RIKSGÄLDS KONTORET
THE SWEDISH NATIONAL DEBT OFFICE

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# Central Government Debt Management
# - Proposed Guidelines

# Central government debt management – Proposed guidelines

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# Summary

In this memorandum, the Swedish National Debt Office submits to the Government its proposed guidelines for the management of central government debt. The proposal is based on the legally mandated goal of government debt management, which is to minimise long-term costs while taking into account the risks inherent in such management and the constraints imposed by monetary policy. The main points in the proposal are:

- The benchmark for amortisation of *foreign currency debt* during 2002 should be SEK 25 billion. The Debt Office should be allowed to deviate from the pace of amortisation stated in the Government's decision by SEK –25 billion and SEK +10 billion, respectively. The benchmark for amortisation in 2003 and 2004 should be stated as SEK 35 billion.

- The share of *inflation-linked loans* in the total central government debt should increase in the long term. Inflation-linked borrowing should be weighed against the growth in demand for inflation-linked bonds and the borrowing costs of other types of debt, with due consideration to risk.

- The remainder of the central government's gross borrowing requirement should be covered by *nominal krona-denominated loans*.

- The *maturity* (measured as duration) of total nominal krona and foreign currency debt should be kept unchanged at 2.7 (±0.3) years. Inflation-linked borrowing should occur in long maturities.

The proposed benchmark for amortisations of foreign currency debt corresponds to the guideline decision now in force, but it is SEK 10 billion lower than the long-term strategy that the Government stated last year. The reason is that for some time, the krona has been extremely weak, which makes it expensive to amortise foreign currency debt. Given the krona exchange rates noted in recent months, it may be justified during a short or long period to refrain from amortisations. However, in the Debt Office's judgement, it would be inappropriate to lower the benchmark further for this reason. If the krona strengthens to more normal levels, an extra Government decision might be required in order to adjust amortisations. Keeping the existing benchmark also underscores the long-term ambition of reducing foreign currency debt.

A more appropriate adjustment to the extreme conditions prevailing in the foreign exchange market is to expand the flexibility of the guidelines, mainly downward. Given a benchmark of SEK 25 billion, an interval of SEK –25 billion and SEK +10 billion, respectively, will enable the Debt Office to refrain from amortising foreign currency debt if the krona remains weak. The upper limit of the interval is equivalent to the long-term strategy of SEK 35 billion per year.

The Debt Office's proposal to increase the share of inflation-linked debt in the long term corresponds to the guidelines now in force. This memorandum contains an in-depth analysis of how costs and risks are affected by including inflation-linked loans in central government debt. Qualitative reasons indicate that it is possible to lower risks by supplementing central government debt, which is mainly nominal, with inflation-linked loans. In quantitative analyses, the dominant result is that the differences between inflation-linked and nominal loans are small.

The Debt Office's conclusion is that an increased share of inflation-linked loans would diminish the risks in central government debt. In the Debt Office's judgement, there is also potential for developing the inflation-linked bond market in such a way that the government's costs for utilising its risk-related advantages can be kept low, but this work may take time. For this reason, no quantitative specification of the guidelines should be made. The issuance of inflation-linked loans should be weighed against the borrowing costs of other types of debt, with due consideration to risk, as part of the long-term goal of increasing the share of inflation-linked loans.

As for the maturity of nominal krona and foreign currency debt, the Debt Office proposes no changes. However, it proposes a minor adjustment in the maturity guidelines for inflation-linked borrowing. The Debt Office proposes that the concept of *long-term maturity* be interpreted as meaning longer than five years on the issue date instead of the current interpretation that most inflation-linked borrowing should have a maturity of at least ten years.

Aside from its regular guideline proposal, the Debt Office discusses the handling of its exchanges between kronor and foreign currencies. The existing system is not adapted to the Debt Office's task of handling foreign currency debt amortisation more actively and weighing in the value of the krona in order to minimise costs, since the Riksbank makes its exchanges in the market at a mechanically uniform pace to avoid confusion with its monetary and currency policy-related transactions. This exchange technique also makes it necessary for the Debt Office to announce all changes in planned amortisations in advance, even when this is not appropriate from a government debt policy standpoint. Amortisations and interest payments on central government debt are the only government payments in foreign currencies administered in this way. A number of government agencies with large foreign currency transactions – for example the National Pension Funds, Swedish International Development Co-operation Agency and Swedish Defence Material Administration – make foreign currency payments via ordinary banks.

The Debt Office notes that the Riksbank has not expressed the judgement that a solution in which the Debt Office also bypasses the Riksbank when exchanging currencies would go against monetary policy constraints in a flexible exchange rate regime. Based on the facts presented to date, there is thus no reason to handle currency exchanges in any other way than what seems appropriate based on the task of minimising costs. This favours a more flexible solution than the current one.

In light of this, the Debt Office proposes that the currency exchange rules in its instruction be amended to allow it to select counterparties other than the Riksbank. The Debt Office outlines a solution that will ensure predictability and transparency concerning the scale and aim of its currency exchanges, while adapting the methods of administering and announcing these exchanges to the goals of government debt policy. The purpose is to enable the Debt Office to use the pace of its currency exchanges as a means of lowering the costs of government debt.

# 1 Introduction

In this memorandum, the Swedish National Debt Office presents its proposed overall guidelines for the management of central government debt, as provided by the instruction for the Debt Office (1996:311). This proposal is based on the goal formulated in Article 5 of the Act (1988:1387) on State Borrowing and Debt Management. This says that central government debt shall be managed in such a way as to minimise the long-term cost of the debt while taking management risk into account, and that management shall occur within the constraints imposed by monetary policy. The analytical work that underlies this year's proposal has focused on the effects of inflation-linked bonds on costs and risks.

The memorandum is organised as follows. In Section 2, the Debt Office discusses the points of departure for the proposal in light of the analyses and Government decisions of prior years. Section 3 deals with the effect of inflation-linked bonds on costs and risks in qualitative terms. In Section 4, the Debt Office presents quantitative analyses of how costs and risks are influenced by the structure of the debt, with an emphasis on the effects of inflation-linked bonds. Section 5 discusses practical conditions for developing the inflation-linked bond market. The Debt Office presents its proposed guidelines in Section 6. At the end of the memorandum, the Debt Office raises evaluation issues related to the proposals it has presented.

# 2 Points of departure for the proposed guidelines

## 2.1 Introduction

Since 1998, the Swedish National Debt Office has submitted to the Government three sets of proposed guidelines for the management of central government debt. Both the perspective on the goal of minimising cost while taking risk into account and the analysis of government debt structure have gradually changed. As the point of departure for the year's proposed guidelines, the Debt Office will summarise the conclusions from these analyses and the decisions made by the Government.

## 2.2 Cost and risk measures

According to the Act on State Borrowing and Debt Management, the goal of government debt management is to minimise long-term costs while taking risk into account. The preliminary point of departure in the Government bill was that costs and risks should be measured in nominal terms while awaiting an in-depth analysis of how a real-term measure of costs and risks should be formulated. How costs and risks should be interpreted has subsequently received considerable attention in the proposed guidelines and in Government guideline decisions. In its November 2000 guidelines, the Government presented the following assessment (p. 9):

> In a consideration of the structure of central government debt and its maturity, the costs should be measured by the running yields. The relevant nominal risk measure is the running yield at risk, which takes into account the risk of rising yields.

In last year's proposed guidelines, the Debt Office argued that risk should be defined in terms of the contribution of central government debt to variations in government finances, measured both in terms of budget balance and the central government's balance sheet. The Debt Office obtained inspiration for this view from the conventional approach to financial risk analysis known as asset and liability management (ALM), which emphasises the overall risk characteristics of assets and liabilities. The intuition is that a debt portfolio that typically has low costs when government finances are strained, for example due to a deep economic downturn, is less risky than a portfolio to which the opposite applies.

The Debt Office emphasised that at this stage, ALM should be perceived as a conceptual framework, rather than as an analytical tool. To fully apply an ALM approach to government debt, it is insufficient to analyse how future interest rates and exchange rates may evolve. It is also necessary to find out how, aside from interest payments on government debt, government income and expenditures co-vary – cyclically and structurally – with these financial variables. The Debt Office concluded that the ALM approach can and should be developed further as a framework for analysing government debt management but underscored that it is difficult to judge how far this analysis can be carried, especially in modelling terms.

Certain ALM aspects are captured by the simulation model that the Debt Office developed in preparing last year's proposed guidelines. In concrete terms, this means that the costs of government debt are set in relation to Gross Domestic Product (GDP). GDP can be interpreted as an indirect measure of the central government's financial situation, since its budget balance normally co-varies with GDP via both tax bases and government expenditures.

In its decision on the guidelines for government debt management, the Government drew the following conclusions based on the Debt Office's proposal (p. 13):

> It is the Government's view that ALM represents a plausible conceptual framework for the analysis of the risks in central government debt management and that the analysis should be expanded and improved. The Debt Office should therefore continue its analytical work in both qualitative and quantitative terms in preparation for the next proposal for guidelines.
>
> The Government is of the opinion that the risk associated with central government debt management should, in principle, be defined in terms of the contribution that the debt portfolio makes to fluctuations in the budget balance and the debt. This definition of risk seems more appropriate than a nominal concept of risk…. At the same time, the increased complexity that the ALM

technique entails means that the difficulties in coming to operational conclusions may increase. Even if the concept of risk discussed here ought to be able to replace a nominal measure in the long term, both these measures should be used until further notice.

In the judgement of the Debt Office, the Government's decision on the principles concerning cost and risk measures provides a sufficient basis for continued analytical work. The Debt Office thus sees no reason to further elaborate the discussion on the principles surrounding cost and risk measures in this year's proposed guidelines. The proposal will thus focus on issues related to how the debt should be structured in order to attain the best possible characteristics, given these definitions of costs and risks.

## 2.3 Analyses and conclusions to date

The Debt Office's analysis of how the debt should be structured has also gradually been elaborated in earlier proposed guidelines. In last year's proposal, the analysis focused on the characteristics and role of foreign currency debt. The proposal devoted particular interest to the allocation between foreign currency debt and nominal krona debt. The Debt Office's conclusion, which was based on both qualitative and quantitative analyses, was that foreign currency debt is associated with greater risk than nominal krona debt, without yielding lower expected costs. The Debt Office therefore advocated a long-term reduction in foreign currency debt, without stating any specific target for its share of total government borrowing. The Debt Office believed that the desirable share is so far below the 30 per cent initial share, and the potential for quickly reducing this share was so small, that the question of how far the foreign currency debt should be reduced could wait.

The Government concurred with the Debt Office's assessment that foreign currency debt as a share of total government debt should be reduced. In November 2000, the Government decided that the foreign currency debt should be amortised at a rate equivalent to SEK 35 billion per year during the period 2001–2003. For 2002 and 2003, these guidelines are preliminary.

In July 2001, the Government decided to lower the benchmark for amortisation of foreign currency debt during the current year to SEK 25 billion. In its decision, the Government referred to the fact that, due to the low value of the krona, the Debt Office had taken advantage of the flexibility provided in the original guideline decision to reduce amortisations in relation to the benchmark. The Government considered it important to give the Debt Office the opportunity to further reduce the pace of amortisation, in case this was judged appropriate in order to reduce the costs of managing government debt. At the same time, the Government emphasised that its point of departure and ambition continues to be that the share of foreign currency debt should be reduced in the long term.

The question of the maturity (duration) of nominal krona debt and foreign currency debt has also been analysed in earlier proposed guidelines. The model analysis in last year's proposal indicated that short-term borrowing in Swedish kronor may have advantages from both a cost and risk standpoint when the costs are compared to gross domestic product (GDP). The reasons are that generally speaking, short-term interest rates are lower than long-term rates and short-term domestic interest rates tend to be relatively low when GDP growth is low. In turn, this is because monetary policy, which controls short-term interest rates, reacts to cyclical changes in the economy. However, these effects must be weighed against the increase in refinancing risk caused by short-term borrowing, which may be problematical if the economy ends up in a situation where interest rates are high even though growth is low. The simulation model does not taken this possibility into account. Considering that initially, Swedish government debt is relatively short-term and its duration was slightly shortened during 2000, the Debt Office thus proposed no change in maturity.

The Government decided to keep the benchmark for the duration of nominal krona and foreign currency debt unchanged at 2.7 years. At the same time, it stated that the aim for 2002 and 2003 is also for the duration to remain unchanged.

## 2.4 Priorities in preparing the year's proposed guidelines

A review of previous proposed guidelines and Government decisions indicates two important areas where the conceptual and analytical frameworks need to be developed. Firstly, further steps must be taken towards an ALM approach to government debt and its structure. Among other things, this should include improved descriptions of the structural and cyclical determining factors behind the borrowing requirement – and thus government debt – in the Debt Office's analytical models.

Secondly, there is a need for more in-depth analysis of the characteristics and role of inflation-linked debt, especially in quantitative terms. The model analyses performed to date have only included nominal krona loans and foreign currency loans. By also including inflation-linked bonds, the Debt Office can examine the interplay between all three fundamental debt components and the maturity of each respective type of debt. In this way, it will be possible to view government debt as a complete portfolio.

During preparations for the year's proposed guidelines, it has been necessary to focus resources on one of these areas, since both of them give rise to complex questions. The Debt Office has chosen to prioritise an analysis of inflation-linked bonds. The main reason is that the Debt Office has not previously presented any detailed analysis of the characteristics of inflation-linked bonds. The possibility of using the simulation model to study the links between GDP, borrowing requirement and financial variables provides the analysis with certain fundamental elements of what an ALM approach should include. The Debt Office has

consequently concluded that in a short-term perspective, developing its analysis of inflation-linked debt will yield the greatest benefit. This prioritisation is reflected in the following presentation of new analytical work in Sections 3 and 4, which focuses on inflation-linked bonds.

The task of developing an ALM approach to government debt management will, in the judgement of the Debt Office, require major efforts and probably take several years. However, it should be possible to take additional steps in next year's proposed guidelines. One important question in this context is how the primary borrowing requirement is affected by developments in the economy, since the interplay between interest rates on government debt and the primary borrowing requirement is what determines the fluctuations in the total borrowing requirement.

# 3 Effects of inflation-linked bonds on costs and risks – qualitative aspects

## 3.1 Introduction

The goal of central government debt management is to minimise long-term costs while taking risk into account. In its previous proposed guidelines, the Debt Office has sought to develop a portfolio approach to government debt. Last year, its interest focused on the choice between nominal krona and foreign currency debt, but the choice of maturity was also part of its analysis. In its previous proposed guidelines, inflation-linked bonds have been kept outside of the portfolio analyses. One ambition of preparations for the year's proposed guidelines is to integrate inflation-linked bonds into the analytical framework, in order to obtain a more comprehensive picture of the government debt portfolio. In this section, as a first step the Debt Office presents the results of the qualitative analyses it has carried out for the purpose of improving our understanding of how inflation-linked bonds may affect the costs and risks of government debt.

## 3.2 Points of departure

Last year's Government decision on guidelines concluded that in principle, the risk in government debt should be analysed in terms of the contribution of debt-related costs to overall central government financial developments. The fundamental question is thus how the costs of a particular type of borrowing co-varies with factors that otherwise affect central government finances (in principle, the primary borrowing requirement, i.e. the borrowing requirement excluding interest payments on government debt), as well as what characteristics portfolios that include different shares of each type of debt can be assumed to have.

As a measure of cost and risk, the Debt Office uses the ratio between government debt costs and GDP – or *debt cost ratio* – in which GDP is intended as the operative measure of the aggregate tax base. Using this measure, a debt portfolio with the

characteristic that its costs are high when GDP is high (and vice versa) will appear more favourable than if only nominal costs and their variations are taken into account.

Initially, the Debt Office compares inflation-linked debt one-on-one with other types of debt. The purpose is to examine what inflation-linked borrowing can add to a portfolio that consists of nominal krona and foreign currency borrowing. The main focus of interest is on comparisons with nominal krona borrowing. To this extent, the presentation reflects the decision to reduce the share of foreign currency debt in the government debt portfolio in the long term. The Debt Office emphasises the effects on risks in government debt management. Since inflation-linked loans have long maturities, the Debt Office also touches upon how these associations can be assumed to be affected if Sweden joins the Economic and Monetary Union (EMU).

## 3.3 Comparison to long-term nominal debt

The point of departure is that inflation-linked bonds are a unique instrument that cannot easily be created by putting together a portfolio of other more traditional types of assets. This is the main argument why investors should be interested in inflation-linked bonds. By including a certain share of inflation-linked bonds in their portfolios, investors can normally achieve a more favourable relationship between expected return and risk. This fundamental diversification argument is also applicable to the Swedish central government as a borrower.

The diversification argument can be supported by noting that, in important respects, nominal and inflation-linked instruments are mirror images of each other. If the economy is hit by a disruption that makes inflation higher than expected while growth is low (stagflation), it is advantageous to have long-term nominal debt. Inflation decreases the real-term value of nominal fixed interest payments. Inflation-linked debts, on the other hand, increase the debt cost ratio, since the central government is forced to compensate lenders for inflation, at the same time as low growth strains government finances.

