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# Central Government Debt Management

Proposed Guidelines 2005–2007

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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 aim of central government debt management, which is to minimise long-term costs while taking into account the risks inherent in such management. In addition, the management shall be made within the constraints of the requirements posed by monetary policy.

The main points in the proposal are:

- The percentage of foreign currency debt in the central government debt should be reduced in the long term. The Debt Office's assessment is that the percentage should be around 15 per cent. The proposed benchmark for amortisation of foreign debt during 2005 is SEK 25 billion. The Debt Office should be allowed to deviate from this benchmark by SEK  $\pm 15$  billion. The preliminary benchmark for amortisation of foreign currency debt in 2006 and 2007 should be SEK 25 billion per year.
- The percentage of inflation-linked loans in the central government debt should increase in the long term. The Debt Office's assessment is that the percentage should be around 20–25 per cent. The 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 gross borrowing needs should be covered by nominal krona borrowing.
- The benchmark for the average maturity (measured as duration) of the aggregate nominal SEK and currency debt should be lowered to 2.5 years. The Debt Office should be allowed to decide on benchmarks providing an average duration for its nominal debt that deviates by a maximum of  $\pm 0.3$  years from this benchmark.

The Debt Office has in this year's proposed guidelines been assigned to study in particular the percentage of foreign currency debt. This has occasioned a renewed analysis also of the percentage of the inflation-linked debt and thereby the structure of the debt as a whole.

The Government has for several years following proposals by the Debt Office decided that the *foreign currency debt* is to be amortized on a continuous basis. The rationale has been that foreign currency debt is associated with greater risk at the same time as the cost may be expected

to be approximately the same as for borrowing in Swedish krona. Additionally, foreign currency borrowing is a flexible instrument. Experience shows that if borrowing needs increase drastically, it may be advantageous to borrow in foreign currency. Not only is the pressure on the domestic market reduced, it may also lead to cost advantages to the extent the great borrowing needs lead to upwards pressure on krona interest rates and weaken the krona. In order for the central government to have the requisite scope to borrow large amounts in foreign currency in the event of a crisis, the foreign currency debt may not however be too great at the outset.

However, there are also arguments that speak in favour of having some foreign currency debt. Borrowing in several currencies reduces the interest risk by reducing the dependence on the Swedish interest rates. If Swedish interest rates were to rise sharply without a corresponding change in international interest rates while the krona exchange rates remain the same, the foreign currency debt contributes to limit the increase of aggregate interest expenses. The Debt Office's concluding assessment is that the foreign currency debt percentage in the long term should be approximately 15 per cent.

The foreign currency percentage is presently approximately 25 per cent. In order to continue the reduction of this percentage, amortisation should continue at an unchanged rate. The proposed benchmark for amortisation of foreign debt is SEK 25 billion, with the ability of the Debt Office to deviate from this benchmark by SEK  $\pm 15$  billion.

The guidelines have for several years stated that the percentage of *inflation-linked debt* should increase in the long term. The arguments are primarily that this will contribute to an increased diversification of government debt in comparison to if the debt were comprised merely of nominal instruments. This reduces the risk of great variations in interest costs.

In addition to their favourable risk aspects, inflation-linked bonds should in the long term be somewhat less expensive than the corresponding nominal bonds. Investors may be assumed to be willing to pay a premium as protection against inflation risk. The favourable trend of the inflation-linked bond market has reduced the liquidity premium that from time to time has countered the inflation risk premium. We therefore expect that the yield requirement for inflation-linked loans is lower than for nominal loans.

The percentage of the inflation-linked debt should therefore be permitted to increase, to a long-term level

of approximately 20–25 per cent, from approximately 15 per cent today. The inflation-linked debt is at that level assessed to have sufficient volume in order for the market to be liquid and in order for the diversification effects to have an impact. In combination with a lowered foreign currency debt percentage, it also creates the scope for a large and liquid nominal bond market. The pace of increase in the inflation-linked debt should as before be weighed against the demand for inflation-linked bonds and the cost of borrowing in other types of debt, with due consideration to risk.

The Debt Office has for this year's proposed guidelines also analysed *the maturity of the entire government debt*. The benchmark for the duration of the nominal krona and the foreign currency debt has been unchanged since 2000. At the same time, the maturity of the entire debt has increased as a result of the percentage of inflation-linked bonds has increased. This trend will continue provided that the inflation-linked debt percentage increases. In combination with the foreign currency debt percentage being reduced, this leads to a reduction of the risk level of the central government debt.

