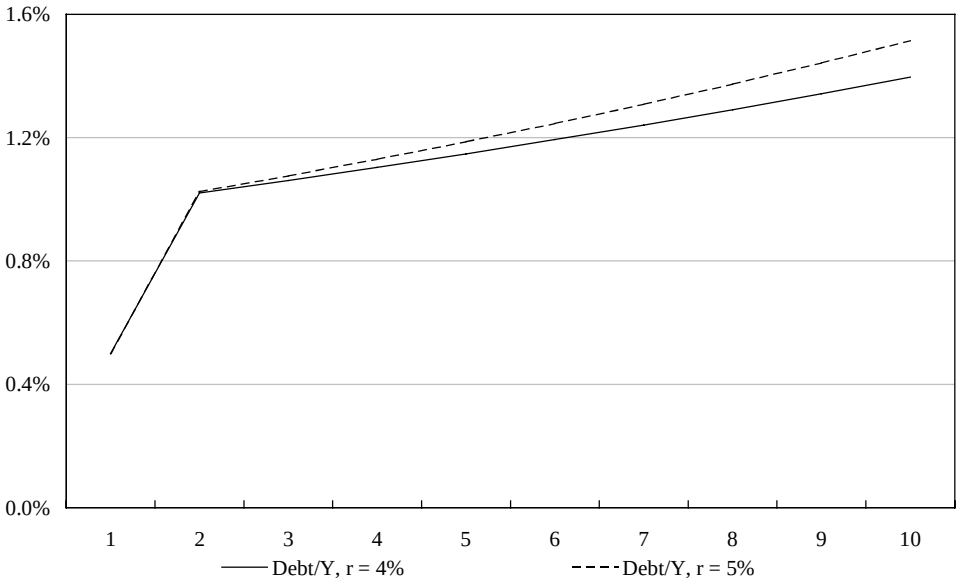
[3] See Francisco Buera, Juan Pablo Nicolini, Gerardo della Paolera and Pablo Guidotti, "On the debt management policy of Argentina: 1974-1997", January 25, 1999.
In the period 1977-82 the Argentine government opened the economy to the international capital market and imposed a deposit insurance scheme guaranteed by the government – in case of a banking crisis the liabilities of the financial sector are transformed automatically into liabilities of the central bank. In 1978 an exchange rate guarantee was introduced by the government which should have been activated in case of an exchange rate devaluation sharper that the crawling peg rate of depreciation.

Figure 9

Debt-to-GDP
(if $dY > 0$ then $g > 0$, $g = \tau$; if $dY < 0$ then $s < 0$, $g = 0$)



Note: X-axis - Time (recession in periods 1 and 2, growth in the remaining time span).
Source: Authors' calculation.

Under the conditions of low incomes, low saving rate and underdeveloped capital markets, and particularly when the government borrowing requirements are high, the domestic commercial banks might become the single buyer of government debt. In an environment of free movement of capital, the distinction between domestic and external debt becomes irrelevant and domestic commercial banks set their interest rates on government debt based on risk – rate of return considerations and arbitraging between domestic and foreign assets.[4] Securities issued by an emerging market's government compared to other domestic financial assets have the property of a relatively low risk and low cost of acquisition asset.[5] However, compared to developed countries' government debt they are risky assets. The size of the risk premium implicit in the required interest rates on developing country's

[4] In Bulgaria in case a commercial bank operates with government financial resources it is obliged to block an equal amount of government securities, which creates an additional motive for buying government securities.

[5] Lending to the private sector, especially in an environment of unstable inflation or high probability of firms' bankruptcy, often entails higher costs for projects assessment and performance monitoring and bears higher risks for the commercial bank.

government debt depends on the credibility of the economic policy commitments and implementation. In the dominant number of cases particularly incredible might be a commitment to balance the government budget as a guarantee for the future debt service. In order to float the new debt the government should offer satisfactorily high rate of return under a strong competitive pressure of other emerging economies' governments. The issue of new debt may require a rising interest rate on debt and the government may easily fall into the bad debt trap.[6]

An indebted government has to reconsider its priorities. If during the time of debt financing fiscal policy considerations were of the highest priority, from a certain point of time debt servicing wins the highest position. We may use the solution of the debt accumulation equation (2) to illustrate the possible points of contradiction between fiscal policy and debt management:

$$B(t_0) = -\int_{t_0}^{\infty} e^{-r(t-t_0)} D(t) dt \tag{7}$$

To solve the equation we have used the transversality condition:

$$\lim_{t\to\infty} e^{-r(t)} B(t) = 0 \tag{8}$$

Equation (7) is commonly applied as an indicator of debt sustainability (and fiscal policy sustainability). The intertemporal budget constraint presents a firm relation between past fiscal policies (the accumulated debt at time t_0) and future fiscal policies (the accumulated expected future primary balances). As far as there is uncertainty about the future level and sign of primary balances the requested interest rate on government debt today (the discount factor) depends on the expectations of investors about the future fiscal policy, based most probably on the track record. The discount factor (implicitly including an assessment of the risk premium) indicates the degree of adjustment in the future fiscal policy: the higher the interest rate (the risk premium) on government debt, the greater adjustment measures are necessary to be made.

We may hypothetically split the debt accumulation process into three phases: the first phase is of debt accumulation; the second is the phase of default; the third phase is the phase of debt reduction. Each phase contains its distinctive points of contradictions between debt management and fiscal policy objectives.

3.1 The first phase – a phase of debt accumulation

The first phase represents the debt accumulation process from zero to the level of B_{t0} , the B_{t0} considered by the financial markets as a sustainable debt level. It is obvious that during the period of debt accumulation fiscal objectives have a

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[6] In some cases the debt may emerge instantaneously. In developed countries it happened during wars or major economic contraction. In developing countries it appeared as an activation of contingent liabilities, bail out of state-owned or privately owned enterprises, banks or other entities.

priority – running a budget deficit is based on a number of well endorsed reasons. Debt management operations are also possible but their effectiveness will depend on the speed of approaching the sustainable level of debt.[7]

The speed of debt accumulation should be measured not by the debt growth rates, but by the behaviour of investors incorporated in the risk premium on debt. The speed of debt accumulation may be assessed as moderate if the risk premium remains stable and relatively low. It may be interpreted also in terms of expectations of future fiscal policy – expectations that the government may easily adjust the primary balance and it may keep control over the debt accumulation process maintain the risk premium at a relatively low and stable level.

Government's behaviour during boom periods is indicative for the type of fiscal policy run and its commitment to keep the debt at sustainable level. If investors detect indebted government efforts to adjust so that the interrelation between the coefficients is close to case 2 (Table 1), they may show some patience and keep the risk premium stable. If the government is able to assess rightly the sustainable debt level it may undertake the necessary fiscal adjustment so that either to keep constant the debt level or to undertake measures to reduce it in order to be able to make future debt issues at lower risk premium.

If the speed of debt accumulation is high, which means that either the level of outstanding debt approaches the sustainable level or that the sustainable level is getting lower, it may suggest that the government is losing power over its fiscal policy. If investors perceive that the indebted government follows a fiscal policy of case 1 or case 2 in a boom they may indicate their concerns by shortening the accepted maturity of government debt and raising the risk premium. Debt management operations under the conditions of fast debt growth (in terms of its distance to the sustainable level) will be inefficient and will increase the future costs of debt service. The high speed of debt accumulation narrows the scope of debt management operations and, very important, in this case the sustainable debt level will be much lower than the possible level if debt accumulated at a moderate speed.

The first phase of the debt accumulation process ends when the speed of debt accumulation goes beyond its sustainable level as it is assessed by the markets and the country very quickly approaches the default point. If the government continues with the implemented fiscal policy it enters the second phase.

3.2 The second phase – the default

Based on their expectations investors request a higher risk premium and further shorten the acceptable maturity of new issues. During this phase the financial

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[7] Debt management is a policy instrument for indebted countries. The main objective of debt management as stated in the *Guidelines for Public Debt Management* of the IMF and the World Bank (2001) is to "ensure that the government's financing needs and its payment obligations are met at the lowest possible cost over the medium to long run, consistent with a prudent degree of risk".

markets dictate the conditions on new debt issues and any debt management operation related to reducing risks will increase considerably the costs of debt service. Fiscal policy tasks may be still implemented. There is evidence that the developing countries fiscal response to debt accumulation weakens when the debt-to-GDP ratio exceeds a certain level: 50 per cent has been the average observed benchmark (Daniel, Callen, Terrones, Debrun and Allard, 2004).