Inflation-linked debt is advantageous in a situation where the inflation rate is unexpectedly low or negative and growth is low at the same time, i.e. in a recession. In that case, the costs of inflation-linked borrowing declines in proportion to the fall in prices, while the government is forced to continue making the same interest payments on nominal debt – interest payments that were determined by the assumption that inflation would be higher than it actually turned out. Unexpectedly high inflation combined with high growth boosts the costs of inflation-linked bonds, but the debt cost ratio should be stable, since GDP is growing.

One reservation is that Swedish inflation-linked bonds have a deflation guarantee, which means that the investor always gets back at least the nominal value of the bond. However, this guarantee only covers the face value and is thus payable in the event that the average inflation rate during the entire life of the bond has been

negative. Coupon payments thus follow actual inflation rates. This means that the central government nonetheless reduces its risks compared to long-term nominal loans, which may be costly during an (unexpected) period of deflation.

Given that both stagflation and deflation appear to be possible scenarios, the conclusion is that a suitable mix of nominal and inflation-linked instruments is appropriate from a risk standpoint. By having several types of debt in its portfolio, the central government decreases the risk of extreme cost fluctuations in case of extreme disruptions in economic conditions.

How inflation-linked debt will affect costs during more normal fluctuations in the economy and central government finances depends largely on the circumstances. It is thus necessary to construct more specific scenarios about how the economy may turn out. If, for example, one assumes that the inflation rate will remain stable at around the two per cent target of the Riksbank (Sweden's central bank), the long-term costs of inflation-linked debt are independent of what else is happening in the economy. Thus inflation-linked loans do not reduce risks in government debt management. In such a scenario, it is reasonable to assume that confidence in the Riksbank's monetary policy is high. In that case, nominal interest payments will also be stable and the actual real-term cost of nominal borrowing will move in parallel with the cost of inflation-linked loans. Thus if expectations of 2 per cent inflation are fulfilled, the choice between nominal and inflation-linked borrowing will matter little from a cost and risk standpoint. However, even in a successful inflation target regime, the rate of price increases varies somewhat. As long as the economy follows a demand-controlled cyclical pattern, inflation will typically be higher when growth is high and vice versa. In that case, inflation-linked loans should help stabilise the debt cost ratio.

If Sweden joined EMU, the rate of inflation would probably become more variable, since monetary policy will no longer be specifically adapted to Swedish conditions. During a normal economic cycle, inflation may then, on the one hand, conceivably co-very more with tax bases, since domestic inflationary tendencies will not be counteracted in the same way by a tightening of monetary policy. Consequently, inflation-linked bonds might help decrease government budgetary risks to a greater extent if Sweden joined EMU. Due to greater uncertainty about inflation, investors ought to be more interested in protecting their savings against inflation, i.e. the conditions for the central government to issue inflation-linked bonds should improve.

One aspect of this scenario is that interest rates on nominal government bonds would be determined by the average EMU trend, since nominal government bond markets in the euro area are well-integrated and international investors have no reason to worry that inflationary differences will lead to exchange rate adjustments. One can thus not assume that nominal bonds will provide compensation for expected domestic inflation. Viewed in absolute terms, it may thus be advantageous for the Swedish government to issue nominal bonds when the expected domestic

inflation rate is higher than the EMU average. Under these circumstances, however, it should also be possible to borrow cheaply via inflation-linked bonds. Domestic investors who wish to protect their purchasing power will not be interested in nominal bonds, but are instead likely to demand inflation-linked bonds. The interest rate on inflation-linked bonds should thus fall. Under ideal conditions, the interest rate on inflation-linked bonds should at least fall so much that expected return is the same as on nominal bonds. One can thus not assume that nominal borrowing will be cheaper when domestic inflation exceeds the EMU average, if the behaviour of investors in the inflation-linked bond market is taken into account.

On the other hand, the inflation rate may be affected by disruptions in the rest of EMU that have no corresponding impact on domestic growth. Sweden may thus import inflation (or deflation) via the common currency in the same way as in a traditional fixed exchange rate regime. In the latter case, inflation-linked debt would become riskier. As so often when one tries to assess the effects of EMU accession, the conclusions thus depend on whether the Swedish economy can be assumed to follow the same growth trend as the dominant EMU countries or show a deviant pattern.

There are numerous possible examples and scenarios. However, these arguments do not lead much further than to the realisation that whether inflation-linked loans are advantageous or not depends on how the scenarios are constructed. In light of this, the general diversification argument – which merely presupposes that different trends are possible – is probably the most robust reason why the central government's debt portfolio should include both nominal and inflation-linked loans.

To have any significant diversification effect, inflation-linked debt should account for a reasonably large share of government debt. In any event, the effect of a share under 5 per cent on the debt cost ratio is likely to be negligible, even in extreme scenarios. This argument, which is agnostic as to how the economy may develop, thus indicates that the Swedish government should probably have a larger share of inflation-linked debt than it does today (8 per cent). Given the risk-related advantages of increasing the share of inflation-linked loans, the government should be prepared to issue inflation-linked bonds even when their expected cost is the same as for the corresponding nominal borrowing, i.e. the government should not necessarily demand that inflation-linked borrowing will be (or is expected to be) cheaper than nominal borrowing.

## 3.4 Comparison to short-term nominal debt

Inflation-linked loans are similar to long-term borrowing instruments with recurring interest rate adjustments called *floating rate notes* (FRN). In an FRN loan, the nominal interest rate is set, for example, every quarter at the same level as the current three-month interest rate. In a corresponding manner, the nominal interest

payment on an inflation-linked loan is determined by the inflation rate. To the extent that short-term interest rates have a strong positive correlation with the inflation rate, the characteristics of these loans will be similar. However, in a credible inflation target regime, the correlation between short-term interest rates and actual inflation should be low. In that case, the central bank varies short-term interest rates on the basis of expected inflation. If monetary policy is fully successful, actual inflation – and thus the costs of inflation-linked loans – will be independent of short-term interest rates. Even if this ideal state is not achieved, there is reason to assume that nominal borrowing with short interest rate-fixing periods in an inflation target regime will provide greater risk reduction, measured in terms of the debt cost ratio, than inflation-linked borrowing, since short-term interest rates should be more strongly correlated with growth than inflation is.[1]

For a small country belonging to a monetary union, where monetary policy is guided by an inflation measure in which that country represents a small weight, the connection between short-term interest rates and the domestic economic cycle is weakened. In case of a disruption that causes this country's economy to grow at a different rate or direction than the union average, growth may decline without there being any significant interest rate cut. The co-variation between short-term interest rates and GDP is thus weaker, while for the same reasons the correlation between inflation and GDP may be assumed to be greater than outside a monetary union. Consequently, EMU accession will increase the likelihood that the comparison will favour inflation-linked loans, but as long as the domestic economic cycle follows the same pattern as the rest of EMU, short-term borrowing is nevertheless probably less risky.

## 3.5 Comparison to foreign currency debt

The risk characteristics of foreign currency borrowing are primarily dependent on how the exchange rate co-varies with GDP, since interest levels in foreign currency are not likely to be significantly affected by what happens in the Swedish economy. If foreign currency loans are to offer reduced risk, this requires that the krona should be relatively strong in situations where GDP growth is weak. In general, the opposite is likely, i.e. a cyclical downturn normally leads to a weakening of the exchange rate, in both nominal and real terms. Correspondingly, long-term weakness in productivity growth, and thus weak growth in tax bases, should be accompanied by a real-term depreciation of one's own currency, making foreign currency debt more expensive. A large share of foreign currency debt in the government's total debt portfolio is thus hardly justified from a risk standpoint.

[1] The comparison refers to FRN loans. In the case of short-term borrowing via Treasury bills, the difference in refinancing risk must be taken into account, since in the case of foreign currency borrowing, the government must continuously find buyers of newly issued instruments. The Debt Office has no FRN loans in kronor. However, since the Debt Office combines bond loans and interest rate swaps, this creates positions with the same characteristics as FRN loans.

Under certain circumstances, inflation-linked loans and foreign currency loans have similar characteristics. A burst of inflation that raises the payments on inflation-linked loans may also presumably lead to a depreciation of one's own currency, making foreign currency loans more expensive. In order for inflation-linked loans and foreign currency loans to be identical, however, there must be purchasing power parity, i.e. exchange rate adjustments must be fully equivalent to inflation rate differences. This is not true in practice. Instead, real exchange rates – nominal exchange rates adjusted for differences in price levels between countries – vary sharply and in ways that are difficult to predict. Given the risk of variations in real exchange rates, inflation-linked loans are less risky than foreign currency loans.

Inflation-linked loans and foreign currency loans also have similar characteristics if one wishes to analyse how the structure of government debt may affect confidence in the official price stability target. Both types of debt can be assumed to become expensive if inflation climbs, one via compensation for inflation and the other via depreciation of one's own currency. The government may therefore use both of them to underscore that it does not intend to let inflation climb. In this respect, too, variations in real exchange rates are a disadvantage. The central government has less influence on exchange rates than on price trends (via the central bank). Foreign currency debt may therefore be expensive even if the government fulfils its obligation to maintain price stability. From a credibility standpoint, inflation-linked loans are thus preferable.

On the other hand, as the Debt Office has stated in earlier proposed guidelines, it may still be beneficial to increase the share of foreign currency debt in periods when economic growth is weak and the government's borrowing requirement is large. Firstly, a large borrowing requirement may push up domestic interest rates. Secondly, the domestic currency may be extra weak. If the downturn proves temporary, foreign currency loans can probably be repaid in a situation where the exchange rate has once again strengthened. This insurance mechanism only works, however, if the government's initial foreign currency debt is not too large.

## 3.6 Maturity of government debt

Inflation-linked bonds are issued, on average, for considerably longer maturities than nominal bonds. One reason is that the real yield curve is normally much flatter than the nominal one. The reason is that the desire of investors to give up expected return in exchange for protection against inflation should be higher the longer this insurance extends. Thus an increased share of inflation-linked borrowing would – all else being equal – extend the average maturity of government debt and decrease the current refinancing requirement. For a given refinancing risk, there would thus be room to shorten the maturity of nominal debt. Provided that the nominal yield curve has a positive slope, this would lower, at the margin, the expected costs of nominal debt. Whether *total* expected costs of government debt would be lowered also depends on the real interest rate, but to the extent that the share of inflation-

linked debt is increased for reasons of risk, the room for shortening the maturity of nominal debt may be a positive side effect.

EMU accession may also have implications for the choice of maturity in government debt. EMU monetary policy will not be influenced to the same extent as a purely Swedish monetary policy by developments in the Swedish economy. Growth and inflation may thus become more variable, and fluctuations in central government finances may be assumed to increase. Firstly, given the current systems of central government income and expenditures, larger variations in the economic situation will *in themselves* be translated into larger changes in the government borrowing requirement via automatic stabilisers in the taxation and expenditure systems. Secondly, the *need* to vary fiscal policy – via (possibly amplified) automatic stabilisers or discretionary measures – will increase, since monetary policy can no longer be used for national stabilisation policy. To achieve given stabilisation policy ambitions, fiscal policy must therefore assume a larger responsibility than in a flexible exchange rate regime.[2]

Due to major underlying fluctuations in borrowing requirements, it may be appropriate to lengthen debt maturity in order to reduce the risk that large refinancing requirements will coincide with a large net borrowing requirement. In that case, this may occur in any type of debt. Since it is natural to issue inflation-linked loans with longer maturities, EMU accession may possibly be one argument in favour of increased inflation-linked borrowing, provided that the costs of issuing inflation-linked bonds are at a reasonable level. Otherwise the lengthening of maturities should occur via long-term nominal bonds.

## 3.7 Summation

A review of the fundamental risk characteristics of different types of loans leads to the conclusion that the choice of portfolio structure should depend on what scenarios for future economic developments are believed possible and likely. Inflation-linked bonds offer protection in a deflationary scenario and may also have favourable characteristics in a demand-led economic cycle. Having a large share of the debt portfolio in inflation-linked loans is a disadvantage, however, if the economy is hit by stagflation. Essentially the opposite is true of long-term nominal loans. In the absence of firm opinions about the likelihood of different scenarios and the strength of the co-variation between different variables, this argument leads to general advocacy of risk-spreading. The central government's debt portfolio should thus contain a mixture of nominal and inflation-linked borrowing.

Given these points of departure, it is difficult, however, to see a lasting role for foreign currency loans in the government debt portfolio. Foreign currency debt

[2] These issues are discussed in detail by Henrik Braconier, "Automatiska stabilisatorer och aktiv finanspolitik inom EMU" (Automatic Sabilisers and Active Fiscal Policy in EMU), Appendix 1 of the Swedish government report SOU 2001:62, *Stabilitet och stabiliseringspolitik i EMU* (Stability and Stabilisation Policy in EMU).

admittedly increases opportunities for diversification, but it also creates additional risk due to variations in the real exchange rate. In addition, there is likely to be a correlation between the borrowing requirement and the exchange rate in such a way that foreign currency debt tends to be expensive when government finances are strained. As a way of underscoring the government's determination to stick to a price stability target, inflation-linked loans are more effective than foreign currency loans, since the government has greater influence on inflation (via the central bank) than on exchange rates.

Based on a general diversification argument, it should also be possible to argue that the share of inflation-linked loans in the debt portfolio should not be too small. It thus seems reasonable that a share of 5 per cent inflation-linked loans or less is of negligible importance to the risk level of government debt, since inflation-linked loans then account for such a small percentage of costs. If the central government wishes to achieve any significant diversification, a larger share than the current level (8 per cent) is probably desirable.

Once again, it is worth noting that the discussion in this section has emphasised effects on the risk level in government debt. In order to decide how the government debt portfolio should be structured, the costs of the intended strategy must also be taken into account. In order to obtain more concrete quantitative support for assessments of what mix between nominal and inflation-linked loans may conceivably be appropriate, one needs more specific assumptions about the functioning of the economy. In Section 4, the Debt Office presents its attempts to quantify these associations. In Section 5, the Debt Office then discusses the practical conditions for achieving its ambitions concerning the share of inflation-linked debt that seems appropriate, based on theoretical and model-based analyses.

# 4 Quantitative analysis of government debt structure

## 4.1 Background and assumptions

Like last year, the Debt Office's quantitative analysis is based on a stochastic simulation model. The focus of this analysis is on examining the effect of inflation-linked bonds on costs and risks in government debt management. This section provides an overall description of the simulation model, as well as a review of the results. For those readers who are not so interested in technicalities, a thorough non-technical summary is provided at the end of the chapter.

The simulation model has been developed internally and is a refinement of last year's model. The most important change is the introduction of inflation-linked bonds. This has led to a new relationship to take into consideration: the relationship between nominal and inflation-linked interest rates. Otherwise the model is, in all essential respects, unchanged and is therefore not described here in detail. Those readers who are interested are referred to last year's proposed

guidelines. The Debt Office also intends to present a more detailed description in a separate report.

It should be emphasised that the model is a simulation tool. It is used – under certain stylised assumptions about the structure of the economy and the associations between different economic magnitudes – in order to analyse how costs and risks will change over a long period of the future. These simulations should not be perceived as forecasts. Their purpose is instead to create a coherent, consistent analytical framework, enabling the Debt Office to examine the links between the costs and risks of government debt and the structure of this debt.

## 4.2 The Debt Office's simulation model

The simulation model consists of two portions: a macroeconomic portion that simulates economic processes primarily related to growth and inflation, as well as related development paths for interest rates and exchange rates; and a strategy portion that simulates various portfolio strategies and keeps track of how the costs and risks of government debt change over time. Both portions are described in the sections below.

### 4.2.1 The macroeconomic simulation model

The macroeconomic simulation model is used in order to simulate changes in a number of important financial and macroeconomic variables in the economy. The model describes a stable economy with cyclical swings between boom and recession roughly similar to those of the past thirty years, an annual growth rate averaging two per cent and a central bank that meets its annual inflation target of two per cent. The simulation horizon is 30 years and the period length is three months, i.e. all variables are measured on a quarterly basis.

Briefly, the model consists of six common building blocks for each of three currency areas: Sweden, EMU and the US. These building blocks model the *economic cycle regime, inflation, growth, nominal short-term interest rates, nominal long-term yields* and *exchange rates*. There are two additional building blocks for Sweden: one for *real long-term interest rates* and one for the *borrowing requirement*. Figure 1 provides a schematic picture of the model's variables and the associations between them.

Most of the model's variables are generated on the assumption that they follow some form of auto-regressive process. Certain variables, for example growth and nominal long-term interest rate, are also assumed to be regime-dependent, which means that they have different expected values depending on whether the economy is in a boom or recession. The basis for the parameterisation of the model has been empirically estimated relationships as well as the prevailing monetary and fiscal decisions. In certain cases, for example interest rates, more subjective estimates of levels and volatilities have been made.

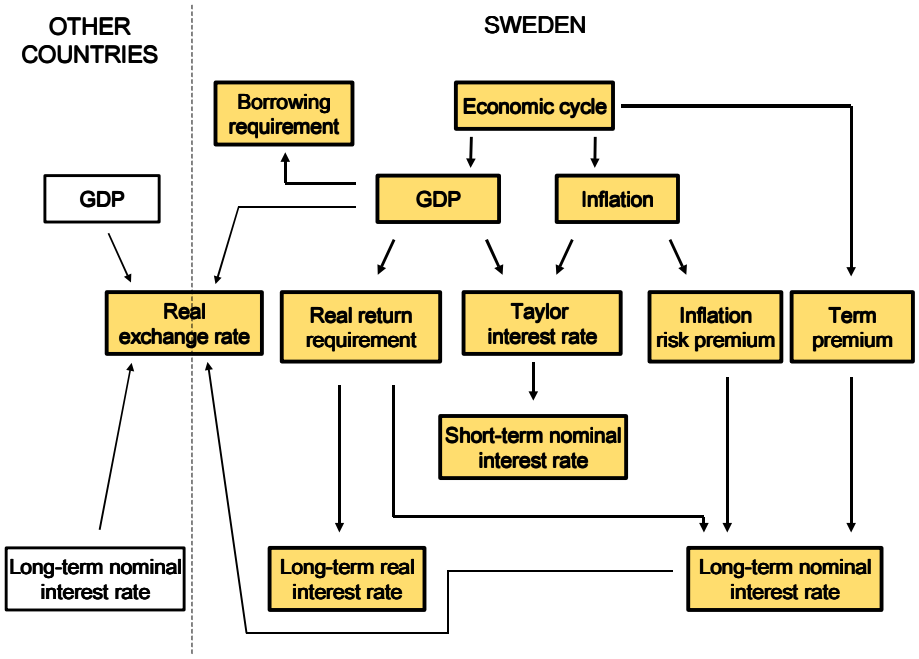


**Figure 1. The model's variables and associations between them**

One variable that is especially important to mention is the net borrowing requirement. The point of departure for modelling it is Sweden's official fiscal policy target: two per cent of GDP, viewed over one economic cycle. Given this target, and taking into account the pension system, the Debt Office has assumed that the borrowing requirement should be 0.5 per cent of GDP over one economic cycle. This implies that the debt will grow in nominal terms over the simulation period, but decrease as a percentage of GDP. The length of the economic cycle is determined stochastically in the model, with the economy during each period having a certain probability of moving from boom to recession or from recession to boom. Based on this information, it is possible to deduce a rule of thumb about how much should be amortised or borrowed during each period. Depending on the economic growth rate during a given period, the simulated borrowing requirement will then be larger or smaller than the borrowing requirement implied by the rule of thumb.

The table below presents the mean values for some of the key variables in the model. Those variables that are regime-dependent have two means, one during booms (b) and one during recessions (r). In the case of real exchange rate, only the initial value of the exchange rate is reported, since the mean for this variable is not constant over time, but changes in response to differences in average GDP growth between Sweden and the other country in question. Further details on parameterisation, volatility assumptions etc. are provided in the technical report.

| Variable | Sweden | EMU | US |
|---|---|---|---|
| **Inflation** | 2,0 % | 1,5 % | 2,5 % |
| **Real growth (b)** | 3,6 % | 3,4 % | 4,0 % |
| **Real growth (r)** | -2,2 % | -1,3 % | -1,9 % |
| **Duration (b) (# quarters)** | 19 | 19 | 21 |
| **Duration (r) (# quarters)** | 5 | 5 | 4 |
| **Short-term nominal interest rate** | 5,0 % | 4,5 % | 5,5 % |
| **Long-term nominal interest rate (b)** | 6,1 % | 5,6 % | 6,7 % |
| **Long-term nominal interest rate (r)** | 5,4 % | 4,9 % | 6,1 % |
| **Long-term real interest rate** | 3,5 % | 3,5 % | 3,5 % |
| **Real exchange rate** | – | SEK 9,00 | SEK 10,00 |

**Table 1. Basic parameterisation assumptions**

### 4.2.2 The strategy portion

The strategy portion of the model controls how the central government finances its day-to-day borrowing requirement and refinances maturing loans (or repurchases loans in cases where the borrowing requirement is negative). The strategy portion also calculates the costs and risks associated with different strategies. These strategies may differ in two ways. Firstly, they may have different targets for the allocation of debt between different types of debt. Secondly, they may have different duration targets (measured in years) for each type of debt.

In this year's proposed guidelines, the analysis focuses on examining how the costs and risks of government debt are influenced by variations in the allocation between inflation-linked and nominal loans in Swedish kronor. The foreign currency share of total debt is therefore kept constant in all strategies. There are two reasons for this: it decreases the number of possible strategies, and the characteristics of foreign currency debt were thoroughly analysed in last year's proposed guidelines.

In the basic scenario, nine strategies (or portfolios) are studied. See Table 2. The share of inflation-linked debt varies here between 0, 10 and 20 per cent of total debt. Changes in the share of inflation-linked bonds are always made against nominal krona bonds, in such a way that an increase in inflation-linked debt leads to a decrease in nominal krona debt. Also studied is whether the effects of the inflation-linked share on the portfolio are influenced by the duration of nominal krona debt. Then the three share targets are combined with three duration targets for nominal krona debt: two, three and four years.

The strategy at the centre of the matrix corresponds largely to the debt portfolio the central government has today. The simulation model is then used to take a step in each direction and examine what effects this has on the costs and risks of government debt. The idea is that by examining a few clearly differentiated strategies in this way, one can achieve an overall sense of the effects of varying the structure and duration of the debt.

| Shares of total debt | | Duration, nominal krona debt | | |
|---|---|---|---|---|
| | | 2 | 3 | 4 |
| **0% IL** | **75% SEK** | Strategy | Strategy | Strategy |
| 17.5% EUR | 7.5% USD | 1 | 4 | 7 |
| **10% IL** | **65% SEK** | Strategy | Strategy | Strategy |
| 17.5% EUR | 7.5% USD | 2 | 5 | 8 |
| **20% IL** | **55% SEK** | Strategy | Strategy | Strategy |
| 17.5% EUR | 7.5% USD | 3 | 6 | 9 |

**Table 2. Strategies in base scenario**

The simulations of these various strategies start with a given initial portfolio, specified as a number of cash flows in different currencies. The choice of initial portfolio is important and may influence the results, insofar as it may take different periods of time for the portfolio to achieve the targets established by different strategies. One natural alternative, for example, would be to base the simulation on the actual government debt portfolio. But since the purpose here is to examine long-term cost and risk characteristics of various strategies, rather than analyse how the debt should be taken from one point to another, the principle has been to base the simulation on portfolios that, from the very beginning, fulfil the allocation and duration targets each respective strategy establishes. Each strategy thus starts with its own initial portfolio.

From the simulated economy, for each period a net borrowing requirement is obtained, which is assumed to include interest payments. Debt maturing during the period in question is then added to this borrowing requirement. Together, these two borrowing requirement components comprise the total borrowing requirement. However, it should be noted here that the simulated interest payments are not linked back in a way that causes them to influence the net borrowing requirement. The total borrowing requirement is allocated by types of debt and maturities in such a way as to achieve the target of that particular strategy in terms of debt structure and duration. In those cases where it is not possible to achieve a given duration, for example, the strategy simulator allocates borrowing in such a way that the portfolio ends up as close to the target as possible.

It should be noted that the strategy simulations are not rigged in such a way that the debt allocation target is *exactly* fulfilled during every period. The reason is that this would systematically raise the cost of foreign currency debt. For example, a weakening of the krona would lead to a foreign currency debt share larger than the targeted share, which in turn would require repurchases of foreign currency debt in a situation where foreign currencies are expensive. This would regularly lead to the amortisation of foreign currency debt when it is at its most expensive and, correspondingly, to borrowing in foreign currencies when this is unfavourable. The

criterion for allocation of the debt among different types is thus formulated in such a way that the portfolios only fulfil their respective allocation targets *on average.*

In the model, both inflation-linked krona debt and nominal debt in foreign currencies is continuously converted to nominal kronor. For foreign currency debt, this is done with the aid of the relevant exchange rate, and for inflation-linked debt by using the Consumer Price Index (CPI) as an "exchange rate" between real and nominal kronor.

The debt costs calculated in the model are primarily those costs that have an impact on the government budget. This means that *unrealised* gains and losses, caused by short-term fluctuations in market interest rates or exchange rate movements, have no impact on costs. However, *realised* exchange rate gains and losses that have arisen due to exchange rate movements, upon maturity or repurchases, are included. This means that all coupon payments on foreign and inflation-linked bonds, as well as the capital amount in case of maturity or repurchase, are converted to nominal kronor. Exactly as with actual inflation-linked bonds, coupon payments are recalculated using the ratio of where the CPI stands when the coupon is to be paid and the base index of the bond. When an inflation-linked bond matures, the same recalculation of the capital amount is made. It should be pointed out that realised exchange rate effects only influence the debt cost in the model and not the borrowing requirement.

## 4.3 Results

### 4.3.1 Cost and risk measures in the simulation model

The cost of debt during a given period is calculated as the sum of all coupon payments, translated to nominal kronor, plus realised exchange rate effects upon maturity or repurchase of foreign currency and inflation-linked loans. As a first step towards an ALM approach, the Debt Office is calculating the costs in relation to GDP. This measure is called the *debt cost ratio* and provides a better (more real-term) picture of the government financial risks with which a particular debt portfolio is associated than a measure that looks only at nominal costs.

In order to measure and compare the costs of different debt management strategies, 1,000 (stochastic) replications of economic developments are made in the macroeconomic model. In the strategy portion, the costs of each strategy and replication are then calculated. In this way, each strategy will be associated with a complete allocation of costs.

It should be noted that the Debt Office is mainly comparing portfolios on the basis of differences in risk. Differences in cost are less interesting in the model, since they are a direct consequence of the parameterisation. Somewhat simplified, whether inflation-linked bonds are cheaper than nominal bonds or not depends on the relationship between average break-even inflation and actual inflation in the model. The model is parameterised in such a way that in the end, inflation-linked

bonds are somewhat cheaper than nominal bonds. Since this is only an assumption, it is not meaningful to rank portfolios by cost.

The risk in a strategy is measured in two dimensions. The first dimension measures risk as the range of average costs viewed over thirty years. This dimension measures the risk of experiencing an unfavourable trend of costs throughout the thirty-year period, for example as a consequence of unfavourable economic developments. This is referred to here as *scenario risk*. The other dimension measures risk as the range of costs in case of a given set of economic developments. This dimension measures the variation in annual costs (around a trend) and examines the risk of experiencing an unexpectedly large cost during a single year. This is referred to here as *time series risk*. One can say that scenario risk expresses how badly things can get on average, since one does not know which of the 1,000 simulated economic paths will be realised, whereas time series risk expresses how much annual costs may vary for an arbitrary economic trend.

To measure the range in an allocation, one uses the percentile distance between the 95$^{th}$ and the 50$^{th}$ percentile (the median) in the simulated cost allocation. Such a risk measure answers the question: how far from the median are the five per cent worst outcomes? For example, if the median cost is 2 per cent of GDP and the risk is 50 per cent of the median, the five per cent worst outcomes will exceed a cost level of 3 per cent of GDP.

### 4.3.2 Base scenario

The base scenario uses the basic parameterisation of the economic model that was presented in Section 4.2.1. Figures 2 and 3 show the result of simulations of the nine strategies – or portfolios – that were presented in Section 4.2.2. The first figure shows the expected average debt cost ratio in relation to scenario risk. The second figure shows the expected average debt cost ratio in relation to time series risk.

The main result is that the differences in risk between the strategies are small. Even if one compares the portfolios that have the highest and lowest risk, respectively, the difference is only 1.5 percentage points in terms of scenario risk, and 1.1 percentage points in terms of time series risk. This means, for example, that if the worst outcome for the portfolio that has the lowest risk is 50 per cent larger than the expected value, then the worst outcome for the portfolio that has the highest risk is only around 51 per cent larger than the expected value. In other words, this means that the worst outcome, measured in relation to the expected value, is the same in principle for all strategies.

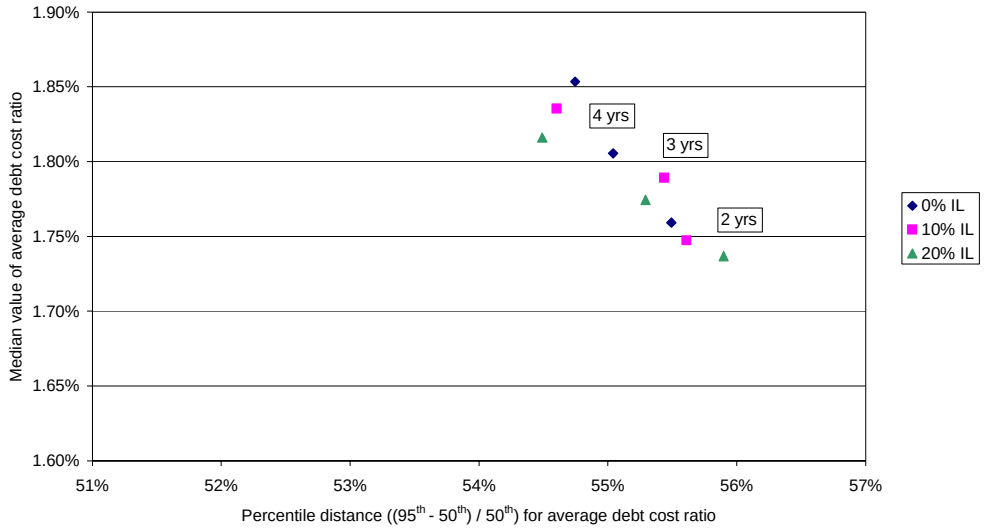


**Figure 2. Expected debt cost ratio and risk (scenario risk)**

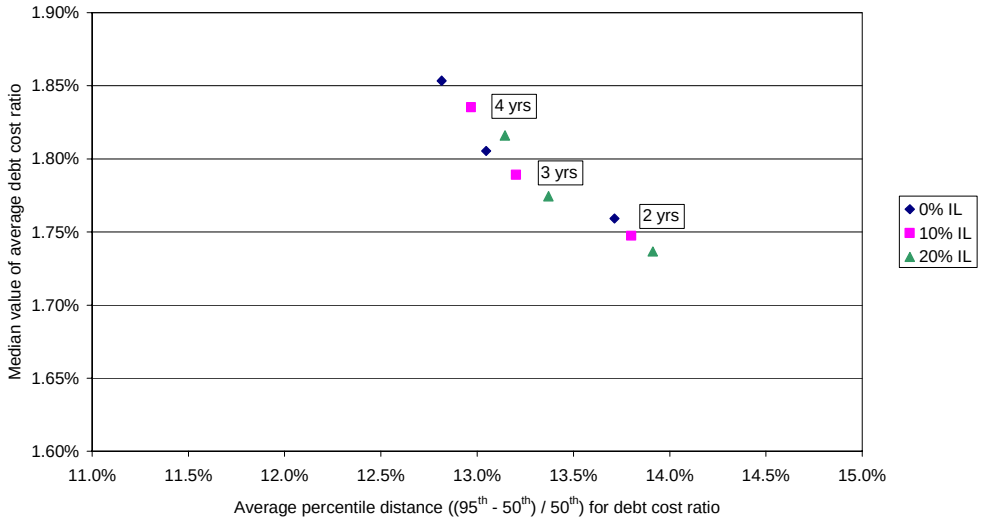


**Figure 3. Expected debt cost ratio and risk (time series risk)**

With such small differences between the portfolio strategies, it is uninteresting to try to interpret and explain the mutual relationship between the portfolios. However, one can still note that in certain cases inflation-linked bonds seem to have a risk-increasing effect, while in other cases they seem to decrease the risks. There are various conceivable explanations as to why this is the case, but considering that the cost differences between the portfolios are so small, it is more

likely that these have arisen due to chance factors, which have more to do with the portfolio modelling process than with real economic correlations.

It should also be mentioned that in last year's analytical work, the Debt Office found that a shorter debt maturity leads to both lower cost and lower risk. The results of this year's analytical work indicate the opposite. It should be underscored, however, that in this case too, it is a matter of negligible difference between portfolios.

### 4.3.3 The base scenario with debt only in kronor

In the model simulations presented so far, the Debt Office has examined portfolio structures that include both Swedish and foreign currencies. This is a natural point of departure, since it provides a realistic picture of the government borrowing portfolio that the Debt Office is actually managing today. However, in order to make the analysis clearer and better illustrate the main issue – the interplay between nominal and inflation-linked bonds – it may be a good idea to examine portfolios that contain only krona-denominated loans.

This section examines three portfolios that do not contain any foreign currency debt, but that have a widely ranging share of inflation-linked bonds: 0, 50 and 100 per cent of the total portfolio. The duration of the three portfolios is three years for the nominal portion of the debt and ten years for the inflation-linked portion of the debt. The results are presented in Figures 4 and 5. However, these two figures show that despite significant differences in the share of inflation-linked loans, the differences in risk between the various portfolios are still small.

Looking at how the three portfolios rank in relation to each other, however, there is an indication that risk diversification works as the theory predicts: a portfolio that contains both inflation-linked and nominal bonds yields lower risk for the same expected cost than portfolios containing only one type of bonds. This is true of both risk measures. One can therefore say that these results are of an expected nature, even though it should be emphasised that the differences are still too small to be economically significant.