However, debt accumulation accelerates further; confidence in the economic policy collapses and the government defaults on its debt since nobody at any terms is willing to buy new debt. A situation of default may appear also in the case of a sudden increase of government debt, when the liabilities are of short term duration and the government cannot allocate resources to cover the claims. In that case it is possible (not very likely because investors usually monitor the overall economic performance of emerging economies) that up to the sudden appearance of the debt interest rates have incorporated a relatively low risk premium.

If a default has been announced the government loses access to financial markets and it is forced to adjust its fiscal policy (Argentina after the default in 2001, Bulgaria in 1989). In the situation of a default negotiations with creditors acquire the highest priority while fiscal policy adjustment involves severe reductions in expenditures and perhaps increases in taxation (if it is possible at all).

3.3 The third phase – a decrease in debt

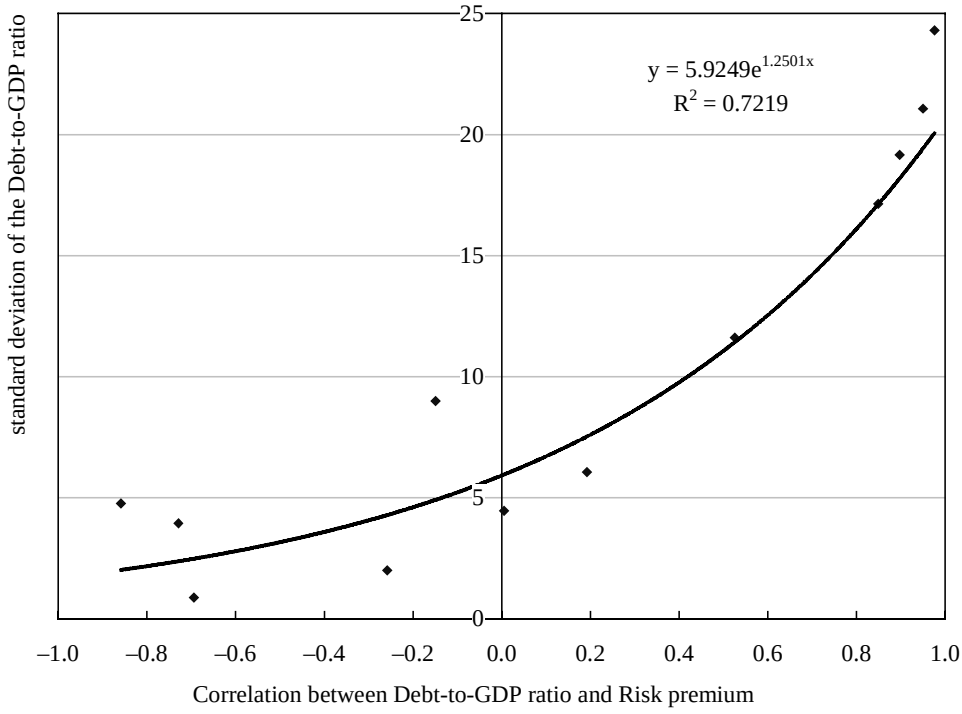
If the government makes the necessary fiscal adjustments during the first phase it means that it subordinates its fiscal tasks to the debt management objectives. The fiscal adjustments are even more severe after a default. The primary objective of the government in the third phase is to take efforts to reduce the risk premium calculated by investors in the required interest on debt. How long the government should maintain fiscal restrictions and how severe the restrictions should be is ambiguous. It depends on the track record and the efforts to rebuild confidence. Years may pass, especially if there has been a default on debt, before the risk premium start to decline. Only when the government has become able to inspire confidence in its future commitments then the risk premium on debt may switch on a decline and the government may gain from opportunities to implement debt management operations.

On the basis of a sample of twelve developing countries (Brazil, Colombia, Ecuador, Mexico, Peru, Venezuela, Philippines, South Korea, Bulgaria, Poland, Russia and Turkey) we have calculated the correlations between sovereign spreads and debt-to-GDP ratios. The correlation is close to unity for the group of countries with fast speed of debt accumulation, implying increasing interest rates when debt is growing. A temporary decline of the debt-to-GDP ratio followed by an increase do not break the vicious circle of high debt – high risk premium. The correlation is negative or missing for the group of countries that have been successful in stabilizing the debt-to-GDP ratio and lowering the speed of debt accumulation.

Based on this sample of countries we may consider that if the standard deviation of the debt-to-GDP ratio is close to or below 6 (Figure 10) the country is likely to be in the first phase. If the standard deviation is over this threshold the country could be entering the second phase. In other words, when debt dynamics is

Figure 10

Correlation Between Debt-to-GDP Ratio and Risk Premium and Debt Volatility for a Sample of Countries

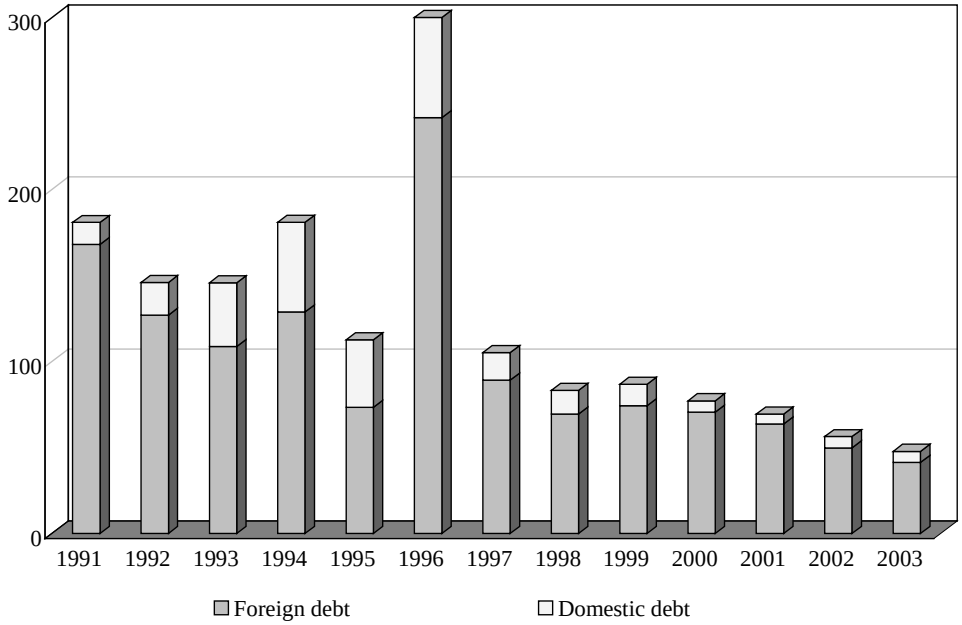


Note: Brazil, Colombia, Ecuador, Mexico, Peru, Venezuela, Philippines, South Korea, Bulgaria, Poland, Russia and Turkey.
Source: Deutsche Bank and JP Morgan.

not very volatile, presuming stabilization, debt-to-GDP ratio does not influence the risk premium. A government can lower its risk premium by stabilizing the debt-to-GDP ratio for a period sufficiently long to change the markets attitude to the country. The conclusion is that an indebted developing country has to keep tight fiscal stance until the risk premium declines to an acceptable level.

Figure 11

Domestic and Foreign Debt
(percent of GDP)



Source: Bulgarian Ministry of Finance.

4. The evolution of government debt and fiscal policy – The case of Bulgaria (1990-2003)

Shortly after the beginning of its transition to market economy Bulgaria defaulted on its foreign debt.[8] The economic collapse in the years 1990-91 reduced almost thrice the GDP measured in dollar terms, and the debt-to-GDP ratio rocketed to 180.7 per cent (the external debt comprising 90 per cent of total debt).

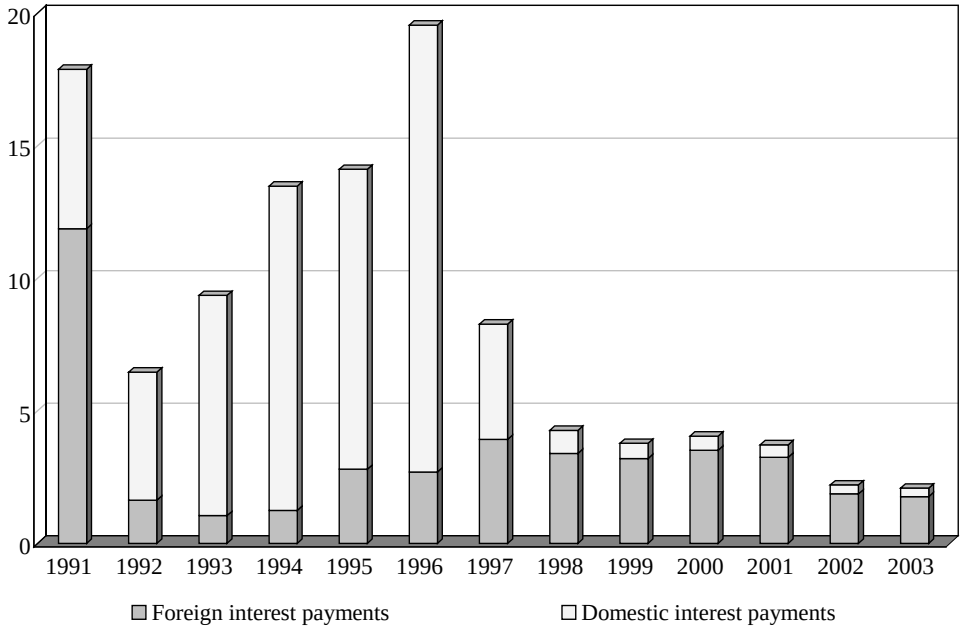
The debt negotiation process was tough and long. In 1994 Bulgaria signed an agreement with the London Club private creditors which led to the issuance of three types of Brady bonds and achieved a substantial reduction of its foreign debt.[9] There was also a series of agreements with the Paris club creditors, which ended in 1998. Negotiations about other bilateral and multilateral debts (for instance with the banks from the former Council for Mutual Economic Assistance, CMEA) continued till 2002. During this period one of the main tasks of the debt management was to sign

[8] 29 March 1990.

[9] Brady bonds with par value of USD 5.118 billion replaced liabilities of over USD 8 billion with total reduction of the debt for approximately USD 1 billion.

Figure 12

Interest Payments on Domestic and Foreign Debt
(percent of GDP)



Source: Bulgarian Ministry of Finance.

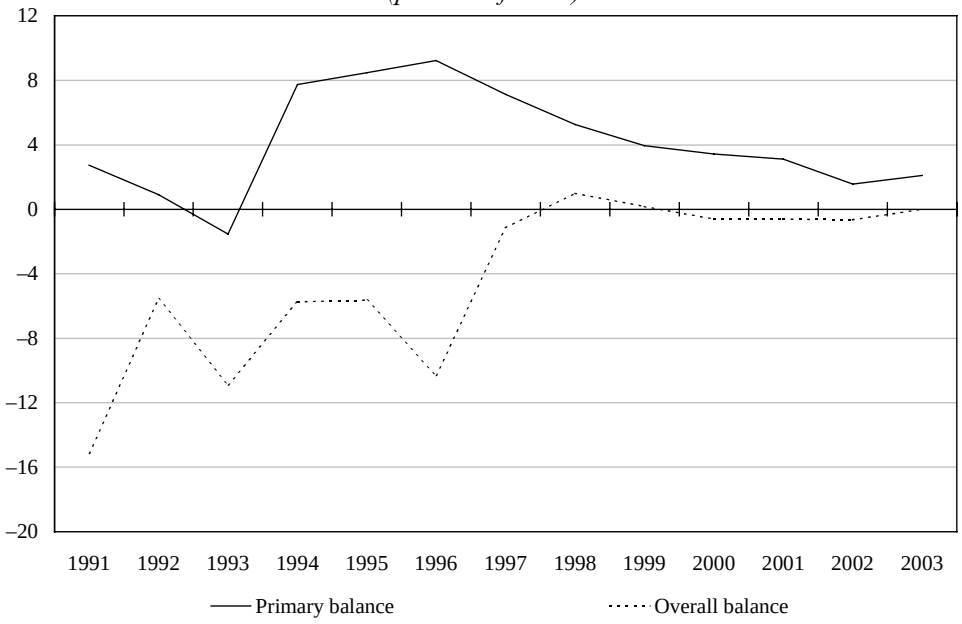
agreements on all unsettled and outstanding liabilities, so to have a clear view of the exact amount of the debt.

The introduction of the Currency Board Arrangement (CBA) in 1997 splits the period of transition into two distinctive parts – the first one before and the second one after the introduction of the CBA. In a situation of persistent economic instability during the first period, fiscal policy has been under enormous pressure to increase expenditures and to cushion the rapid decline of incomes and growing poverty. This led to rather expansionary primary surpluses, not enough to provide for the lowering of the debt-to-GDP ratio. Interest expenditures were constantly growing, to reach in 1996 the astounding 19.5 percent of GDP. The lack of real sector restructuring and the persistence of soft budget constraints produced huge disequilibria and distortions in economic policy. Monetization of growing cash budget deficits brought a steady growth in the price level and finally, to hyperinflation.

Since 1997 the fixed exchange rate under the currency board arrangement shortly installed stability in the economy. The fiscal policy is designed to support the

Figure 13

General Government Balances
(percent of GDP)



Source: Bulgarian Ministry of Finance.

currency board arrangement. The fiscal policy rule applied is to maintain the government budget close to a balance on the basis of positive primary balances.

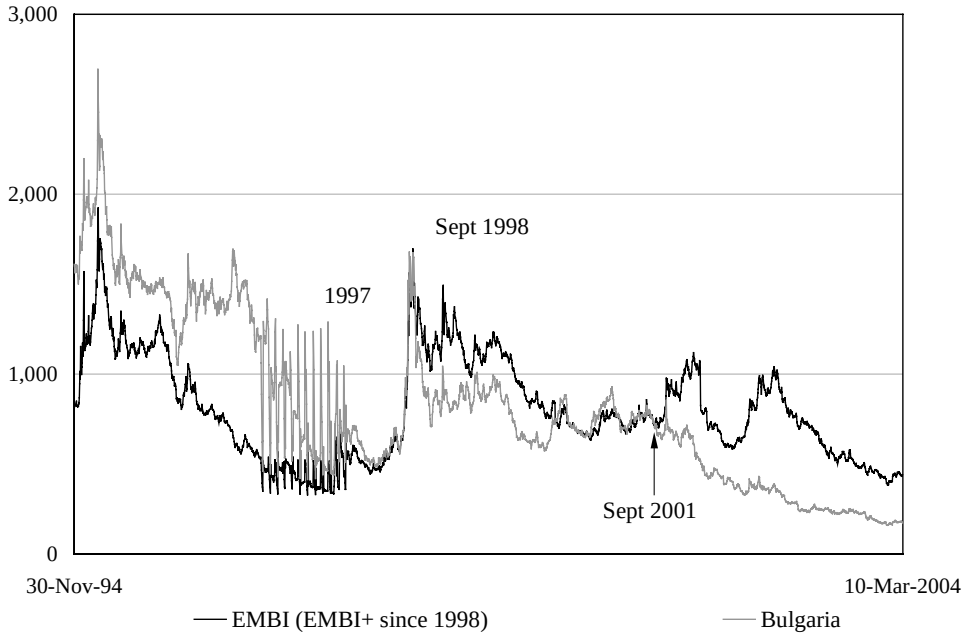
Although we have seen a constant drop in the debt-to-GDP ratio and the debt service payments ever since 1997, it took four years till the risk premium on debt started steadily to decline. Recently it is even below the average for the emerging markets. In 2002 Bulgaria for the first time performed an active debt management operation – two Brady bond swaps deals.

5. Concluding remarks

The paper tried to explain the interrelation between fiscal policy measures and the effectiveness of debt management. Emerging economies are more liable to debt financing due to weaknesses of the institutions, the high share of poverty, weakness of the private sector. An indebted country should build up the capacity for effective debt management but before getting involved in any debt operations it should assess the investors' perceptions. We recommend finding the answers to the following questions:

Figure 14

The Emerging Markets Bond Index



Source: JP Morgan.

- What is the dynamics of the government debt – rising (at what speed), stable or declining?
- What is the dynamics of the risk premium on debt – rising (at what speed), stable or declining?
- What is the dynamics of the primary balance?
- How the fiscal policy has influenced the debt and risk premium dynamics in the past?

If the answers to the stated questions reveal that the government is in the first phase of debt accumulation it should know that even if it tightens the fiscal stance and makes the necessary adjustments the debt may continue growing though at a decelerating rate. After a certain period of time the debt-to-GDP ratio may stabilize and only after that the risk premium may start to decline.

If the government is on the verge to enter the second phase of debt accumulation it has to undertake severe adjustments in its fiscal policy in order to prevent the default on debt. Again long after the debt-to-GDP ratio stabilizes the risk on government debt may remain high. Reducing the risk premium implies very tight fiscal policy for a long time.