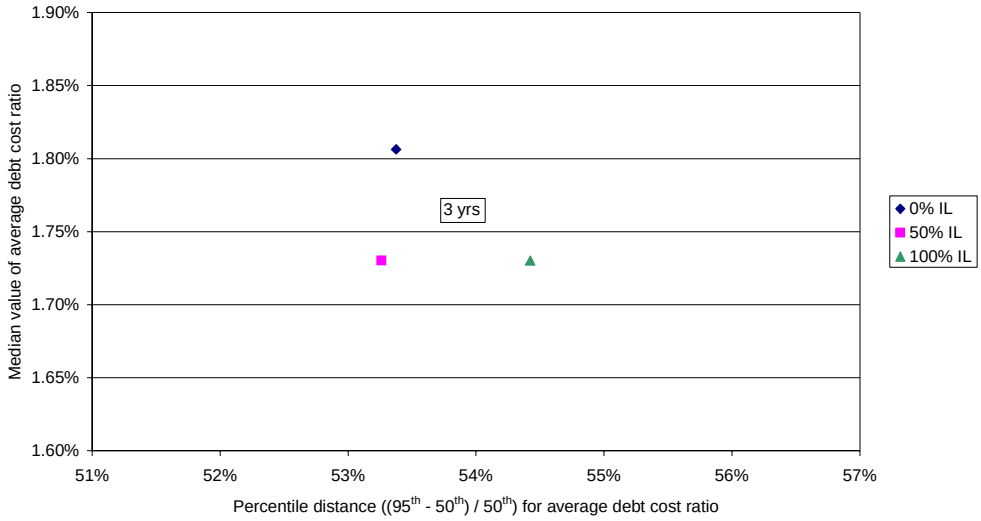


**Figure 4. Expected debt cost ratio and risk (scenario risk) – 0, 50 and 100% inflation-linked debt**

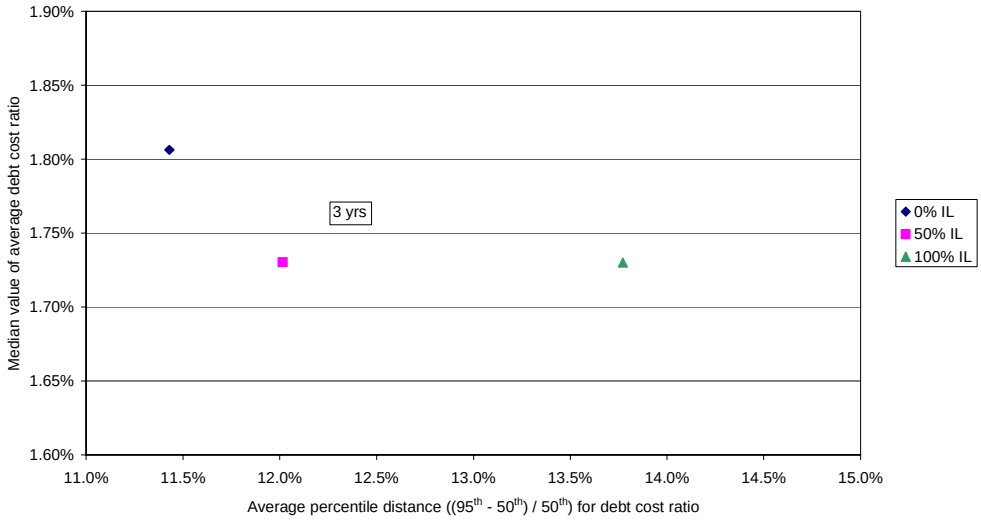


**Figure 5. Expected debt cost ratio and risk (time series risk) – 0, 50 and 100% inflation-linked debt**

The results so far indicate that the diversification effects of inflation-linked loans are small. This may be an effect of the structure and parameterisation of the model. After all, the model describes a stable economy without major shocks and with full confidence in the monetary policy inflation target. As a result, the correlation

between the costs of inflation-linked and nominal bonds is high, which in turn means that potential diversification effects are small.[3]

Otherwise, the theoretical diversification argument is based on the fact that inflation-linked and nominal bonds are mirror images of each other, which is discussed thoroughly in Section 3.3. If actual inflation is higher than expected, while growth is low (stagflation), it is advantageous to have nominal debt. If, however, actual inflation is lower than expected while growth is low, it is advantageous to have inflation-linked debt, since the costs of this debt decrease in proportion to the fall in prices.

Inflation-linked bonds may thus be one way of decreasing the risk of large upturns in debt costs due to inflationary or interest rate shocks. This is perhaps not so much a traditional diversification effect, but more a form of hedging or insurance. The Debt Office's model is a stochastic simulation model and is not intended to test various types of shock scenarios. However, to be able to examine this theory to some extent, one can change the parameterisation of inflation. In the following sensitivity analysis, the Debt Office will therefore test two different scenarios, in which inflation is assumed to be pro-cyclical in the first scenario and counter-cyclical in the second scenario (the stagflation scenario).

### 4.3.4 Sensitivity analysis

For the sake of clarity, in its sensitivity analysis the Debt Office is using only the three portfolios that contain 0, 50 and 100 per cent inflation-linked bonds. In the first scenario, inflation follows a regime-shifting auto-regressive AR(1) process, where average inflation is set at 3 per cent during the boom and 1 per cent during the recession. This should lead to a more favourable outcome for inflation-linked bonds in terms of risk, since the costs of debt increase when the growth of the economy is high and decrease when the growth of the economy is low.

The results are presented in Figures 6 and 7. As the first figure shows, the portfolio containing only inflation-linked bonds is the most advantageous in terms of scenario risk. The intuition behind this is that with pro-cyclical inflation, the connection between the costs of inflation-linked bonds and GDP growth is strong, and the debt cost ratio is thus stable (i.e. the risk is low). In this scenario, however, there is no room for risk diversification, since the portfolio containing 100 per cent inflation-linked bonds is the portfolio that both has the lowest cost and risk.

Figure 7 provides a different result for time series risk. Here the portfolio with only nominal bonds is the least risky one. In this figure, however, the typical curved frontier is visible, showing that one can reduce the risk in a portfolio at unchanged cost by mixing types of debt.

[3] In the simulations, the median value of the correlation between debt cost ratios for portfolios containing 0 and 100 per cent inflation-linked bonds, respectively, is 0.93.

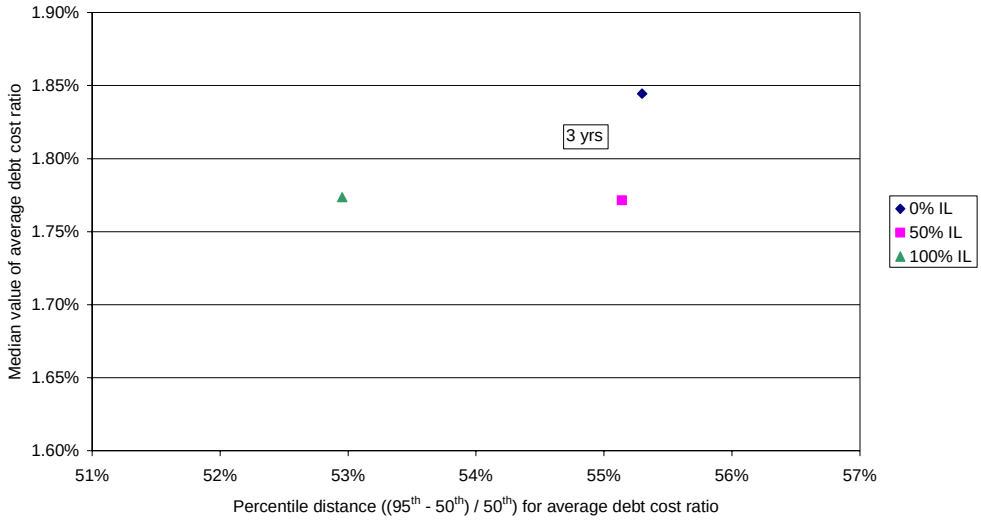


**Figure 6. Pro-cyclical inflation: Expected debt cost ratio and risk (scenario risk) – 0, 50 and 100% inflation-linked debt**

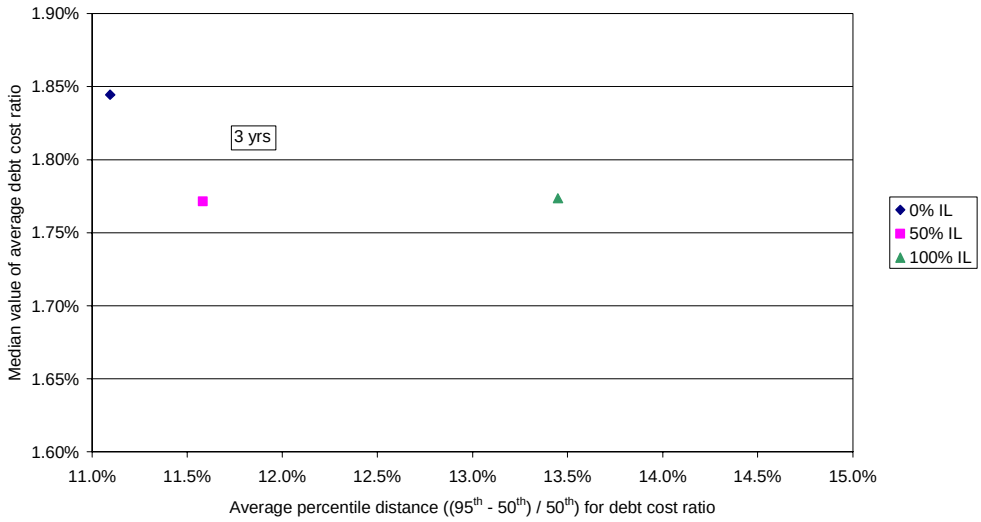


**Figure 7. Pro-cyclical inflation: Expected debt cost ratio and risk (time series risk) – 0, 50 and 100% inflation-linked debt**

In the second scenario, inflation is counter-cyclical, with inflation of 1 per cent during the boom and 3 per cent during the recession. In such a scenario, inflation-linked bonds are very risky, since a negative association arises between their costs and GDP growth. The costs tend to be high when growth is low and vice versa, which leads to greater variation in the debt cost ratio. As a consequence of this, the most advantageous portfolio in terms of risk will be the portfolio that only contains nominal bonds, something that is also apparent from Figures 8 and 9. However, it

is still possible to achieve diversification effects even in this scenario, by using a portfolio that contains both nominal and inflation-linked bonds.

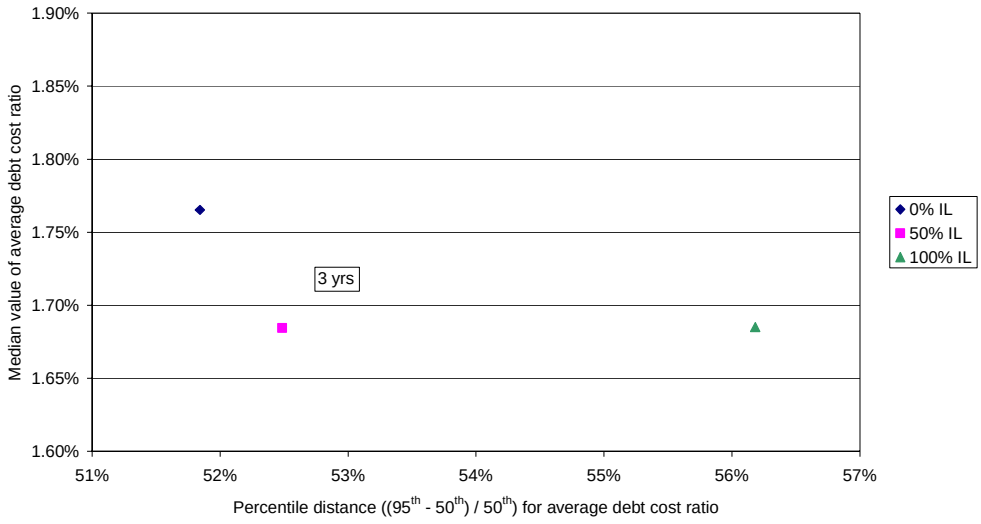


**Figure 8. Counter-cyclical inflation: Expected debt cost ratio and risk (scenario risk) – 0, 50 and 100% inflation-linked debt**

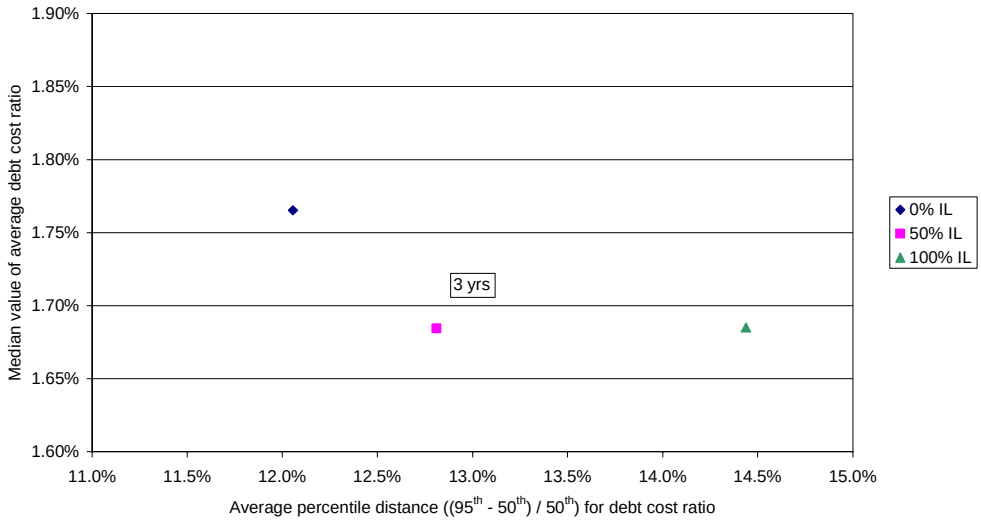


**Figure 9. Counter-cyclical inflation: Expected debt cost ratio and risk (time series risk) – 0, 50 and 100% inflation-linked debt**

The two experiments that are presented above provide examples of the mechanisms discussed in Section 3.3. But they also show that the quantitative differences in risk between the portfolios are small. As pointed out earlier, it cannot be ruled out that this is an effect of the design and/or parameterisation of the

model. Even with cyclical change in inflation, the model is an image of a very well-functioning economy, without severe shocks, which may explain why it is difficult to discover any significant risk diversifying or hedging effects of inflation-linked loans. Of course, it may also be that the model provides a realistic picture of reality, i.e. that the effects are actually comparatively small, and that only in certain extreme economic situations, for example in case of deflation, will inflation-linked loans definitely help to lower the costs of government debt.

The interesting question is thus whether the small differences in risk between portfolios with different percentages of inflation-linked bonds is a true and fair picture of reality, or whether they are due to model-specific factors such as the structure, parameterisation or portfolio administration of the model. One interesting experiment is therefore to utilise an actual set of economic events, instead of those generated by the economic simulation model.

### 4.3.5 The model using historical data

In this experiment, the Debt Office examines the outcome of different strategies if, instead of simulated macroeconomic and financial variables, it uses actual data on short-term and long-term interest rates, real GDP, CPI and government borrowing requirements for the period 1971-2000, and uses the model only to administer the portfolio and to calculate costs and risks.[4] This experiment, too, examines the three strategies of 0, 50 and 100 per cent inflation-linked bonds.

The historical period that is being used includes more extreme events than the macro model generates. At the same time, one must remember that history is history and actually only says something about what has happened, and not anything about what will happen in the future. The historical material may, however, help us to understand the interplay between inflation-linked and nominal bonds in a better way, above all concerning the insurance aspect discussed in Section 3.3.

The last-mentioned effect is apparent when one plots the three portfolios (0, 50 and 100 per cent inflation-linked bonds) through the historical period. The result in Figure 10 shows that between 1971 and 2000 there were at least two occasions when the costs of a portfolio with only inflation-linked loans and a portfolio with only nominal loans would have moved in opposite directions. It is therefore obvious that a portfolio with both inflation-linked and nominal bonds would have led to a development where the most extreme outcomes could have been avoided. In other words, one can look at inflation-linked loans in this context as a type of insurance or hedging.

[4] Since inflation-linked bonds were not introduced until 1994, there are no data on real interest rates before that. This experiment therefore assumes that the real interest rate was 3.5 per cent throughout the period. An alternative would be to try to estimate the association between real and nominal interest rates using some econometric method and then use the results to estimate real interest rate figures before 1994. However, the Debt Office has found, in another exercise similar to this one, that the qualitative results between using such interest rate series and a constant interest rate do not differ.

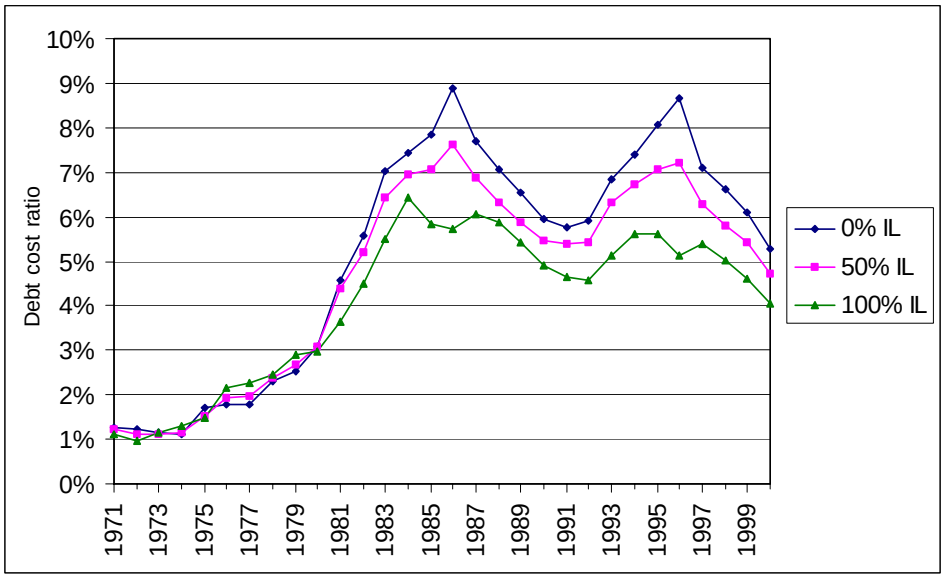


**Figure 10. Cost changes in the model using factual data – 0, 50 and 100% inflation-linked debt**

## 4.4 Summary and conclusions

The Debt Office is using an internally developed simulation model in order to analyse different portfolio strategies from a cost and risk perspective. The model includes both Swedish nominal and inflation-linked bonds, as well as loans in foreign currencies. The simulation model is stochastic, i.e., it is based on random generation of a large number of conceivable economic scenarios and, using these, calculating the costs of different portfolio strategies.

The model consists of two portions: a macroeconomic portion that simulates economic developments, and a strategy portion that calculates the costs that different strategies give rise to, assuming these economic developments. The economic model covers three economies: Sweden, the euro area and the US. For each of these three economies, it simulates real GDP, inflation, short-term and long-term interest rates as well as exchange rates. For Sweden, it also simulates the borrowing requirement, nominal GDP and the interest on inflation-linked bonds. The Debt Office's model is designed in such a way that the financial variables depend on the changes in the macroeconomic variables GDP and inflation.

The Debt Office is examining strategies that primarily differ in terms of the share of inflation-linked bonds. In the first round, it examines portfolios with 0, 10 and 20 per cent inflation-linked bonds. After that, the interval is increased to 0, 50 and 100 per cent. The costs that are calculated in the model are mainly cash flow-based, i.e. include only coupon payments and the actual effects of changed exchange rates and CPI changes that occur when bonds mature or are repurchased.

The conclusion of the Debt Office's model analyses is that there are small differences in risk between portfolios with different shares of inflation-linked bonds. Even if the Debt Office examines the entire interval between portfolios containing 0 and 100 per cent inflation-linked bonds, it obtains no results that indicate that there would be clear diversification effects from mixing inflation-linked and nominal bonds. Whether inflation-linked bonds or nominal bonds are less risky varies somewhat with parameterisation and risk measures, but the differences between them are not economically significant in any event.

In other words, the Debt Office's simulation model provides no quantitative support for risk diversification in the traditional sense, i.e. a continuous risk-decreasing effect, from the inclusion of both inflation-linked and nominal bonds in the central government debt portfolio. In order to examine to what extent this is an effect of the fact that the simulation model describes a well-behaved economy without genuine shocks, the Debt Office has used the model's strategy portion to analyse what costs the historical developments that occurred during 1971 – 2000 would have given rise to. This analysis reveals that a mixture of types of debt would have had a risk-decreasing effect historically. By having both inflation-linked and nominal loans in the portfolio, on at least two occasions Sweden could have clearly limited the effects on the debt cost ratio of interest rate and/or inflation shocks. The historical material thus supports the qualitative argument in Section 3.3.

# 5 Inflation-linked bonds in practice

## 5.1 Points of departure

The analyses in Sections 3 and 4 indicate that there is reason to include inflation-linked bonds in the government debt portfolio. However, these arguments have primarily dealt with the effects of risks and to a lesser extent have considered the costs of increasing the share of inflation-linked loans. Before making decisions about how to handle the inflation-linked debt, the practical differences between financing via inflation-linked and nominal bonds must be taken into account.

Nominal bonds are the core product in the fixed-interest markets of all countries. They are the object of large-scale national and international trading. As a result, the markets for these bonds are deep and liquid. In other words, the central government can use nominal bonds to borrow large amounts without more than marginally affecting the borrowing terms. In comparison, inflation-linked bonds are a small product. Few countries have inflation-linked bond markets of any significance, and the markets for them are less liquid and less internationalised. At least initially, this limits the central government's potential for issuing inflation-linked bonds.

At the same time, the fact remains that inflation-linked bonds are a unique financial instrument. They offer both issuers and investors an opportunity to improve the characteristics of their portfolios compared to a situation where no inflation-proof

instruments are available. A priori, there is thus reason to maintain that (some share of) inflation-linked instruments should be part of every long-term asset portfolio. Inflation-linked investments should be attractive.

As a borrower, the central government must take into account how much it costs to achieve these favourable effects, which in turn depends on the extent to which investors are interested in supplementing their portfolios with inflation-linked bonds. In this section, the Debt Office will discuss some aspects of the conditions for increasing the share of inflation-linked bonds in government debt at reasonable costs.

## 5.2 Market conditions for inflation-linked bonds

As mentioned, inflation-linked bonds are a marginal product in most of the world's bond markets. Except in the United Kingdom, where special institutional conditions prevail, it has been difficult to bring demand for, and trading in, inflation-linked bonds permanently up to speed. In Sweden, most issues of such bonds occurred during the years 1995–1997. That period was characterised by relatively high real interest rates, but since inflationary expectations and uncertainty – and thus also long-term nominal interest rates – were high, it was judged advantageous for the central government to issue inflation-linked loans. Since these inflationary concerns turned out to be unjustified, inflation-linked borrowing also resulted in lower costs, viewed in hindsight.

In recent years, the differences between nominal and real interest rates have been smaller, which can be interpreted as meaning that it has been relatively cheap for investors to protect their savings against inflation. (The other side of the coin is that it has been relatively expensive for the central government to borrow in inflation-linked form, causing the Debt Office to keep supply down and periodically suspend all issues of inflation-linked bonds.) Despite the low insurance premium, the demand for inflation-linked investments has been small. The question is whether this sluggishness is due to temporary, and thus surmountable, factors or whether inflation-linked bonds can be expected to remain a hard sell in the future as well.

If one approaches inflation-linked loans as a unique asset class with an obvious place in well diversified portfolios, these difficulties appear surmountable. For example, the sluggishness may be due to the fact that in a market that is still young, investment decisions are controlled to an excessive degree by market participants who compare these bonds with nominal bonds and measure the results in nominal terms. In this context, inflation-linked bonds appear low-yielding and difficult to trade. In addition, the special conditions prevailing in recent years have both focused people's interest on equities and reduced their concerns about inflation. However, uncertainty about the stock market has increased in the past few years, leading to greater interest in fixed-income products. Inflation has also showed greater fluctuations than expected, which might increase interest in inflation-linked investments. Another factor is that nominal interest rates remain low. When

nominal interest rates are around 5 per cent, even small differences in the average inflation rate, say between 1.5 per cent and 2.5 per cent, play a role in actual real return on a long-term nominal bond. To this extent, the behaviour of investors has not adjusted to the downturn in interest rates during the past few years.

By doing continued informational work, the Debt Office should be able to persuade those responsible for strategic portfolio decisions of the favourable characteristics of inflation-linked bonds. Once inflation-linked loans have become part of the benchmark portfolios of asset managers, demand will increase. Furthermore, long-term savings are increasing, both in the private sector and in publicly regulated forms. Here inflation-linked investments have a natural place. Over the past few years, these savings have been channelled largely into equities. The realisation that a portfolio supplemented with inflation-linked bonds carries a lower risk for a given expected return should gain ground over time. The significance of small differences in average inflation during periods of low interest rates should also generate more attention, the more well-established lower interest rates become.

The proposal in the budget bill for 2002 that certain government agencies' inflation-linked account holdings with the Debt Office be transformed into conventional inflation-linked bonds will increase supply and activity in the inflation-linked bond market. This, in turn, may have positive effects on private investors' interest in inflation-linked bonds. In a somewhat longer perspective, EMU accession could increase Swedish investors' interest in inflation-linked bonds, since uncertainty about inflation will probably be greater in EMU than in a domestic inflation target regime.

Viewed in this perspective, the central government should be persistent. Information will eventually reach investors, and their interest in inflation-linked bonds will awaken. Demand will then increase, and interest rates will become more advantageous for the central government as a borrower. This, in brief, is the positive scenario for inflation-linked bonds.

However, there are also factors that point in the opposite direction. One is related to the fact that a general internationalisation of the savings market is underway. Many investors conclude that domestic assets account for too large a share of their portfolios. This is true of both Swedish and foreign investors. There is consequently reason to expect both outflows and inflows on a considerable scale. This may be a development that is unfavourable to inflation-linked bonds, since foreign investors ordinarily have no interest in insuring themselves against Swedish inflation. Only particularly sophisticated market participants are likely to view exposure to CPI risks in various countries as an exciting investment strategy. Consequently, a small share of the long-term inflow of foreign capital to Sweden may end up in inflation-linked bonds. A significant increase in inflation-linked borrowing may thus require that Swedish investors reallocate their savings towards inflation-linked bonds.

This is probably also true in case Sweden joins EMU. The central government's inflation-linked bonds are pegged to the Swedish CPI and should probably remain that way. Firstly, in this way they provide the best inflationary protection to Swedish investors. Secondly, the Swedish CPI is more closely connected to government finances than is a price index for all of EMU or a foreign price index. CPI indexation thus makes inflation-linked bonds less risky for the government. Even in the event of EMU membership, Swedish inflation may vary substantially in relation to inflation in other EMU countries, since Sweden would have little weight in the union. Investors who wish to insure themselves against general inflation in the euro area will prefer, for example, French inflation-linked bonds, since France has larger weight in common monetary policy.

Looking at the financial portfolios of Swedish households, there appears to be a great deal of room for an expansion of inflation-linked bonds. Household portfolios are dominated by equities. Although equities are often called "real-term" assets, they usually provide poor protection against unexpected inflation. However, the claims of households on the publicly administered pension system should be added to personal financial savings. It then turns out that the income-based pension has striking similarities with an inflation-linked bond whose return is tied to average wage and salary growth. Granted, prices and wages may grow at different rates. Nonetheless it is not obvious that the average saver has too small a share of inflation-linked savings.[5]

Few household savers conduct an overall analysis of their assets in which they include their entitlements from the publicly administered pension system. Consequently, this is hardly the reason why such a large portion of household financial savings are invested in equities. However, the degree of sophistication in the savings decisions of Swedish households is likely to increase. This perspective on household savings decisions is thus relevant to the conditions for increasing the share of inflation-linked bonds in overall government debt.

## 5.3 Diversification vs. effective borrowing

Swedish central government debt has decreased sharply in recent years. Given the long-term forecasts of a return to a positive borrowing requirement and room to continue shifting from foreign currency borrowing to krona borrowing, however, there is currently no need to decrease the number of loan instruments.[6] Thus, the size of the debt does not, in itself, limit the room for increasing inflation-linked borrowing.

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[5] This argument ignores the fact that the National Pension Funds largely hold equities and that activation of the automatic balancing mechanism, due to poor return in the pension system's buffer funds or other reasons, may cause a deterioration in wage-indexation. From a matching standpoint, one may meanwhile argue that the real-term obligations of the pension system make inflation-linked bonds a natural instrument for the buffer funds. Depending on the inclination of the buffer funds to take risks, these may thus eventually hold a sizeable share of their assets in the form of inflation-linked bonds.

[6] The shift to SEK borrowing will occur regardless of the pace at which foreign currency debt is amortised, as long as the Debt Office creates all foreign currency debt through SEK/foreign currency swaps.

The long-term trend of government debt is uncertain. For example, if the Government should decide to divest state-owned assets or if the debt should decrease for other reasons, this would raise the question of whether there is room for more than a certain number of nominal bond issues. Since inflation-linked loans are typically issued for long maturities and are relatively illiquid – and thus costly to repurchase – large inflation-linked borrowing implies more inflexible debt commitments than the equivalent nominal loans. Government debt may also grow more than predicted. In that case, it is an advantage if the government has issued long-term inflation-linked loans, since the refinancing requirement (all else being equal) will be lower.

One way of weighing these factors against each other may be to continue issuing inflation-linked loans, but to choose an average maturity somewhat shorter than thus far. Even with an emphasis on somewhat shorter-term loans, inflation-linked debt would have substantially longer maturity than nominal debt and would thereby help lower the refinancing risk. At the same time, this would reduce the risk of being locked into loans with maturities more than two decades in the future.

## 5.4 Should the Debt Office maintain the inflation-linked debt market even when borrowing conditions are unfavourable?

The experiences of the past few years indicate that investors have little desire to pay for inflation insurance in periods when the inflation rate is stable and the official inflation target is credible. In other words, demand for inflation-linked loans has been low. Under such circumstances, the premium that the central government can earn by assuming the inflation risk is small or even negative, since the nominal interest rate minus expected inflation is lower than the interest rate on inflation-linked bonds. The diversification advantages of inflation-linked loans thus become expensive. The value of this diversification may also appear small for as long as the official inflation target is credible. The question is whether the government should stop issuing inflation-linked bonds (and perhaps even repurchase the outstanding inflation-linked bonds), since Sweden nowadays has an established and credible low-inflation regime.

The answer depends on one's assessments of the future and the degree of risk aversion that one practises. There might once again be reasons for issuing inflation-linked loans if the economy ends up in a situation of high inflationary expectations and/or great uncertainty about inflation. In that case, long-term nominal interest rates will be high. Short-term interest rates will probably be at least as high, since the central bank may need to demonstrate through tight monetary policy that inflationary concerns are unfounded. In that case, nominal borrowing will appear expensive compared to inflation-linked borrowing. This corresponds to the situation that prevailed when the Debt Office issued most of the current stock of inflation-linked loans. If the government is prepared to believe in its own inflation

target, it is reasonable to move a portion of the issues to inflation-linked instruments. There is also reason to believe that investor demand for inflation insurance is greater in periods of inflationary concern. In that case, it is advantageous if there is an established market for inflation-linked loans, so that the government can quickly change the structure of its debt issues.

The discussion in Section 3 indicates that EMU accession would probably contribute to a more variable Swedish inflation rate. The Debt Office also notes that inflation-linked bonds might possibly help stabilise the debt cost ratio in EMU more than under a domestic inflation target.

Since one cannot rule out the possibility that the resilience of the inflation target may come into question or that deviations from the target may occur – inside or outside EMU – there is thus an insurance argument for the central government to continuously maintain the inflation-linked bond market. One element of such market maintenance may be to issue at least small amounts of inflation-linked bonds even during periods when the direct borrowing costs may appear high.

It can be noted that a corresponding insurance argument has sometimes been discussed as a reason for the government to continue borrowing in foreign currencies. Foreign currency loans may also be a favourable alternative in situations where domestic nominal interest rates are high and the local currency is meanwhile probably undervalued. As the Debt Office has stated earlier, however, the contingency-related reasons for continuous borrowing in foreign currencies are weak. The infrastructure of the international capital market will be in place regardless of whether the Kingdom of Sweden is regularly active as a borrower. No equivalent market, established without efforts by the central government, exists for inflation-linked bonds. In other words, the infrastructure argument has greater weight. Meanwhile the fact remains that the more expensive it is to keep the inflation-linked bond market going, the more advantageous it is to use the international market instead as a safety valve if the government needs access to loans other than nominal krona ones, despite the accompanying extra risks.

Given this point of departure, one possible conclusion is that the central government may have reason to maintain a market for inflation-linked bonds to be able to move borrowing from nominal to inflation-linked instruments during periods when the conditions are favourable. The precondition is that the additional costs of keeping the inflation-linked loan market going are not perceived as too high. On the other hand, this approach does not justify increasing the share of inflation-linked loans in government debt. In this case, the insurance mechanism refers to the possibility of reallocating the flow of new borrowing from nominal to inflation-linked loans, while the diversification arguments in Section 3 focus on the advantages of having a debt portfolio that contains a certain share of inflation-linked loans.

## 5.5 Market maintenance strategy for inflation-linked loans

Market maintenance is an important element of the Debt Office's general borrowing strategy. The task of developing the market is extra important for a relatively new type of debt. The Debt Office sells inflation-linked bonds via auctions in which four dealers are authorised to participate. These dealers have undertaken to act as a link to investors and to promote a broadening of the investor base. This means, for example, that via seminars and analyses, they try to increase people's knowledge of inflation-linked bonds. The dealers also have a responsibility to the Debt Office for the promotion of a smoothly functioning second-hand market. Those who wish to be dealers must apply for this in advance each year and describe their business plans for inflation-linked bonds. The Debt Office pays commissions to the dealers.

Trading in inflation-linked bonds is characterised by the difficulty of covering the risk that arises when a dealer buys or sells such bonds. In other markets, there are numerous participants with contrasting interests and derivative instruments. This results in high liquidity and makes effective risk management possible. In order to facilitate risk management for dealers, and thereby improve liquidity, upon request the Debt Office carries out exchanges between inflation-linked loans. The Debt Office also allows dealers to borrow inflation-linked bonds via repos in cases where they have sold bonds and have then had difficulty covering their position.