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COMMENTS ON SESSION IV: MANAGING PUBLIC DEBT

António Afonso[*]

Introduction

The papers in this session address several aspects of government debt management. Some papers are more general and deal with theoretical developments and innovations in debt management in Europe, and with the relations between fiscal policy and debt management objectives. Other papers also study specific country realities concerning both theoretical and operational debt management issues in Australia, the Czech Republic, Italy, Japan, and Bulgaria.

Before commenting on the papers, let me first quickly illustrate the size of what debt managers are actually managing in Europe, putting the outstanding sovereign debt numbers into perspective. This is done through Figures 1 and 2 below.

All in all, one must be aware of some stylised facts for the outstanding sovereign debt at the end of 2003. First, in the EU-25 area, the main players in this segment of capital markets are Italy, Germany, with shares above 20 per cent, and France and UK, respectively with shares around 15 per cent and 10 per cent. Secondly, the ten newcomers to the EU account for just 1 per cent of the developed countries sovereign debt and for around 3 per cent of the EU-25 government debt. Thirdly, the size of the developed countries government debt (even if not including all OECD countries) is almost evenly split between the US (33.8 per cent), the EU-25 (33.8 per cent), and Japan (32.4 per cent).

Naturally, debt managers are aware of the aforementioned constraints and of its implications for their strategies, concerning namely market liquidity as a determinant of paid prices. Let me now turn to the papers that were just presented. My comments will follow their alignment in the session.

1. Debt management: theoretical developments and innovations in European practices

The paper by Wolswijk and de Haan addresses and reviews several developments in debt management, with a particular focus on the euro area countries. Briefly, the authors mention such factors as the convergence of debt

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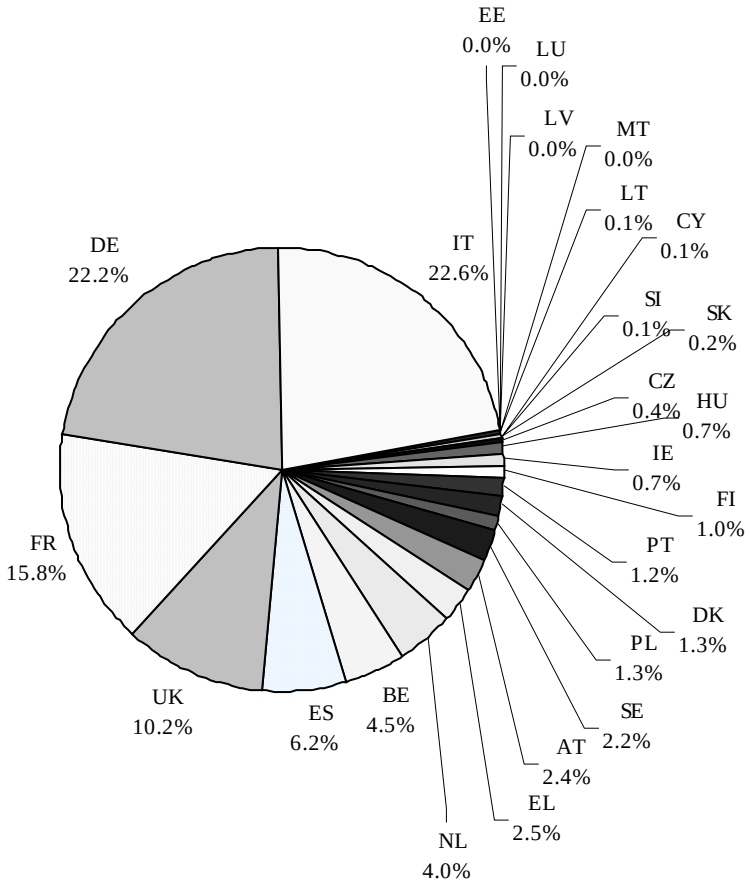
Figure 1

Breakdown of Outstanding Government Debt for the EU-25, 2003



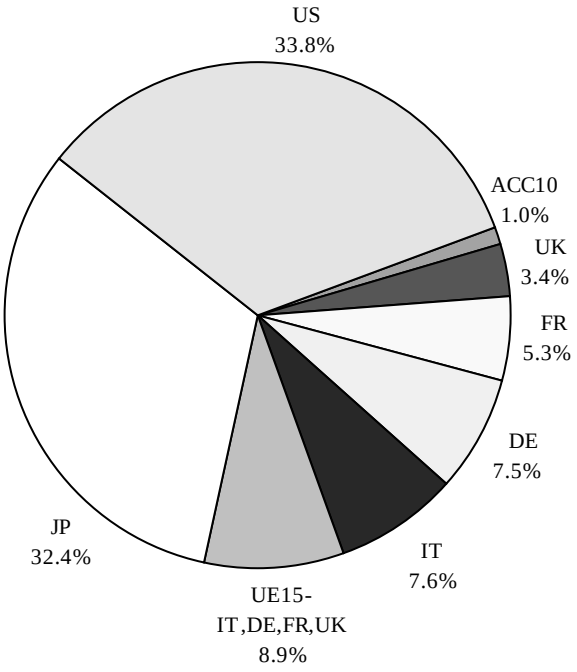
Source: AMECO database, updated on 07/01/2004.

maturity, the set up of independent debt management offices/agencies, the scarce use of non-euro denominated debt in the euro area, and the use of derivatives, namely Interest Rate Swaps (IRS).

According to the paper, the objectives of the government are macroeconomic stability and/or tax smoothing. Sometimes this is not fully in line with the objectives of debt management, in principle the minimisation of the cost of interest payments on debt, according to the government guidelines. Indeed, and as the authors point out, debt management may not be very appropriate for deficit stabilisation, and, in my opinion, need not be.

Figure 2

Breakdown of Outstanding Government Debt for the EU-25, US and JP, 2003



Source: AMECO database, updated on 07/01/2004.

Concerning debt management "independence", the paper mentions the existence in the euro area of Special debt Management Offices (SMO) in fourcountries: Austria, Germany, Ireland, and Portugal. In the remaining euro area countries, debt management is more closely related to the Ministry of Finance. On this subject, I would not go as far as the authors in saying that these "countries emphasise the role debt management can pay in public policy, e. g. regarding maintaining well-developed financial markets". This could be misinterpreted since the aforementioned SMO do play a key role in developing financial markets.

Another point that is rightly mentioned is the fact that the increase in price stability in the euro area, due namely to the strengthening of central bank independence, allowed for the lengthening of debt portfolios' maturity. This is true, even if in 2003 one may detect an increase in the share of the outstanding short-term securities in most euro area countries, eventually stemming from the attempt to lower interest payments on a growing stock of debt.

The paper also addresses the use of IRS to "correct" portfolios' maturity, even if these can not clearly be labelled as risk free operations. The use of inflation-indexed debt, used mainly by the France, and to a lesser extent by Italy and Greece (and particularly by the UK), may also contribute to a higher sensitivity of budget to inflation. The authors also find out that non-euro denominated debt is seldom used, with the exceptions of Austria and Finland, and that domestic ownership of debt in the euro area decreased between 1997 and 2002.

The paper does a good job in surveying most of the relevant topics concerning debt management. To my mind, there could be two areas for further future development. First, it would be useful to extend the analysis to the other three countries of the EU-15: the UK, Denmark, and Sweden. Some references to the US experience might be interesting as a comparison of practices. Secondly, an area that is barely touched upon is risk management, and that I feel would contribute to the enrichment of an otherwise quite interesting paper. Nevertheless, this is a topic addressed by some of the other papers in this session.

2. Debt management in a low-debt environment: Australia

The paper by Comley and Turvey reviews the institutional framework underlying debt issuance in Australia, a country where debt ratios are quite small (below 10 per cent in 2001-02) and where there is no foreign denominated debt.

This paper is interesting because, besides depicting the Australian reality also discusses the reasons why it is useful to have a sovereign debt market, even in a low debt environment. This is an issue that was actually quite discussed a few years ago when budget surpluses where being projected for the US (even if not anymore), as a result of the economic expansion during the late Nineties.[1]

According to the authors, the reasons for having the government debt market can be summarised as follows:

- sovereign debt plays the role of the risk-free asset,
- government debt is seen as a safe heaven instrument,
- provides a yield curve to the markets,
- foreign investors might not want to invest if there is no government market debt,
- the Central Bank can provide liquidity to the market through open market operations,
- contributes to develop financial markets,
- treasury bond futures are less expensive than IRS,
- the IRS market might otherwise not be viable.