In recent years, the Debt Office has also organised and participated in investors' conferences both in Sweden and internationally aimed at persuading new investors to consider buying inflation-linked bonds. One interesting possibility is to increase informational activities to include smaller investors and households as well. The Debt Office offers inflation-linked savings both via conventional inflation-linked bonds and within the National Debt Savings (RiksgäldsSpar) system. The Debt Office intends to continue providing information about inflation-linked savings products and their characteristics. In order to create genuine demand from large investors, it is crucial that there also be demand for and knowledge of inflation-linked bonds among private individuals. If the Debt Office succeeds in awakening an interest in inflation-linked bonds among the broad general public, the behaviour of larger investors will also be affected. The Debt Office thus believes that, under the current market conditions, providing broad-based information about the characteristics of inflation-linked bonds should have the potential to elicit a good response. It should also be possible to persuade more mutual fund companies and other financial intermediaries to add inflation-linked bonds to their array of savings products.

In this context, it is important to note that although the market situation for inflation-linked bonds seems better than previously, the task of developing the market must be viewed in a long-term perspective. It is a matter of establishing a new asset class in the Swedish financial market, which takes time.

## 5.6 Conclusions

Inflation-linked bonds are an instrument with interesting characteristics from the standpoint of government debt policy. As the Debt Office states in Section 3, there are good reasons in principle for the central government to finance a considerable share of its debt with inflation-linked loans in order to improve the risk characteristics of government debt. The results of the studies presented in Section 4 provide little guidance as to how large this share should be, since the differences between nominal and inflation-linked loans appear insignificant. Given that they can differ substantially in more extreme situations than those that are captured by the Debt Office's simulation model, the advantages of inflation-linked loans from a risk standpoint still outweigh the disadvantages. If the goal were to minimise risks, the Debt Office would not hesitate to propose that the share of inflation-linked loans in the total debt portfolio be increased from the current 8 per cent. A share of, say, 15–20 per cent would probably be required in order to provide significant diversification effects.

However, the goal of central government debt management is to minimise costs, and weighing in risks is a restriction on the problem of minimising costs. It is thus necessary to take into account the costs of increasing the share of inflation-linked debt. Experiences to date, especially from recent years, indicate that the demand curve for inflation-linked bonds is sloping upward, i.e. in order to issue significantly larger volumes of inflation-linked bonds, the central government must offer real interest rates that are high compared to nominal interest rates. Under these circumstances, the government would be forced to pay a premium in order to increase the share of inflation-linked bonds. Given the advantages from a risk standpoint, the government may be prepared to pay a certain premium, but due to its cost minimisation goal, its willingness to pay is limited.

The practical conclusions about the role of inflation-linked bonds in the central government debt portfolio thus depend largely on the extent to which there is reason to expect greater interest in inflation-linked investments in the long term. One related question is whether, and in what way, the Debt Office can help to broaden the market for inflation-linked bonds. In the Debt Office's judgement, continued broad informational efforts may lead to increased interest in inflation-linked bonds. This is especially true in an environment where equity investments again seem risky.

As the Debt Office reports above, it can point to both positive and negative factors when assessing the outlook for the inflation-linked bond market. The weightiest positive argument is the unique characteristics of inflation-linked bonds and their favourable effect on the relationship between expected return and risk in financial portfolios. Among the offsetting arguments is the fact that so far, investors have shown limited interest in taking advantage of these characteristics. In the opinion of the Debt Office, in a long-term evaluation the positive factors outweigh the negative ones. The Debt Office thus believes that there is potential for developing

the inflation-linked bond market. Its continued ambition should therefore be to increase the share of inflation-linked loans in government debt at reasonable cost. The Debt Office wishes to emphasise that such work should have a long-term perspective. Among other things, this implies that there is no reason for the government to quickly increase the share of inflation-linked debt.

As the Debt Office pointed out above, the terms of inflation-linked borrowing vary over time. One reason is that inflationary expectations and inflationary uncertainty are not constant, even in a regime characterised by fundamental faith in monetary policy targets. Developments in the asset markets may also influence interest among market participants in keeping a certain share of their portfolios in safe investments. As part of a long-term effort to increase the share of inflation-linked instruments in central government debt, the guidelines should therefore be formulated in such a way that the Debt Office has the opportunity to adjust the pace of issues to the market situation and current borrowing conditions.

# 6 Proposed guidelines

## 6.1 Introduction

The main points in the Government's previous decisions on guidelines for central government debt management have been to state benchmarks and limits for the amortisation of foreign currency debt and for inflation-linked borrowing. It follows from this that the remaining gross borrowing requirement is to be covered by nominal borrowing. In addition, the Government has set benchmarks for the duration of the aggregate krona and foreign currency debt, as well as for the maturity of new borrowing in the form of inflation-linked bonds. Beyond this, the Government has controlled the maturity profile by stating a maximum level for the share of central government debt that may mature during rolling twelve-month periods. As Section 2 indicates, the Debt Office has found no reason to propose any significant changes in the structure of these guidelines. It is therefore, in principle, expressing this year's proposed guidelines in the same way as the guidelines now in force. However, the Debt Office proposes that the existing detailed directives for the maturity profile should be removed.

In last year's guideline decision, the Government stated that in future, the time perspective in the guidelines should be three years in order thereby to cover the same period as the expenditure ceiling for the central government budget. In keeping with that structure, the Debt Office is presenting proposals on preliminary guidelines for 2004, as an expression of its long-term strategic direction, as well as binding guidelines for 2002.

## 6.2 Foreign currency debt

**The Debt Office's proposal:** The Debt Office proposes that the benchmark for amortisation of foreign currency debt during 2002 should be SEK 25 billion. The Debt Office should be allowed to deviate from the stated amortisation rate by SEK -25 and SEK +10 billion, respectively. The benchmark for amortisation of foreign currency debt in 2003 and 2004 should be stated as SEK 35 billion.

### 6.2.1 Guidelines now in force

In November 2000, the benchmark for the amortisation of foreign currency debt during 2001 was set at SEK 35 billion. The Government also decided that the Debt Office may deviate by SEK ±15 billion from the specified amortisation rate. The Government stated that the Debt Office was to use this flexibility to support the goal of minimising costs while taking risk into consideration, and it mentioned changes in the borrowing requirement and strategic assessments of the krona exchange rate among factors to consider.

In December 2000, the Debt Office decided to lower the amortisation rate during 2001 to SEK 25 billion on grounds that the krona was deviating from its long-term warranted value and that it was therefore expensive to repay the central government's foreign currency loans. Due to further weakening of the krona, the Debt Office announced in June 2001 that borrowing plans would aim at amortisations of SEK 20–25 billion, as close to the lower limit of the guideline interval as possible. In July, the Government decided to change the benchmark for 2001 to SEK 25 billion. In its decision, the Government cited the low value of the krona and the fact that the Debt Office had utilised the interval stated in the original guideline decision. The Government considered it important that the Debt Office be given the opportunity to slow the pace of currency exchange in the event this was judged appropriate in order to reduce the costs of government debt management. At the same time, the Government emphasised that its continued point of departure and ambition is a long-term reduction in foreign currency debt. As a consequence of the amended guidelines, the Debt Office decided to lower its amortisations of foreign currency debt to SEK 10–15 billion during 2001.

### 6.2.2 Deliberations and proposal concerning 2004

Since the long-term goal of debt management is essential in deciding what direction one should move in the short term, the Debt Office will first deal with the question of its policies for 2004. In the Debt Office's opinion, the analysis that led to the conclusion that the foreign currency share of total government debt should be reduced in the long term remains valid. If anything, the view that foreign currency debt is associated with greater risk than krona debt has been strengthened by the large exchange rate movements that have characterised 2001. Nor, when it comes to the trend of government finances and the relationship between the budget balance and the pace of amortisation, has any essential new information emerged

that changes the assessments made last year. In this context, it should be noted that the foreign currency share of the total debt has increased so far this year. This is partly due to transfers of krona bonds from the National Pension Fund (AP Funds) and the Riksbank, which reduced total debt without affecting foreign currency debt. In addition, amortisations during the year have been less than those required in order to reduce the foreign currency share. Furthermore, the weakening of the krona is causing foreign currency debt to increase slightly, despite the amortisations during 2001. At year-end 2000, foreign currency debt including debt management transactions was SEK 391.6 billion. On August 31, it was reported as SEK 392.4 billion. This was equivalent to one third of total debt. Due to unevenness in the maturity profile, a slight additional increase is expected by year-end 2001 (at unchanged exchange rates).

The Debt Office believes that there is a value in using long-term considerations as the basis for the strategic direction in the guidelines concerning the pace of amortisations. The conclusion that the share of foreign currency debt in total government debt should, in the long term, be reduced rests on assessments of what constitutes an appropriate debt portfolio for the central government. This assessment does not include the current value of the krona. Instead, the decisive factor is that due to fluctuations in the value of the krona, foreign currency debt is associated with higher risk than krona debt without offering any cost advantages. Consequently there is no reason to change the long-term direction of policy by citing the krona exchange rate. Considering the fluctuations in these exchange rates, moreover, it is not meaningful to allow the strategic direction for 2004 to be determined by the level of the krona during the autumn of 2001.

In light of this, the Debt Office proposes that the benchmark for amortisation of foreign currency debt in 2004 be stated as SEK 35 billion. This is the same pace that last year's guideline decision specified for the period 2001–2003.

### 6.2.3 Deliberations and proposal concerning 2002

Given that the goal remains a long-term reduction in the foreign currency share of total debt, the next question is how the guidelines for management of foreign currency debt during 2002 should be formulated. This concerns whether the benchmark should be set at SEK 35 billion, in keeping with last year's long-term direction, and what interval around the benchmark should be stated as a basis for management of the foreign currency mandate.

In the judgement of the Debt Office, the *primary* point of departure should be to set the benchmark at SEK 35 billion. As indicated above, this figure is an expression of the desire to reduce the foreign currency share in the long term. Furthermore, as the Government emphasised in last year's decision, the time perspective of the Government's guidelines should be relatively long. From the standpoint of principle, the value of the krona at the time when the Debt Office submits its proposed guidelines for the management of government debt should therefore not

be of crucial importance. Exchange rates fluctuate so much, even in a one-year perspective, that the value of the krona in the autumn of 2001 provides no stable foundation for predicting developments during 2002. Besides, the benchmark is surrounded by an interval that will enable the Debt Office to slow the pace of amortisation if the krona is judged to be undervalued when the guideline decision goes into effect, in the same way as occurred this year.

If during the autumn, the krona should remain at the weak levels that have prevailed so far during 2001, however, it would be illogical to set a benchmark of SEK 35 billion. Firstly, in July the Government decided to lower the benchmark for the amortisation rate from SEK 35 billion to SEK 25 billion, citing the weakness of the Swedish krona. Secondly, the Debt Office has decided to slow the pace of foreign currency debt amortisation to the lower limit of the new interval, also citing the weakness of the krona. To then propose SEK 35 billion, when the krona has not strengthened significantly, would not be consistent with these earlier decisions. In that case, the Government would need to revise its decision within one or a few months if the krona exchange rate remains unchanged. As the Government has stressed, such revisions should only occur in exceptional cases. The Government should thus state a benchmark and an interval that make it possible to cope with different exchange rate scenarios without requiring extra Government decisions, other than in exceptional cases.

In the Debt Office's judgement, the krona will strengthen during 2002. Supporting this view is the good fundamental trend in the Swedish economy plus the fact that Swedish assets ought to appear attractive to foreign investors at today's krona level. However, there is great uncertainty surrounding this judgement, and it is reasonable to assume that on average, the krona will be weak next year compared to previous forecasts, due to the exchange rate level that has been established during 2001. In addition, due slower growth, the surplus in central government finances is expected to be lower than according to earlier estimates. The Debt Office therefore believes that it is reasonable to continue next year to amortise the foreign currency debt at a more sedate pace than the preliminary guidelines for 2002 would indicate. Taken together, this points towards a benchmark of SEK 25 billion, the same as in the guidelines currently in force.

Given the krona levels noted in recent months, during short or long periods it may be justified to refrain from amortisations. In the Debt Office's judgement, however, it would be unsuitable to change the benchmark for this reason. This would mean constraining the guidelines to fit the assumption that the krona will remain weak throughout next year. If the krona strengthens to more normal levels, a new extra Government decision would be required to enable the Debt Office to adapt its amortisations to the new circumstances.

A more suitable way of adapting government debt management to the extreme conditions prevailing in the foreign exchange market is to expand the flexibility of the guidelines, primarily downward. Given a benchmark of SEK 25 billion, an

interval of SEK -25 billion and SEK +10 billion would enable the Debt Office to refrain from amortisations if the krona remains weak. The upper limit of the interval corresponds to the long-term direction of SEK 35 billion per year. With such a mandate, it should be possible to manage foreign currency amortisations in a cost-effective way without extra guideline decisions during the year, in principle regardless of how the krona performs. Under normal conditions, an interval of SEK ±15 billion provides a suitable balance between control and flexibility in the management of the foreign currency debt, but the Debt Office believes that an exception is justified, considering the volatility of the krona.

In light of this, the Debt Office proposes that the benchmark for amortisation of foreign currency debt during 2002 be set at SEK 25 billion, unchanged from the guidelines now in force. This is lower than the Government stated in last year's decision as its preliminary strategic direction. The reason is that the krona is initially at low levels and that the average during 2002, despite an expected strengthening of the krona, can be assumed to be lower than previous forecasts have indicated. The Debt Office further proposes an interval of SEK +10 billion and –25 billion around the benchmark. This asymmetric interval is an adjustment to the extreme movements that have characterised the Swedish krona over the past year.

### 6.2.4 Exchanges between kronor and foreign currencies

**The Debt Office's proposal:** As an adjustment to the task of administering amortisations of foreign currency debt more actively, the Debt Office should be given more flexible opportunities to exchange foreign currencies and Swedish kronor. Through an amendment to its instruction, the Debt Office should be empowered to exchange currencies directly with counterparties other than the Riksbank. Like other parts of government debt management, the administration of the Debt Office's currency exchanges should be characterised by predictability and clarity.

*Background*

According to Article 13 a of the instruction (1996:311) for the Debt Office, the Debt Office must carry out all exchanges between kronor and foreign currencies via the Riksbank (unless the Riksbank refrains from performing the exchange, which has not occurred to date). Since the central government is amortising foreign currency debt and paying interest on outstanding foreign currency debt, the Debt Office makes net purchases of foreign currencies, which the Riksbank initially withdraws from its foreign currency reserve. To offset the effects on the foreign currency reserve, the Riksbank has chosen to buy a predetermined amount of foreign currencies during a given period every trading day, based on the Debt Office's planned amortisations and interest payments. The Riksbank previously fixed the daily exchange amount on a half-yearly basis, but during 2001 several changes have been made. Firstly, the exchanges were increased during a period in January and February to compensate for a payment to the EU that the bank had

made via the foreign currency reserve. Secondly, after the Debt Office's decision in August to slow the pace of amortisation, the Riksbank decided to switch to weekly currency exchanges during the rest of the year, since the remaining amount was too small to be divided into daily exchanges. The Riksbank's purpose in making exchanges in this way is both to smooth the effects in the foreign exchange market of the Debt Office's need for foreign currencies and to distinguish purchases made to offset the Debt Office's currency exchanges from Riksbank interventions motivated by monetary and currency policy reasons.

In last year's guideline decision, the Government made it clear that for the purpose of minimising the costs of government debt management, the Debt Office may weigh in the value of the krona when deciding how to administer the variation interval in its foreign currency mandate. The Debt Office has done so during 2001, thereby establishing a new practice. In order for more active administration of foreign currency amortisations to result in overall savings for the government, corresponding changes must occur in the transactions undertaken with players outside the government sector. This is not generally the case with the existing system of currency exchanges via the Riksbank.

Reallocations in time within the framework of a given pace of amortisation currently have no impact on overall central government costs, since the Riksbank makes its exchanges in the foreign exchange market at a uniform pace. More lasting changes in the pace of amortisation affect the government's costs only once the Riksbank alters its daily exchange amount, which may occur after a time lag. Any savings for the Debt Office thus risk being offset by higher expenses for the Riksbank (or vice versa). Since the Riksbank's costs affect the bank's transfer to the Treasury, the net result to the central government is zero. In order to satisfy the Riksbank's need for background information for decisions on its daily exchanges, the Debt Office must also announce its amortisation plans in detail. This is normally not appropriate from the standpoint of government debt policy, since it risks raising the costs.

In light of this, the Debt Office believes that the existing system should be reassessed. The goal should be to find a solution that is adapted to the Debt Office's task of more actively administering the amortisation mandate, among other things by weighing in changes in the value of the krona for the purpose of minimising costs.

The rigidities of the existing system are largely related to the Riksbank's method of administering currency exchanges in the market. Its method is determined, in turn, by the bank's need to distinguish between compensatory foreign currency purchases connected to the Debt Office's transactions, on the one hand, and monetary policy interventions, on the other. A solution in which the Debt Office has the option of choosing counterparties other than the Riksbank would thus permit more flexible administration of these exchanges. Decisions on these

exchanges would thereby also become a means of lowering the costs of government debt. The Debt Office outlines a proposal for such a solution below.

*Proposed system for administering the Debt Office's foreign currency exchanges*

Predictability and transparency are important elements in the Debt Office's overall strategy. Via guideline decisions, pre-announced borrowing strategies, speeches etc., market participants should be able to form a good picture of how government debt policy is conducted. This decreases uncertainty and lowers the return requirements of investors. Predictability is thus a means of lowering state debt costs. A system in which the Debt Office exchanges currencies should be characterised by the same principles. As a small market participant, the Debt Office has little chance of influencing the foreign exchange market. But to the extent this is possible, the Debt Office has an interest in ensuring that the market works well and in avoiding disruptions, so that the necessary exchanges can be made as smoothly and efficiently as possible.