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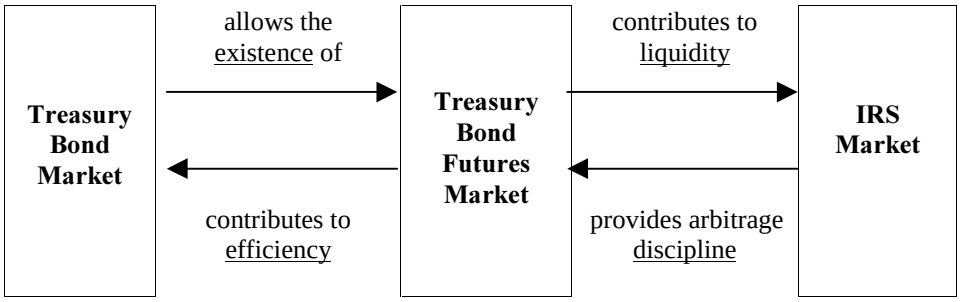
[1] See for instance the proceedings of *Declining Treasury Debt*, a conference sponsored by the Federal Reserve Bank of Cleveland, October 24-26, 2001, and subsequently published in the *Journal of Money, Credit, and Banking*, Vol. 34 (3, Part 2), August 2002.

Concerning the contribution of sovereign debt to the liquidity and efficiency of derivatives markets, the authors rightly mention that the bond market allows the existence of a Treasury bond futures market, and that this improves liquidity in the IRS market. Figure 3 sketches such links.

Figure 3

Sovereing Debt and Derivatives' Markets



Just a comment on the aforementioned reasons for having a sovereign debt market, namely in what concerns the existence of a risk-free asset, usually assumed and used in equilibrium price models such as the Capital Asset Pricing Model and the Arbitrage Price Theory. Indeed, for those models what is relevant is the existence of an asset whose returns are not correlated with the market return, provided by a chosen market index, and not necessarily a risk free asset.[2]

Interestingly, in the case of Australia, the authors report that it was finally assessed as more useful to keep the issuance of government debt since the advantages clearly seemed to overtake the associated costs.[3]

3. Debt management in the Czech Republic

The paper by Matalík and Slavík deals with debt developments in the period 1993-2003 in the Czech Republic, and the authors identify two sub-periods. In the

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[2] Indeed, what is necessary is the existence of an asset *Z*, not correlated with market portfolio, *M*, with $\sigma_{zm} = 0$, and $\sigma_Z \neq 0$, that can successfully replace the free-risk asset *F*, characterised by $\sigma_{Fm} = 0$, and $\sigma_F = 0$.

[3] For some other related literature, one may mention Bohn (2002), who also discusses the possible consequences for debt management of a low debt environment, namely in terms of risk management.

first sub-period, 1993-1998, debt ratios decreased, while in the second sub-period, 1999-2003, the debt-to-GDP ratio increased. The authors mention that "a deficit-oriented fiscal policy has been pursued since 1999". In this last sub-period, alongside high budget deficits, hidden debt was also explicitly recognised.

Debt management in the Czech Republic is directly done by the State Treasury, since the costs of setting up an independent debt management agency seem to be higher that the benefits. The Czech National Central Bank does the auctions and supports the operational work, according with the policy decisions of the government. Foreign denominated Government debt has decreasing, with its share of total outstanding government debt going from 47.7 per cent in 1993 to 9 per cent in 2003.

Again, this paper gives an interesting example of the problems that might wait ahead for the new EU Member States in the EU framework. I am mentioning the so-called "hidden" debt that can be related namely to State guarantees. Indeed, the authors mention that debt management, as in other transition economies, seems to be closed linked to the management of State guarantees.

The impact of making explicit those operations, as burden on public debt, can be illustrated in equation (1), the government budget constraint, written in nominal terms as follows:

$$(B_t - B_{t-1}) = \underbrace{(\mathrm{G_t} + i_t B_{t-1} - R_t)}_{budget\,balance} - (M_t - M_{t-1}) + Z_t \qquad (1)$$

where B is the public debt, G are the government expenditures, excluding interest payments, R are the government revenues, i is the nominal interest rate, M stands for the monetary base. Z stands for other operations impacting on the stock of debt, for instance privatisation revenues used by the government to repay existing debt, $Z < 0$, or other debt increasing operations, $Z > 0$, such as guarantees when they have to be paid and financed.

For example, in the Czech Republic, the effect of those operations is well exemplified with the deficit numbers of 2003. Indeed, after a previous reported deficit of 6.4 per cent of GDP, the number reported to the European Commission seems to be much higher, 12.9 per cent of GDP. The explanation for these developments is linked to a major one-off operation imputed to State guarantees (given between 1997 and 2003).[4]

According to the authors, other factors that may hinder the developments of fiscal policy in the Czech Republic seem to be the lack of sufficient financial management centralisation, namely the existence of off-budget spending institutions (that the government might have to bail out in the future).

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[4] See European Commission documents available on the Internet at: http://europa.eu.int/comm/economy_finance/about/activities/sgp/procedures_en.htm

4. Broadening the approach for Italian debt management

The paper by Cannata *et al.* discusses the determinants of an optimal issuance strategy, namely taking into account risk and cost considerations. The authors mention the use of such Asset and Liability Management (ALM) tools as Value at Risk (VaR), Cost at Risk (CaR), Budget at Risk (BaR), and exemplify the optimisation process to produce several possible issuance strategies.[5] As far as I can tell, some management authorities in Europe already use these techniques.[6]

In theory, sovereign portfolio management is quite related to standard private portfolio management. Indeed, in practice one would have to solve optimisation problems such as the ones in (2) and in (3) respectively for the private portfolio and for the public debt portfolio, both bounded by institutional constraints:

$$\begin{cases} Min\ \sigma_{\mathrm{p}}^2 = \sum_{i=1}^{n} x_i x_j \sigma_{ij} \\ \text{s.to} \quad \overline{\mathrm{R}}_p = \sum_{i=1}^{n} x_i \bar{R}_i \\ \qquad \sum_{\mathrm{i}=1}^{n} x_1 = 1 \\ \qquad \text{inst. constraints} \end{cases} \tag{2}$$

$$\begin{cases} Min\ \text{Costs} \\ \text{s.to}\ \ \sigma_{\mathrm{p}}^2 = \sum_{i=1}^{n} x_i x_j \sigma_{ij} \\ \qquad \text{Portfolio Duration} \\ \qquad \text{gov. risk prefer.} \\ \qquad \text{inst. constraints} \end{cases} \tag{3}$$

As a summary, some of the differences that have to be considered in managing those two types of portfolios are outlined in Table 1.

As far as I understood, debt management in Italy, as well as in several other countries, still does not fully use these ALM related tools. Perhaps this is a development that might be somehow linked to the set up of debt management offices in each country. Probably the introduction of these approaches is more likely to

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5 In practice, these are all related calculations, stemming from the VaR measure. There are several ways to compute the Value at Risk, and one can make the following classification: parametric (RiskMetrics and GARCH); non-parametric (historical simulation); and semi-parametric (extreme value theory quasi-maximum likelihood GARCH). A usual reference for the parametric VaR is J.P. Morgan (1996).

6 See, for instance, IGCP (2002), Danmarks National Bank (2003) and SNDO (2004).

Table 1

Private vs Public Debt Portfolio Management

Private portfolio manager	Sovereign debt portfolio manager
Short-time horizon	Long-term horizon
Buyer and seller	Mainly seller
Trade-off between risk and return	Trade-off between cost and risk

occur with a Special Debt Management Office, and might be less used when a debt management unit inside the Ministry of Finance implements debt management. One can see the first paper of this session for a characterisation of debt managers in the euro area.

5. Debt management in Japan

The paper by Fujii uses CaR and stochastic simulation to study future interest payments by the Japanese government on JGB. Several debt maturity scenarios are used alongside with interest rate hypothesis since the end of the Eighties. Interestingly, the results reported by the author seem to me rather in line with our general intuitions, and these simulations are always useful to confirm initial assumptions.

In a nutshell, the paper reports that short portfolios are riskier in terms of CaR, since the refixing ratio raises quickly above 30 per cent. On the other hand, CaR also becomes larger as the simulation period increases. The author then concludes that long-term JGB, with 20 and 30 years maturities, should then be issued.

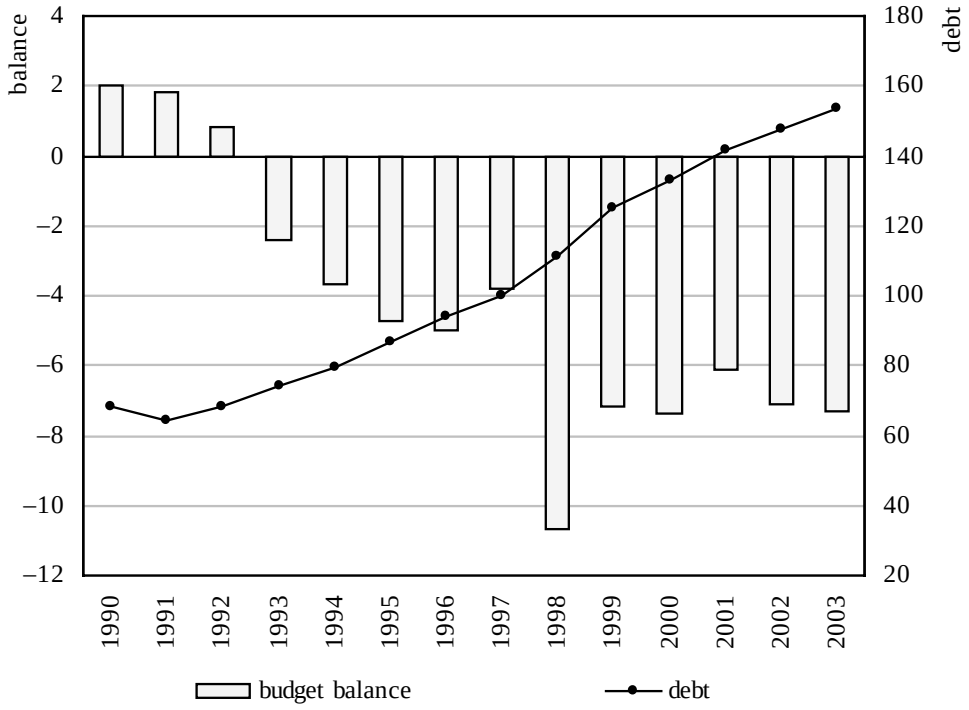
This paper also provides interesting information concerning the holders of outstanding government debt, and we learn that in the end of 2003 the public sector and the Central Bank held 42.5 and 15 per cent respectively. This seems to mean that the Japanese Central Bank, besides having to monitor short-term interest rates and having to deal with inflation, also has an additional restriction: finance government deficits. This point links nicely with the next paper in the session.

6. The monetization of Japan's government debt

The paper by Lebow deals with the monetary and price implications of increasing government debt in Japan. The author uses the consolidated government and Central Bank balances sheets to determine the "appropriate" concept of government debt. Taking into account the general government financial assets, to

Figure 4

Public Finances in Japan
(percent of GDP)



Source: European Economy, Autumn 2003.

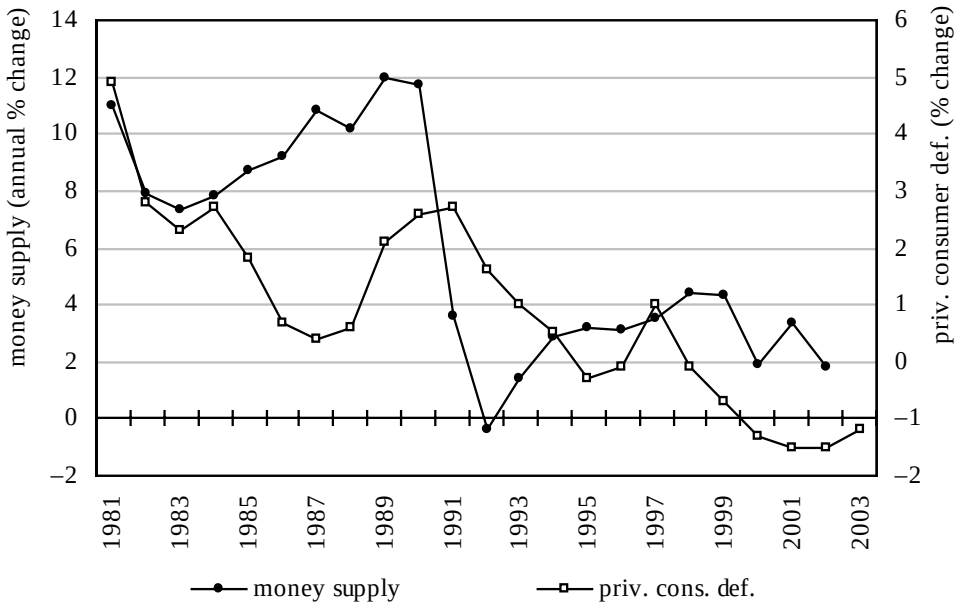
compute the net debt, and the Bank of Japan net worth, a consolidated net debt-to-GDP ratio of 56.8 per cent is reported for 2003. This is a strikingly different number from the gross debt-to-GDP ratio of 154.6 per cent in 2003 (see Figure 4), and highlights the fact, has seen in the previous paper, that the public sector in Japan does hold a significant amount of government debt in its portfolio.

Moreover, with monetary base in the government and Central Bank consolidated budget constraint, the author envisages a substantial increase in nominal GDP and in the price level to reduce the real value of debt. This sounds familiar, and closely linked to the Fiscal Theory of the Price Level (FTPL), with the price level adjusting to the stock of government debt.[7] I have a few comments that I would like to add to the discussion. First, it is true that since the Nineties there is a

[7] For a critical review of the FTPL, see Buiter (2002).

Figure 5

Money Supply and Inflation in Japan



Source: European Economy, Autumn 2003.

lack of a durable relationship between money and inflation in developed countries, leading to a progressive abandon of monetary aggregates as an intermediate objective of monetary policy.[8] Nevertheless, in Japan money supply growth rates and inflation did decrease in parallel in most of the Nineties (see Figure 5).

Secondly, the quantity theory of money, which is put at stake by the FTPL, links money supply and price level.[9] However, the link addressed by the FTPL, through the intertemporal consolidated government budget constraint, runs through the monetary base, not via the money supply. Thirdly, the reduction of the real value of debt would lead to a demand for higher coupon rates, and this is certainly an offsetting outcome of the benefit of reducing the real value of outstanding debt. Finally, shouldn't one rather concentrate on curbing budget deficits, which is surely the best way to reduce high government debt levels?

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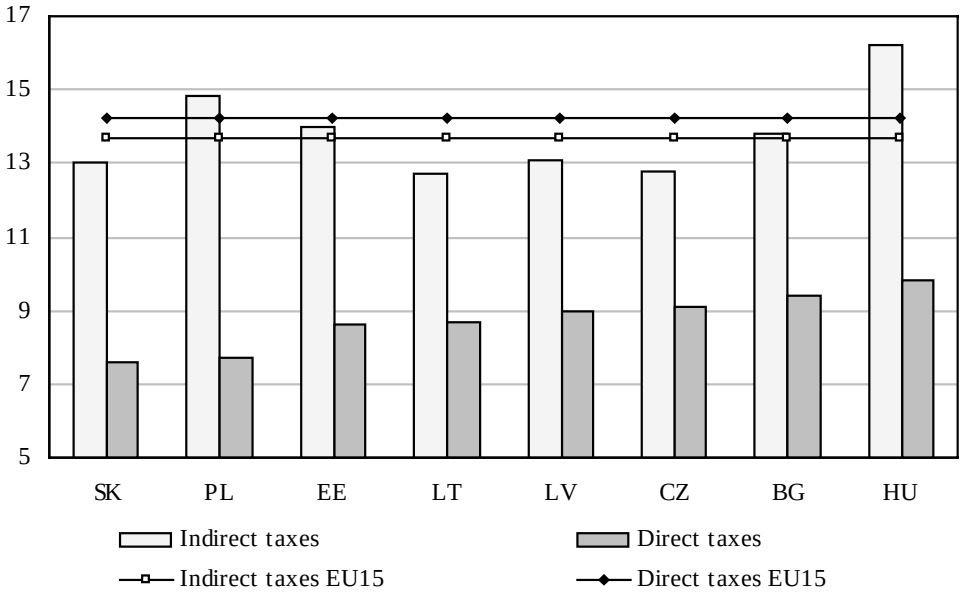
[8] This point is made by Romer (2000): "(…) most central banks, including the U.S. Federal Reserve, now play little attention to monetary aggregates in conducting policy."

[9] One may want to recall the classic reference for the identity of the quantitative theory of money, which can be presented as $M/P = ky$. k (k=1/v) is the proportionality factor used by Pigou (1917), and M is nominal money, P is the price level, y is real income and v stands for the income-velocity of money.

Figure 6

Tax-to-GDP Ratios, 2000
(percent of GDP)



Source: European Economy, Autumn 2003.