One way of finding a suitable balance between predictability and flexibility is to administer exchanges according to the practices that the Debt Office has applied for a long time to its interest rate swaps in Swedish kronor. In that case, the Debt Office states an approximate volume target for the coming period, ordinarily one calendar year, and then carries out the transactions at a uniform pace, taking into account market conditions. This model has worked smoothly and without disturbances.

Applying corresponding principles to currency exchanges would mean that the Debt Office, based on the Government's guideline decision concerning the pace of amortisations, would announce the projected annual pace of currency exchanges, i.e. amortisations and interest payments, in the same way as today. If conditions should change and the Debt Office should make a new decision on its strategic direction, the Debt Office would announce that amortisations will occur at a different pace. Within this framework, there should be a degree of flexibility. Without announcing its decision, the Debt Office should be able to choose to refrain from currency exchanges during a certain period, for example if the market for Swedish kronor is unusually thin or at times when the exchange rate is judged to be under pressure due to temporary factors. When it comes to strategic decisions, this corresponds to the practices that the Debt Office has followed during 2001. What is new about the proposed solution is that the Debt Office's decision may also directly affect currency exchanges with market players outside the central government sector, which also gives the Debt Office an incentive to take tactical considerations.

The point of departure is thus that operative administration of foreign currency exchanges – choice of formats and dates of loans and exchanges, what counterparties are used etc. – like other government debt management, shall be guided by a desire to minimise costs. These decisions should have the potential to

result in genuine savings for the central government. (Proposed principles for the evaluation of the Debt Office's administration of currency exchanges are presented in Section 7.4.)

*Consequences of the proposed system*

The purpose of the proposed structure is to improve the conditions for achieving the principal goal of government debt policy: minimising costs. This applies especially to the potential for using strategic and tactical adjustments in the pace of the Debt Office's currency exchanges in order to reduce the costs of the desired decrease in foreign currency debt. This ambition does not presuppose that the exchanges occur outside the Riksbank. However, given that the Riksbank makes its exchanges to replenish the foreign currency reserve according to a rigid pattern in order to avoid confusion with foreign exchange interventions, the existing system is inappropriate from the standpoint of government debt policy and government finances.

The question is thus whether there are disadvantages of other kinds in empowering the Debt Office to exchange currencies with counterparties other than the Riksbank. Especially relevant is whether, as a result of the proposed model, it can be demonstrated that government debt management no longer occurs within the "constraints imposed by monetary policy," as the law puts it.

Viewed in a historical perspective, the restrictions on the Debt Office's currency exchanges are based on a system characterised by the subordination of government debt policy to monetary and currency policy. Even ten or fifteen years ago, government debt policy was administered almost as a control instrument of monetary and currency policy. In other words, the administration of government debt was strongly influenced, both in policy and operative terms, by monetary and currency policy considerations. Since then, a gradual separation of these respective policy areas has occurred. When it comes to the krona debt and its administration, the separation between the Debt Office and the Riksbank has been fully implemented. The experiences of this are good. Amendments to the Act on State Borrowing and Debt Management also identified government debt policy as an independent policy area with an explicit cost minimisation goal.

Due to currency exchanges, an operative link between the Debt Office and the Riksbank remains. In the proposed guidelines it published in 1998, the Debt Office raised the question of changing the rules, but the Riksbank rejected this proposal. In its official comments, the Governing Board of the Riksbank wrote as follows:

> The risk of market disruptions [if the Debt Office exchanges currencies itself] is presumably not large, but it cannot be entirely disregarded. An impression may spread that the Debt Office possesses relevant and exclusive information on both fiscal policy and monetary policy, which may cause the market to assign a signal value to the Debt Office's exchanges. It cannot be ruled out that large

> exchanges may have undesirable effects on the foreign exchange market, despite the fact that it normally works smoothly.
>
> In a situation where Sweden is expected to have a flexible exchange rate well into the future, the problem is not large either. (…) Earlier arguments would also be of minor importance if Sweden joins EMU in the future. (…) If this occurs it is also possible that for a time, Sweden will belong to the new Exchange Rate Mechanism, ERM2. In such a fixed exchange rate regime, the risks of signalling problems are greater.
>
> In the opinion of the Governing Board, in this area it is not appropriate today to end a practice of many years' standing.

The Riksbank thus wished to preserve the existing structure, primarily as a preparatory measure for a transitional period between a decision to join EMU and the final fixing of the exchange rate during which the krona would be linked to the ERM. In other currency exchange regimes, the Governing Board saw no real problems if the Debt Office exchanged currencies outside the Riksbank. Later proposed guidelines have not discussed these currency exchanges.

In principle, the question of whether the Debt Office's currency exchanges may affect the krona exchange rate is related to the extent to which the Riksbank affects the exchange rate by its sterilised interventions in the foreign exchange market. To the extent that the effects of sterilised interventions have been identifiable in empirical studies, they have been connected with the fact that interventions have come as surprises and that investors have assumed that they provided new information on future monetary policy actions, so-called signalling effects. It is thus not primarily the size (if anything) of the interventions that is important, but how and by whom they are made.

Applied to the Debt Office's foreign exchange transactions, these results indicate that exchanges connected to a gradual and pre-announced decrease in the government's foreign currency debt should have no significant impact on the krona exchange rate. This is especially true if the exchanges are carried out in a predictable way and by a government agency not connected to the central bank, which thus cannot be assumed to have information about future monetary and currency policy measures.

In the Debt Office's judgement, this perception is reinforced by the experiences of more active administration of the amortisation mandate during 2001. The decisions to slow the pace of amortisations in relation to the benchmark have – entirely correctly – been interpreted as part of efforts to minimise the costs of reducing the foreign currency debt. The fears of signalling effects that the Debt Office expressed in last year's proposed guidelines have turned out to be exaggerated. The system of publicly announced proposed guidelines and guideline decisions on debt management has probably helped to clarify the role of government debt policy, thereby further reducing the risk of confusion with monetary and currency policy.

In the Debt Office's judgement, a structure in which its transactions can be made via counterparties other than the Riksbank may have the additional advantage in principle of further underscoring the separation between these two policy areas. As a result of the existing structure, the Debt Office's transactions receive special treatment and attract attention out of proportion to their actual importance. In this context, it may be noted that amortisations and interest payments on central government debt are the only Swedish government payments in foreign currencies that are administered in this way. A number of government agencies with large foreign currency transactions – for example the National Pension Funds, the Swedish International Development Cooperation Agency and the Swedish Defence Materiel Administration – make foreign currency payments via ordinary banks. The central government's payments to and from the EU occur via the Riksbank, but the Riksbank normally carries out currency exchanges directly in the market, i.e. it does not use its foreign currency reserve to smooth out the effects in the foreign exchange market.

As long as the Debt Office needs to buy foreign currencies, its amortisations of foreign currency debt will in themselves probably attract attention, for example in the same way as the ongoing portfolio reallocations of the AP Funds are discussed. In accordance with the above-outlined solution, the Debt Office's actions will continue to be characterised by greater transparency and predictability than those of the AP Funds. However, there is no reason to assume that the dates of the Debt Office's currency exchanges will arouse any special attention or be confused with measures related to currency policy.

*Summation*

The Debt Office proposes that the requirement that it must make all currency exchanges via the Riksbank be removed. The existing system is not adapted to the Debt Office's task of administering the amortisations of foreign currency debt more actively and weighing in the value of the krona for the purpose of minimising costs. If this restriction on government debt policy is removed, the prospects for achieving its principal goal would improve. The administration of the Debt Office's currency exchanges would also be a means of lowering the total government financial costs of the debt.

The Debt Office notes that in earlier discussions, the Riksbank has not expressed the judgement that a solution by which that the Debt Office makes currency exchanges outside the Riksbank would conflict with the requirements of monetary policy in a flexible exchange rate regime. Instead, the Riksbank has referred to a possible future fixed exchange rate system during the transition to EMU.

In the Debt Office's opinion, the administration of government debt should be adapted to the circumstances prevailing today. As the Government maintained in earlier guideline decisions, guidelines can be changed if conditions change in a decisive way. A switch in exchange rate regime may be such a decisive change, but

that issue should be examined in light of the conditions prevailing at that time. On the basis of the facts presented to date, there is thus no reason, in any case as long as Sweden has a flexible exchange rate, to administer currency exchanges in other ways than what appears to be appropriate based on the task of minimising costs. This points towards a more flexible solution that the existing one.

In light of this, the Debt Office proposes that that rules for currency exchanges in the Debt Office's instruction be amended in such a way that the Debt Office may choose counterparties other than the Riksbank. Above, the Debt Office has outlined a solution that ensures predictability and transparency as to the scale and direction of the Debt Office's exchanges, at the same time as the methods for administering and announcing exchanges is adapted to the goals of government debt policy. The purpose is thus to enable the Debt Office to use the pace of its currency exchanges as a means for lowering the costs of government debt.

The Debt Office notes that this solution does not exclude the Riksbank as a counterparty. To the extent that the Riksbank has an interest in carrying out such currency transactions and the Debt Office finds the Riksbank's terms competitive in terms of price and administration from a debt policy standpoint, it should be possible to reach mutually beneficial agreements on this.

The opportunity for the Debt Office to carry out exchanges directly in the market will require changes in its systems and procedures. The Debt Office estimates that the period between the Government's guideline decision and the end of 2001 is too short to enable the new structure to go into effect by January 1, 2002. A suitable date for an amendment in its instruction to enter into force is July 1, 2002.

## 6.3 Inflation-linked debt

**The Debt Office's proposal:** The Debt Office proposes unchanged guidelines for inflation-linked debt. The goal should thus be a long-term increase in the share of inflation-linked loans in government debt. No quantitative specification of the guidelines for 2002 should be made. Inflation-linked borrowing should be weighed against the growth in demand for inflation-linked bonds and the borrowing cost of other types of debt, with due consideration for risk.

### 6.3.1 Guidelines now in force

The Government decided last year that the share of inflation-linked debt in overall government debt is to increase. Unlike foreign currency debt, there are no numerical goals either for the share or for the pace of change. The guidelines instead state that the rate of increase will be weighed against growth in demand for inflation-linked bonds and the borrowing costs of other types of debt, with due consideration for risk.

### 6.3.2 Deliberations and proposal

The analysis in Sections 3–5 above focused on the contribution of inflation-linked borrowing to the costs and risks of government debt. As Section 5.6 indicates, the Debt Office draws the conclusion that in the long term, the share of inflation-linked debt should increase. The main reason is that inflation-linked borrowing will help to reduce the risk level in government debt. One reason why the risks will change is that economic disruptions will have a different impact on costs than if the entire portfolio consists of nominal krona and foreign currency loans. Another reason is that access to an additional form of borrowing might make it possible to borrow more cheaply if the borrowing requirement increases and if borrowing terms in the nominal market deteriorate. It is thus primarily risk considerations that justify inflation-linked loans.

In principle, inflation-linked borrowing should also lead to lower expected costs, since the government takes over the inflation risk from investors and, as compensation, should be able to count on a premium. The practical experiences of recent years indicate, however, that at least periodically the inflation risk premium may be more than outweighed by other factors. During certain periods the difference between nominal and real interest rates – break-even inflation – has thus been substantially below 2 per cent, which is the official inflation target. This means that the expected real return on nominal bonds, calculated on the assumption that the inflation target is achieved, is lower than on inflation-linked ones. One reason may be that investors have assumed that inflation, as measured by the CPI, will permanently remain below target, but a liquidity premium probably also raises the return requirement on inflation-linked bonds. The low liquidity of the inflation-linked bond market thus makes investors demand a certain extra return – beyond the underlying real return requirement – in order to hold inflation-linked bonds. This liquidity premium may more than outweigh the inflation risk premium, which means that on a net basis the government cannot count on any premium by issuing inflation-linked bonds.

In the Debt Office's judgement, however, insufficient knowledge and understanding of the characteristics of inflation-linked bonds also contribute to the high return requirement. It should be feasible to overcome these obstacles by means of continued informational work. The potential thus exists for improving the functioning of the inflation-linked bond market, lowering the return requirements of investors and thereby making inflation-linked borrowing more favourable to the government. Considering the advantages from a risk standpoint, the government should thus continue to develop the market with the aim bringing about of a long-term increase in the share of inflation-linked bonds in the government debt.

It is reasonable to assume that the inflation risk premium – and thus the saving that the government can count on – tends to vary depending on the inflation rate. When inflation is high, investors may be prepared to pay a higher risk premium, and it should be profitable for the government to issue inflation-linked bonds. In

contrast, the cost advantage decreases – or even turns into a cost disadvantage – in cases where inflation is expected to be unusually low. In the Debt Office's judgement, the trend of recent years indicates that there may be a pattern according to which inflation uncertainty varies with the inflation rate. In that case, the Debt Office should adjust its issues according to how the market prices the inflation risk. The guidelines for central government debt management should allow room for such action.

The Debt Office would like to emphasise that administering inflation-linked borrowing involves difficult trade-offs. More exact guidelines and plans for how the government will administer the issuance of inflation-linked bonds would – just as in the nominal bond market – reduce certain risks to investors and thereby help attract more of them into this market. These possible advantages must, however, be weighed against the risk that in order to fulfil its plans, the Debt Office will be forced to issue inflation-linked bonds in market situations when they are substantially more expensive than nominal bonds.

In a short-term perspective, it would probably be expensive for the government to issue large volumes of inflation-linked bonds or to express an ambition that they should reach a certain share of total debt by a particular date. If more exact plans and larger bond issues could be assumed to be sufficient measures to attract new investors, increase liquidity and market depth etc., the additional costs might be perceived as an investment to improve the infrastructure of government debt management. In the judgement of the Debt Office, however, it requires more than an increased supply to change the inflation-linked bond market. As the Debt Office maintains in Section 5, at the same time there must be changes in the behaviour of investors and in their approach to inflation-linked investments. The Debt Office has a responsibility to move this process forward; see Section 5.5. However, it is a task that must be pursued on a long-term basis.

In light of this, the Debt Office proposes that the guidelines for inflation-linked debt be kept unchanged. The stated goal should thus be to increase inflation-linked debt as a share of central government debt, but the pace of issuance must be weighed against the growth in demand for inflation-linked bonds and the costs of other types of debt, with due consideration for risk. Given such a goal formulation, the Debt Office expects to continue being a net issuer of inflation-linked bonds during 2002. Operative goals will, in the customary way, be established and published after the Government's guideline decision has been made.

This goal formulation is not fully consistent with the criterion that has been used to date to evaluate inflation-linked borrowing. This states that inflation-linked borrowing should be cheaper than the corresponding nominal borrowing. Such a direct comparison implies that differences in risk are not taken into consideration. To the extent that inflation-linked bonds help to reduce risks in the government debt, a less strict criterion should be applied. In Section 7, the Debt Office returns to how the evaluation of inflation-linked borrowing should take place.

## 6.4 Nominal krona debt

**The Debt Office's proposal:** Having stated guidelines for inflation-linked borrowing and foreign currency borrowing, it follows by definition that the central government's financing requirements should otherwise be covered by nominal krona debt.

### 6.4.1 Guidelines now in force

The central government's financing needs not covered by inflation-linked borrowing and foreign currency borrowing shall be met by nominal krona borrowing.

### 6.4.2 Deliberations and proposal

The guidelines for central government debt management are based on dividing the debt into three components. Having stated guidelines for foreign currency borrowing and inflation-linked borrowing, it therefore follows by definition that the remaining borrowing requirement will be met by nominal krona loans. The krona market thus functions as a buffer in case of fluctuations in the borrowing requirement and if plans for the other two types of debt change. This is not only a mathematical necessity, but also reflects the fact that the krona market is the government's most important source of financing. By regularly holding auctions for both bonds and Treasury bills, in this market the Debt Office can easily cope with changes in borrowing via other instruments or in the net borrowing requirement.

## 6.5 Maturity

**The Debt Office's proposal:** The average duration of the nominal krona and foreign currency debt should be unchanged, i.e. 2.7 years. The aim for 2004 should be for the duration to remain unchanged. The Debt Office should be allowed to decide on benchmark portfolios providing an average duration for the nominal debt that deviates by a maximum of ±0.3 years from the benchmark of 2.7 years. The inflation-linked borrowing should have a long duration.

### 6.5.1 Guidelines now in force

The Government decided last year that the average duration of the nominal krona and foreign currency debt is to be 2.7 years. The aim for 2002 and 2003 is for the duration to remain unchanged. The government also stated that the Debt Office may decide on an average duration for the nominal debt that deviates by no more than ±0.3 years from the benchmark. The Government also decided that inflation-linked borrowing will have a long duration. In concrete terms, this meant that most newly issued inflation-linked bonds should have a maturity of at least ten years.

### 6.5.2 Deliberations and proposal

*Nominal krona and foreign current debt*

The Government declared in last year's decision – which corresponded to the Debt Office's proposal – that no reasons had emerged for changing the guidelines on the maturity of nominal krona and foreign currency debt. In the opinion of the Debt Office, this judgement is still valid. The Debt Office therefore proposes that the benchmark for the duration of nominal krona and foreign currency debt again be set at 2.7 years during 2002.