7. Possible points of contradiction between fiscal policy and debt management objectives

The paper by Nenova and Kaloyanchev discusses debt accumulation patterns and reports on debt developments in Bulgaria in the period 1990-2003. It seems interesting to see how the new EU Member States compare in terms of financing resources *vis-à-vis* the other EU countries, namely in terms of tax revenues, and if indeed debt financing would be more appropriate or not. In Figure 6 it is possible to notice that in Bulgaria, as in several acceding countries, direct taxes were in 2000 below the EU-15 average. However, this is not the case for indirect taxes.

On the other hand, expenditure-to-GDP ratios in the new Member States are much more in line with the EU-15 average. This might be particularly critical for countries where debt ratios can be subject to some volatility and where those ratios are on an upward path. Moreover, the fact that the differences between the new Member States and the other EU countries is smaller in terms of indirect taxes-to-GDP ratios, does not help the idea of relying more on taxes than on debt to finance the deficits.

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COMMENTS ON SESSION IV: MANAGING PUBLIC DEBT

Yngve Lindh[*]

The papers in session IV give a broad overview of aspects and experiences of debt management under very different circumstances. It is possible to single out at least four different "regimes":

- debt management in an advanced economy with very low debt. Comley and Turvey describe the case of Australia,
- the effect on debt management resulting from the introduction of the euro. Wolswijk and De Haan give an overview and the Italian case is described in Cannata, Scalera, Iacovoni and Turco,
- different aspects of debt management in European transition economies are analyzed. Matalík and Slavík present the Czech case, and Nenova and Kaloyanchev the Bulgarian case,
- two papers are related to the high-debt situation in Japan: the effects on future inflation are tackled in the paper by Lebov and the debt management issues in Fujii's paper.

I find the paper by Comley and Turvey of great interest, in particular the analysis of the importance of Government Securities for the efficiency of the Australian financial markets.

From a European perspective, this issue could at a first glance be seen as irrelevant. In most EU countries gross debt is high and need to be reduced substantially in the future. However, when discussing the EU fiscal policy framework, the analysis of the Australian low debt case is a valuable input. In their introductory note to this conference, Balassone, Franco and Zotteri point out that the fiscal target in SGP, "close to balance or in surplus", for many countries would lead to debt ratios converging towards zero or even to negative ratios. This raises exactly the questions Comley and Turvey dwell on in their discussion of Australian conditions. There is a need for some minimum level of debt for the efficiency of the financial market. When reforming the EU fiscal framework, this should be taken into account.

Wolswijk and de Haan's paper is a comprehensive survey on different issues connected to debt management, such as objectives, organization, debt maturity, macroeconomic stabilization, tax smoothing and deficit stabilization.

To use debt management as stabilization policy tool seems, as the authors also mention, not a particularly good idea. Some active stabilization measures could be needed for a single country in the currency union, at least when the economy is

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[*] Ministry of Finance, Sweden. The views expressed here are only the author's.

threatened of severe asymmetric disequilibria and there is no national monetary policy at hand. However, in that case, more simple, transparent and efficient tools would be a better choice. One such tool is temporary changes in the value-added tax.

The discussion on pros and cons of the use of *indexed-linked bonds* (ILB) is interesting. Investors do not need to be compensated for inflation uncertainty and thus require a lower interest, especially so if this gain is larger than the liquidity premium. This cost-saving can be substantial in situations when a recently set inflation target is not fully credible and investors have higher inflation expectations compared to the target.

This type of cost-saving was substantial in Sweden in the middle of the Nineties, when index-linked bonds were introduced by the Swedish National Debt Office in 1994, two years after the current inflation target was introduced. In 2002 index-linked bonds constituted 8 per cent of the outstanding government debt.[1]

The credibility of low inflation is currently high in most industrialized countries so the cost argument is now weaker. In such an environment there is little reason to expect index-linked debt on average to differ much from nominal debt. It is rather the diversification effect that motivates the inclusion of this type of bonds in the portfolio since an important task for the Debt Authority should be to improve the functioning of the market. In recent guidelines, the Swedish Government instructs the National Debt Office to increase the share of ILB. Also Cannata *et al.* see ILB as a crucial tool for security diversification under changing macroeconomic condition. But I recognize that the argument goes the other way around in Australia, a country with a very low debt.

If we believe that ILB gives enhanced credibility for low inflation, it could potentially be a valuable instrument to use in a country belonging to a currency union with its possible moral hazard problem for national fiscal policies, see for instance Beetsma (2001). It could, at least in theory, be a complement to the European Union's fiscal framework and hamper inflation pressure. However, if this would be an important mechanism remains to be seen and is an empirical question.

Matalík and Slavík discuss the interaction and the institutional arrangements of fiscal and monetary policies and debt management policy. The authors claim that, in economies with less developed financial markets, a consistent coordination of policies is required.

The Czech Republic is an example of an economy that has reached a high stage of development after the transformation. In their interesting paper, Matalík and Slavík describe the coordination of fiscal, monetary and debt policies in such an economy as "realization credibility". That means practical coordination of activities that is accompanied by prudent fiscal discipline. But also that "the central bank is

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[1] IMF and the World Bank (2002).

only to push forward such a monetary policy that is transparent and accepted by the government and the public".[2] The latter is a bit confusing.

It should be made clear what is meant by coordination between policy areas. The authors claim that the basic aim for policies is to reach a long-term balanced economic growth. The development in the last decade in many countries is, for the reason to improve economic performance, to separate monetary and fiscal policies by giving monetary full independence in decision-making. Sometimes the expression *passive coordination* is used, which means that the different policy agents are aware of each other's forecasts and policy framework in a transparent way so that each agent can learn from the other agents' "reaction function". I believe it is important to make clear that the type of coordination the authors refer to is more of a technical nature (described in their paper at p. 843) It is for instance the central banks surveillance of that debt instrument issuances is in line with possibilities for efficient monetary policy.

Nenova and Kaloyanchev discuss four phases in relation to the debt situation transition economies go through and how this development affects fiscal policy in a more and less restrictive way. This discussion is illustrative.

The authors claim early that the task for fiscal policy is to raise revenues to cover expenditures. Normally, as it is described in the literature, the tasks are known to be allocation (efficiency for growth), stabilization (of the cycle) and distribution of income and wealth.

Actually, the paper touches on all these three aspects of fiscal policy. For instance, the authors discuss the problem for the authorities in Bulgaria to carry out appropriate stabilization policies because of the lack of credibility when debt and risk-premium are high (pro-cyclical policies). That is also the implication of the model analyses in section 3 of their paper. In this analysis, the well-known asymmetric feature of fiscal policy, laxity in good times, is described.

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[2] Matalík and Slavík, section 1.

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COMMENTS ON SESSION IV: MANAGING PUBLIC DEBT

Ranjana Madhusudhan[*]

This was a great session and I found the papers very educational and stimulating. Five of the papers included in the session are country studies and the remaining two papers examine theoretical developments in debt management policies and identify possible points of contradiction between fiscal policy and debt management objectives. The country studies include interesting cases spanning across the spectrum of young transitional (Czech Republic) and mature market (Australia, Italy and Japan) economies, reflecting differences in underlying debt dynamics. I commend all the authors for their thought provoking analysis. My comments will focus primarily on the country studies with examples from the United States and the state of New Jersey. Despite differences, the US experience with public debt management policies, particularly, at the state level may be quite revealing for the countries under consideration.

Wolswijk's survey paper sets the stage for the analysis of individual country studies. I will begin with Cannata *et al.*'s paper on Italy, which outlines a sophisticated approach for stochastic optimal portfolio selection in a post euro environment and presents a model for primary budget balance forecasting. The authors point out that the objective of debt managers is to minimize some measure of expected financing cost in the long run while keeping risks under control, recognizing cost/risk trade-off. The paper highlights the large number of random forces entering the debt official's decision making process rendering optimal debt management a very complex task. The model introduces a useful framework relating to stochastic behavior, however, the long-term horizon facing public debt managers makes their job more challenging. The paper suggests that even though debt managers would look at all the models but ultimately a lot depends on their experience and good judgment!

In the papers on Australia and Japan, two distinct approaches to public debt management policies are outlined. Lebow discusses the monetization of Japanese government debt and raises questions relating to long-term sustainability, particularly, if the macroeconomic fundamentals deteriorate. According to Standard & Poor,[1] a rating agency, Japan is expected to face the world's largest debt burden of 700+ per cent of projected GDP by 2050, reflecting its generous pension promises, the longest life expectancy and one of the lowest fertility rates in the industrialized world. It is interesting to note the home country bias of the Japanese debt structure and the historically low rates of interest.

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[*] New Jersey Department of Treasury.
The views expressed are those of the author and do not necessarily represent the views of the New Jersey Department of Treasury.

[1] See the *Financial Times*'article dated 4/1/04.

The paper by Fujii, the second on Japan, highlights the possible threats to the Japanese economy when interest rates rise. Fujii examines policy implications based on simulation results using stochastic modeling of the interest rate within a Cost-at-Risk concept. Monte Carlo simulations are conducted to analyze the issue of choice among different maturity structures as an issuing strategy to study underlying risks associated with refinancing when interest rate environment changes. The results show that risks increase under relatively short portfolio strategies. Fujii suggests moving in the direction of financial instruments with greater long-term maturity and recommends that the respective authorities take into account underlying market conditions and trends before developing the issuance plans. The importance of maintaining stable macroeconomic policies to ensure the success of risk management strategies is also emphasized in the paper.

Comley and Turvey's paper examines issues and options with debt management policies in a low debt environment that Australia is experiencing. In contrast to Japan's high debt situation, Australian debt management measures have been driven by the need to adjust to declining levels of net debt, which resulted in a fundamental review of the country's debt management operations. Supporting financial market efficiency and achieving an appropriate balance of cost and risk for the government are the two primary public debt management policy objectives to be attained through physical bond issuance and financial derivatives (or interest rate swaps), respectively. The paper emphasizes the importance of the Treasury futures market and the role of swap market and outlines the new portfolio benchmark, hedging options and liquidity. The futures market is to be supported via issuance targets. The new debt management framework is outlined in a transparent and explicit manner; however, we need to wait through a few budget cycles before evaluating its success.

Matalík and Slavík's paper presents a detailed analysis of the evolution of debt management policies in the Czech Republic and highlights issues unique to transitional economies that are undergoing economic transformation from a centrally planned economy to a modern market-oriented one. Issues surrounding the financing of hidden government debt and privatization revenues are cases in point. The intensive cooperation and coordination between the Ministry of Finance and the Czech National Bank (CNB) is enumerated in detail. It is interesting to note that although the debt strategy is the primary responsibility of the Ministry of Finance, the CNB plays a significant role in the country's public debt management, reflecting a solid form of fiscal and monetary policy coordination in the Czech Republic. Several good debt management operations are outlined relating to: the development of the domestic financial and capital market infrastructure and its liquidity; decreasing the refinancing and interest risks; broadening of the investor base; increasing participation in the foreign capital market through the issuance of euro denominated bonds; and undertaking buy-backs through the new reversed issues of government bonds to lower refinancing risk. Since the innovations and reforms in debt management strategies are fairly recent it will be a while before a progress report is possible.

Nenova and Kaloyanchev's paper examines the effect of contradiction between fiscal policy and debt management objectives. The paper highlights how inconsistencies in a country's macroeconomic policies undermine the credibility and the consequence is a high risk premium on government debt. In emerging market economies there is strong pressure on the government to spend more than their revenues. The situation is exacerbated due to low income and low level of savings and rampant tax evasion. Debt financing and management in emerging market economies have the potential to be effective only under the conditions of a slow rate of debt accumulation and stable risk premium or in the period of risk premium deceleration.

In general all the papers presented in the Public Finance Workshop, and in Session IV in particular, indicate the seriousness of the public debt crisis facing the EU and other industrialized countries. Sound public debt management policies are called for to avoid severe adverse consequences from the rapidly growing budget imbalances. Public debt management issues and options highlighted have a lot in common in the four countries included in this session as well as US. However, there are some interesting differences as well. Let me briefly summarize the US case to illustrate the underlying similarities and differences in public debt policies across country lines.

In 2003, public debt in the US totalled $6.7 trillion, up 8.7 per cent on a year-over-year basis and accounted for 61 per cent of GDP. However, the percent of net public debt, which excludes intragovernmental debt, accounted for around 36 per cent of GDP for all of last year and had a growth rate close to 10 per cent on a year-over-year basis. The distribution of total public debt by major type of holders was: total privately held (47.9 per cent), Federal Reserve (9.7 per cent) and total intragovernmental (42.4 per cent). For fiscal year 2003, long-term debt outstanding for the state of New Jersey was $18.8 billion representing an increase of 9 per cent over a year ago and the bulk (85+ per cent) comprising of bonded debt categories including general obligation bonds, revenue bonds and installment obligations.[2]

In the US, the debt crisis is exacerbated due to entitlements such as on Medicare, which generate uncontrollable costs both at the federal and state levels. Similar experiences, particularly, relating to pension expenditures were indicated in the country studies (e.g., Japan). Over two-fifths of total debt in 2003 was in the intra governmental category due to mandates requiring investments in government account series.

Over the last ten years, the share of privately held debt in total public debt went down from 67 in 1994 to 48 per cent in 2003. The paper by Comley and Turvey presented the Australian experience with declining share of net debt. As the federal budget moved from deficit to surplus, the government's bond position improved, enabling a reduction in the privately held debt in the US. For instance,

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[2] Refer to New Jersey's Comprehensive Financial Report for the fiscal year ending June 30, 2003 for a discussion of New Jersey's debt categories and other info.

when the Social Security Trust fund runs a surplus, the government buys back debt from the public, lowering the share of privately held debt in the US. With its buy back operations, the Treasury has maintained liquidity in the financial markets and reduced the cost of public borrowing. The paper on the Czech Republic had a discussion of similar buy-back options through the reversed issues of government bonds.

In the US, public debt is primarily a function of the budget. The US Treasury Department decides on how much and what type of debt to issue, including length of maturity. The Federal Reserve Bank (or the central bank) plays the role of a fiscal agent and has no significant direct participation in public debt management in the US. Browsing through the country studies I get the impression that even though the central banks engage in standard monetary policy activities, these agencies appear to play a more active role in public debt management policies in these countries. In contrast, public debt management in the US is the primary responsibility of the Treasury Department.

Another difference I noted relates to public debt management goals, particularly, those relating to managing interest risks and associated cost management. The federal government in the US focuses primarily on maintaining liquidity and efficiency in the financial market than maintaining interest rate costs through interest rate swap activities. The Australian paper illustrates this point.

However, it is important to note that public debt management strategies discussed in the papers have more in common with such polices at the US state level. New Jersey for instance, entered into eleven swap agreements during April and May 2003 in association with $3 billion of future bond transactions involving the New Jersey Economic Development Authority's School Construction Program.[3] The swap agreements enable the state to take advantage of the existing historically low fixed interest rates on future debt thereby limiting its interest rate exposure.

One of the major goals of debt management at the state level in the US is to maintain the investment grade of both long- and short-term credit rating of the state and its bond issuing authorities. New Jersey attempts to control the issuance of new general obligation debt by the amount of general obligation debt retirement. The distribution of the debt portfolio is managed by effectively trying to balance the mix of pay-as-you-go appropriations with bonded debt. Another important debt management strategy relates to balancing the implementation of capital improvements with the need to minimize debt.

Other differences relate to the type and length of maturity of public debt. The country studies suggest a preference for relatively long term debt (Australia, Japan, and Czech Republic) whereas in the US issuances with shorter maturities account for a substantial share of total debt. For instance, Treasury bills (under 1 year) and Treasury notes (1-10 years) accounted for over two-fifths of total public held debt in 2003. The US also stopped issuing the 30-year bonds in October of 2001. Also,

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[3] See the New Jersey CAFR report for FY2003.

inflation indexed notes and bonds account for a very small share, under 3 per cent, of total public debt in 2003.

Another noticeable difference in the debt portfolio among these countries is the relatively large share of debt held by foreign investors, reflecting the attractiveness of US debt instruments. Foreign debt accounted for 21 per cent of total public debt in 2003 and constitutes the single largest component of total privately held debt in the US. Also, its share has been growing steadily and increased substantially from 14.3 per cent of total public debt in 1994. In contrast, this category accounts for a very small percentage of total public debt in the rest of the countries. Some of the country studies did indicate this limitation and have plans to become more active with foreign capital markets.

In conclusion I would like to reflect that fiscal imbalance is a serious problem worldwide and developing optimal debt management strategies is very crucial for sound public finances. Developing efficient capital markets, maintaining sound economic fundamentals through stable macroeconomic policies, issuance of a diversified and flexible debt portfolio along with fiscal discipline, all point in the right direction. The policy makers need to recognize underlying policy trade offs and should strive to adopt transparent debt management rules to build voter confidence. In the US fiscal discipline is superimposed, particularly, at the sub-national level since people vote with their feet as there is free mobility across state lines. Fiscal discipline is likely to become more effective as the degree of mobility improves among EU member countries.

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