Last year the Government decided on an interval of ±0.3 years, which indicates the framework within which the Debt Office's benchmark portfolio decisions may choose average duration. This is a broader mandate than in the Debt Office's proposal, where the interval was intended to set limits on the duration of actual debt rather than the duration of the benchmark portfolios. In its existing operative guidelines, the Debt Office has chosen not to deviate from the benchmarks stated by the Government and has set deviation limits that provide a band of ±0.3 years for actual duration.

In the Debt Office's judgement, the current interval provides sufficient room for its decisions on benchmark portfolios. The Debt Office therefore proposes that the guidelines related to the duration interval be left unchanged.

Concerning the strategic direction for 2004, conditions are, by necessity, more uncertain. Over such a long period, the size of the debt may change, for example. A diminished debt may justify a shorter maturity (and vice versa). Another possibility is that the share of inflation-linked bonds may increase significantly by 2004. In that case, the maturity of the debt as a whole would lengthen, since newly issued inflation-linked bonds are for longer average periods than nominal bonds. In this way, there might possibly be room to shorten the duration of the nominal debt without increasing the government's overall refinancing risk, which would lower its expected cost. As indicated above, it is not certain that such a development will occur, so it is not meaningful to try to weigh in this possibility when deciding the direction for 2004.

In Section 3 above, the Debt Office also notes that EMU accession may have consequences on the choice of maturity in government debt. Since government finances – all else being equal – may show larger fluctuations inside EMU than outside, there may be reasons to lengthen the maturity of government debt in order to reduce the average refinancing need. However, this question is also so far in the future that it is too early to try to take it into account in the guidelines.

Taken together, this means that the Debt Office proposes that the strategic direction should be for the maturity of nominal krona and foreign currency debt to remain unchanged during 2004 as well.

*Inflation-linked debt*

The characteristics of inflation-linked bonds are best utilised for both the government and investors if new borrowing occurs with long maturities. The existing guidelines state that the emphasis should be on maturities of more than ten years. In principle, it should be cheaper for the government to issue long-term inflation-linked bonds, since the inflation risk and thus the desire of investors to give up expected return in exchange for an inflation-insured interest rate should be larger in the long term. In practice, however, the real yield curve has had a positive slope, i.e. the longest-term inflation-linked loans have had somewhat higher interest rates than shorter-term loans. During its auctions, the Debt Office has also noted a heavier demand for inflation-linked bonds with short maturities, including the loan that matures in 2008.

In light of this, there is reason to discuss the interpretation of the goal that inflation-linked borrowing should have a long maturity. The existing guideline decision (which corresponds to the Debt Office's proposal) says that the bulk of such borrowing should have a maturity of at least ten years. In the opinion of the Debt Office, it would be appropriate if the Debt Office had a greater opportunity to choose what loans should be issued, taking into consideration current interest rate conditions. It is not normally meaningful to issue inflation-linked loans with shorter maturities than five years, but experience shows that it may periodically be advantageous to have the opportunity to issue loans with maturities of between five and ten years. The Debt Office therefore proposes that in its guideline decision, the Government modify the interpretation of the concept of long maturity in such a way as to make possible issues of inflation-linked loans with maturities of five years and longer.

## 6.6 Maturity profile

**The Debt Office's proposal:** The detailed restriction on the percentage of central government debt falling due during the next twelve months should be removed. The Debt Office should instead be entrusted to aim at a smooth maturity profile for the purpose of limiting the refinancing risks, and to report afterward to the Government on its administration of the maturity profile.

### 6.6.1 Guidelines now in force

The Debt Office is to manage its borrowing in such a way that no more than 25 per cent of central government debt will fall due in the next twelve months. A maximum of 30 per cent of the entire debt will be allowed to mature in the above-mentioned period.

### 6.6.2 Deliberations and proposal

Among the purposes of the Government's guidelines for central government debt management is to limit the risk of major variations in average yield to maturity. The

benchmark for the maturity of nominal debt, measured as duration, is an expression of a trade-off between costs and risks. However, a given duration may be achieved in different ways, for example by a concentration of borrowing around the benchmark or by a mixture of short and very long maturities. Guidelines for the maturity profile may be viewed as a supplement to the benchmark for duration, since additional restrictions are established for the allocation of government debt between maturities.

The policy of the Debt Office is to aim for a relatively even allocation of borrowing over the yield curve. The refinancing of maturing loans is thus spread over time, which reduces the risk that a large proportion of the debt must be refinanced during periods of high interest rates. This also satisfies the wishes of investors for financial assets with different maturities, which should help lower borrowing costs.

The Debt Office aims, and has aimed, at limiting short-term borrowing in such a way that no more than 25 per cent of government debt matures during the coming twelve months. It sees no reason to change this approach. However, its experiences have shown that the wording of the guidelines now in force may create problems in the planning of borrowing.

Treasury bonds with remaining maturities of less than one year are usually exchanged for a number of Treasury bills with different maturities. These exchanges are normally made after the annual coupon has fallen due, and on dates when this is suitable from a market and technical standpoint. In addition, the Debt Office has large-scale short-term financing requirements on certain days, due to normal fluctuations in central government cash flow during the month. The overnight borrowing requirement, together with outstanding Treasury bills and the bonds whose turn it is to be exchanged for Treasury bills, may exceed 30 per cent of government debt for a number of days. In order to avert this, the Debt Office may be forced to deviate from its normal Treasury bill issuing patterns, with accompanying risks of higher borrowing costs.

If the 30 per cent limit is exceeded on a limited number of days, no significant refinancing risks are created. Refinancing risk is not directly associated with loans with maturities of less than twelve months. A large borrowing requirement concentrated in maturities of less than one week may comprise a certain financing risk, even if the share of loans maturing within twelve months only totals 20 per cent, for example. The current regulation is thus not appropriately formulated.

In the Debt Office's opinion, there is thus reason to go back to the underlying objective of the regulation, i.e. to limit refinancing risks. For this purpose, the maturity allocation of loans should be relatively uniform. Concentrations within individual segments, especially the very shortest maturities, should be limited. In the Debt Office's judgement, it is difficult to translate this principle into exact numerical limitation rules. These rules create obstacles without, in reality, controlling the risks.

The Debt Office therefore proposes that the existing guidelines related to the maturity profile be removed. It should be sufficient for the Government to state that the Debt Office should structure its borrowing in such a way as to limit refinancing risks by aiming at a smooth, well-distributed maturity profile. This proposal does not entail any change in the Debt Office's borrowing policies. The Debt Office intends to continue to aim at keeping the share of its loans with remaining maturities of less than twelve months at a maximum of 25 per cent. However, the enforcement of this limit can be allowed to be somewhat more flexible, and the Debt Office can avoid costly steps to counter short-term fluctuations in the share of maturing debt. The Debt Office should report afterward how its maturity profile changed during the preceding year. This may serve as the basis for an evaluation of refinancing risks and how the Debt Office administers them.

# 7 Evaluation issues

## 7.1 Background

In last year's guideline decision, the Government stated principles for the evaluation of the Debt Office's management of central government debt. The Government distinguishes between *strategic* and *operative* decisions at the Debt Office. The former include the allocation of the central government debt between types of debt within given intervals, the choice of benchmark portfolios and decisions on the overall objectives of debt management and market maintenance. These should be evaluated to the greatest possible extent with the aid of counterfactual comparisons between alternative debt portfolios. Where this is not possible, qualitative evaluations should be made. Operative decisions include day-to-day debt administration as well as the implementation of debt management and market maintenance. According to the Government, the evaluation of operative decisions should include assessing to what extent the Debt Office has achieved its objectives and implemented the agreed debt management and market maintenance measures, plus a quantitative evaluation of the results of its operative management of the foreign currency debt.

In the Debt Office's judgement, these principles are also applicable to its proposed guidelines for 2002, since they are mainly structured in the same way as in 2001. However, the Debt Office would briefly like to discuss the application of the principles in four areas. Firstly, there is reason to review the formulation of the goal related to inflation-linked debt. Secondly, the criteria for evaluating decisions to change the pace of foreign currency debt amortisation in relation to the benchmark should be specified more clearly. Thirdly, points of departure for evaluating the Debt Office's administration of currency exchanges should be established. Finally, the method for evaluating the Debt Office's decision to increase the share of dollars in the foreign currency debt should be stated.

## 7.2 Inflation-linked borrowing

Inflation-linked borrowing has been evaluated thus far through a direct comparison with long-term nominal borrowing. Using this measure, since the beginning inflation-linked borrowing has resulted in sizeable savings. The reason is that to date, inflation has been lower than expected when inflation-linked bonds were issued. Most of this surplus originates from bonds issued during the period 1995–1997. Issues during the past few years have largely provided zero earnings, since the rate of inflation was approximately equivalent to the difference between the nominal and real interest rate on the issue date, or break-even inflation. The Debt Office has adjusted to this change by decreasing its issues of inflation-linked bonds.

A criterion that only measures costs without reference to differences in risk captures only one part of the goal of government debt management. In principle, as the Government stated in last year's guideline decision, both (expected) cost and risk should be taken into account. It is difficult to estimate in quantitative terms how the share of inflation-linked bonds affects the risks in government debt management, as Section 4 indicates. In the Debt Office's judgement, however, there are qualitative reasons to argue that the introduction of inflation-linked bonds has been favourable from a risk standpoint, since another type of debt was created. If total government debt consists of 65 per cent nominal and 5 per cent inflation-linked loans, at the margin an extra krona of nominal borrowing should increase risk more than an extra krona of inflation-linked loans, since these instruments have different characteristics. The Debt Office's assessment – as indicated above – is that a shift towards a larger share of inflation-linked government debt would be beneficial by providing additional risk spreading. Given this assessment, the evaluation measure that has been used to date is excessively restrictive. Owing to the advantages of inflation-linked debt from a risk standpoint, in principle the central government may be prepared to pay a certain premium, but due to the cost minimisation goal this willingness to pay is limited.

However, it is not easy to apply this principle in the Debt Office's practical borrowing activities and then to define quantitative criteria for evaluation afterward. The *expected* cost difference depends on the relationship between break-even inflation, which is observable, and expected inflation, which is based on an assessment. For the Debt Office, it is natural to assume that in the long term, inflation will correspond to the Riksbank's inflation target. However, this picture is complicated by the fact that monetary policy is guided by a measure of underlying inflation, while the index adjustment of inflation-linked bonds follows the CPI. To the extent that there is reason to anticipate systematic differences between these two inflation measures, for example due to changes in indirect taxes, it may be reasonable to expect lower (or higher) CPI inflation even if monetary policy keeps the underlying inflation rate at 2 per cent.

In the Debt Office's judgement, it would be unsuitable to connect inflation-linked borrowing, and in the next stage the evaluation of this borrowing, strictly to the

two per cent target. It should instead be one of the Debt Office's tasks to carry out continuous assessments of when inflation-linked loans should be issued and in how large volumes. In its reporting to the Government, the Debt Office should explain the assessments that underlie its decisions to issue such debt. These decisions should be evaluated qualitatively on the basis of the information available when they were made, i.e. in ex ante terms. In this context, it should be borne in mind that the long-term ambition is to increase the share of inflation-linked bonds in central government debt.

In addition, the *actual* difference in cost between inflation-linked and nominal borrowing should be reported in terms of quantitative earnings, as it has to date. On the basis of a portfolio approach, however, this measure should be interpreted in somewhat different terms than to date. The emphasis has been on the savings achieved by introducing and quickly increasing the government's inflation-linked debt during a period when inflationary expectations were high. As inflation-linked bonds become an established part of government debt, their effect on risk in the government debt portfolio must be taken into account.

Inflation is likely to be higher than expected during certain periods and lower during other periods. Inflation-linked loans will thus periodically be more expensive than nominal loans and periodically cheaper. Provided that the periods of relatively high inflation coincide more or less with boom periods, these fluctuations in the costs of inflation-linked loans are an expression of the fact that they help stabilise the debt cost ratio. This would thus be one desirable consequence of including inflation-linked loans in government debt.

There is also a risk that the economy will be hit by periods when high inflation coincides with low growth. Subsequent evaluations will make it clear that at such times, inflation-linked bonds were more expensive than nominal loans and also helped to raise the debt cost ratio. This is obviously unfavourable, but likewise a known consequence of the decision to issue inflation-linked loans. The evaluation should thus mainly focus on whether it was possible to foresee that the economy would end up in this situation and to adapt the portfolio to this assessment in advance, i.e. it is necessary to go back to the ex-ante assessment. An ex-post result should thus function as one point of departure (among others) for an overall evaluation, not as the end point.

These arguments do not lead to any specific quantitative alternative to the performance measure used until now. However, the exactness of the old measure is deceptive, since it does not correctly reflect the goal of debt management. Since this goal is multidimensional, it is also necessary to work with multidimensional evaluation criteria. Furthermore, there is no factual basis for developing quantitative risk measures. This makes it necessary to judge the overall results qualitatively.

## 7.3 Administration of the foreign currency mandate

During 2001, the Debt Office has taken advantage of the opportunity to deviate from the benchmark for the pace of amortisation of foreign currency debt. The basis of this decision has been the assessment that the krona has been weaker than can be considered justifiable in the long term. In last year's guideline decision, the Government stated its belief that reallocations between types of debt based on the krona exchange rate should be evaluated through counterfactual calculations in stylised terms.

The Debt Office concurs with this assessment. The point of departure should be two stylised calculations in which amortisations occur at a uniform rate during the year, one at a pace equivalent to the benchmark, the other at a pace equivalent to the Debt Office's decisions. It is not meaningful to use the actual amortisation profile. This is determined primarily by the dates when old foreign currency loans mature and therefore has an uneven pattern. The Debt Office spreads the currency risks associated with large maturities by entering into futures contracts on a number of different dates. However, these reallocations are not determined by the Debt Office's views on how exchange rates will develop. (The question of how the administration of currency exchanges at an operative level should be evaluated is discussed in Section 7.4.) Since decisions to changes the pace of amortisation are thus strategic, a long-term evaluation method should be used. This is best done through stylised calculations. The Debt Office also wishes to point out the importance of viewing the administration of the foreign currency mandate in a multi-year perspective. Decisions to deviate from the benchmark are based on long-term assessments of exchange rates and should be evaluated in an equivalent perspective.

## 7.4 Operative administration of currency exchanges

In Section 6.2.4, the Debt Office proposes that it be empowered to carry out exchanges between kronor and foreign currencies outside the Riksbank. As that discussion indicates, one purpose of this change would be to create greater consistency between the Debt Office's decisions on amortisations and its actual currency exchanges, thereby ensuring that the central government's overall costs are affected. As the Debt Office states, the administration of the government's foreign currency debt should be guided by the principles of predictability and transparency. It is thus reasonable that a decision by the Board of the Debt Office to change the pace of amortisation in relation to the Government's guidelines should be made public. However, the Debt Office should be able to choose the dates of its actual currency exchanges without having to inform the market, that is, the Debt Office's counterparties, in advance. This is a new element of operative management , which requires evaluation.

Control should occur by having the Board specify a pace of amortisation, which may differ from the pace specified in the guideline decision. A neutral path of

currency exchanges should correspond to a relatively uniform distribution of exchanges over time. The Board may also set permitted deviation intervals. Within this framework, the Director General has the option of decreasing the volume of currency exchanges during periods when they appear especially unfavourable (and vice versa). Such active decisions can be evaluated afterward, for example by estimating the cost difference in relation to a relatively uniform exchange path that has been stated in advance.

## 7.5 Choice of benchmark portfolio for foreign currency debt

According to last year's guideline decision, the choice of benchmark portfolios shall be evaluated with the aid of stylised counterfactual calculations, where one of the alternatives should be a portfolio with unchanged characteristics.

In December, the Debt Office decided to increase the share of US dollars and decrease the share of euro in its benchmark portfolio for foreign currency debt. This was based on the assessment that the dollar was sharply overvalued and would thus fall in value against the euro in the long term. Since this was a strategic position, the Debt Office chose to change its benchmark portfolio rather than taking a position in relation to the benchmark portfolio. Given the nature of this decision and the reasons behind it, the Debt Office believes that the method of comparing with the old benchmark portfolio is appropriate. It is a matter of a temporary re-weighting of the portfolio based on an assessment of exchange rates. If it turns out that the Debt Office's assessment was correct and the dollar begins to fall, it is natural to gradually reduce this strategic position. In this way, the benchmark portfolio should approach its original structure.

Generally speaking, the choice of a comparison norm for decisions on benchmark portfolios is not self-evident. The original benchmark portfolio is based on calculations of how the foreign currency debt should be structured in order to limit fluctuations in the value of this debt in kronor terms. The result of such calculations often changes, however, as new data become available. In other words, the relationships are not stable. The most recently calculated structure of a risk-minimising portfolio thus does not necessarily have better characteristics during future periods than an earlier structure. It is consequently not meaningful to develop a new master benchmark portfolio in this way every year. On the other hand, it is of doubtful validity to establish a master benchmark portfolio that never changes.

A reasonable system may be to entrust the Debt Office with reviewing its master benchmark portfolio on a more or less regular basis. Quantitative calculations of cost and risk characteristics should be part of the background for this analysis, but more subjective factors should also be weighed in. If these analyses indicate that there is reason to change the structure of the benchmark portfolio, the reasons for doing so should be documented and explained in connection with the Debt Office's annual reporting. Such a process should provide the basis for evaluating

the Debt Office's actions without it being necessary to include the structure of the benchmark portfolio among the issues on which the Government takes a position in its guideline decision.