The Debt Office's assessment is that this will provide the scope for lowering the duration of the nominal krona and foreign currency debt to 2.5 years. The intention thereby is to lower the expected cost at the same time as the risk level is maintained at a desirable level. Taking into consideration the size of the krona debt in relation to the market, the adaptation of the duration to the new benchmark should be made gradually in order for the transaction costs not to become unnecessarily high.

According to the guidelines presently in force for the maturity of the inflation-linked debt, borrowing shall be made with bonds with a maturity of at least five years. The Debt Office proposes that this restriction be removed. The reason is to increase the ability to adapt the issues to market demands in an appropriate manner.

The Debt Office has also investigated the possibilities to introduce a *comprehensive measurement of the maturity of the entire government debt*. The present benchmark for the

maturity comprises only the nominal part of the debt. However, the difficulty of managing the duration of the inflation-linked debt and the fact that the inflation-linked borrowing should be adapted to prevailing market conditions, make such a management system difficult to handle. It would be technically possible, through adaptations of other types of debt, to still achieve a collective duration benchmark. It is however not self-evident that the transaction costs that would arise in such case are motivated from a risk point of view. The management of the maturity of the government debt therefore requires further analysis. It should be emphasised that the guidelines even without a benchmark in figures, as in this year's proposal, may be based on qualitative arguments, where the collective maturity of the inflation-linked and nominal debts are taken into consideration.

In this year's proposed guidelines, the Debt Office has a special focus on how the costs of the government debt are affected by *extreme strain*, such as, e.g., a currency crisis. We will present the result of a number of sensitivity analyses made within the framework of a scenario model developed just to study the impact of different types of crisis.

The Debt Office notes that the best manner of preparing for a crisis situation is to reduce the size of the central government debt. In the management of the central government debt, trade-offs must be made on a continuous basis between costs and risks, with due consideration of both the central government financial prospects and current financial circumstances. The scenario calculations show that the Swedish central government finances are sensitive to a sharp rise in interest rates. On the other hand, it appears relatively costly to increase the maturity of the debt. Also a currency crisis would have a significant impact, at the same time as the costs of reducing the risk level by adjusting the foreign currency debt percentage in all likelihood is rather low. Since the model captures the entire debt, it provides the ability to illustrate the type of risk trade-offs that underlie this year's proposed guidelines, where an increased inflation-linked debt percentage and reduced foreign currency debt percentage provide the scope for some reduction of the maturity.

# 1. Points of Departure for the Proposed Guidelines

## 1.1 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 National Debt Office (1996:311). This proposal is based on the aim formulated in Section 5 of the Act (1988:1387) on central government Borrowing and Debt Management, which provides that central government debt shall be managed in such a way as to minimise the long-term cost of the debt while taking into account the risks inherent in such management. In addition, management shall take place within the constraints imposed by monetary policy.

In this section, the Debt Office presents the points of departure for the proposal. We account for the important conclusions and positions adopted in earlier Government decisions on guidelines, as well as the priorities established in the analytical work in preparation for this year's proposal and how they are reflected in the year's proposed guidelines.

## 1.2 Analysis and Conclusions to Date

### 1.2.1 Cost and Risk Measures

Since the trends of future interest rates, exchange rates and the central government finances are unknown, the Government's decision on guidelines for central government debt is taken amidst uncertainty. The central government debt management must therefore be structured in such a way that there are margins for coping with negative surprises. This viewpoint is reflected in the legally mandated aim of central government debt management, which says that government debt shall be managed in a way that minimises long-term costs while taking into account the risks inherent in such management. The guideline decision thus embodies a trade-off between the expected costs and risks of the debt.

The question of how to define and measure the costs and risks of the central government debt has received considerable attention in earlier proposed guidelines and guideline decisions. In its guideline decision of 2000, the Government stated that in a consideration of the structure of government debt and its maturity, costs should be measured by the *average running yield* (average interest rate upon issue) and the risks as *running yield at risk* (distribution of average interest rate upon issue), which would

provide a measure of the risk of rising issue rates. Running yields should also be used when evaluating central government debt management.

In this decision, the Government also stated that the risk should, moreover, be measured in terms of *the contribution that the debt portfolio makes to fluctuations in the budget balance and the debt*. This may be regarded as a *real* risk measure that supplements the above nominal risk measure. The Debt Office obtained inspiration for this risk measure from the asset and liability management (ALM) approach, in which the fundamental concept is that financial risks can be minimised by matching the characteristics of liabilities against those of assets. From the standpoint of central government debt policy, this means that the central government can reduce the risk in its debt portfolio by structuring the portfolio in such a way that interest costs covary with budget surpluses (excluding interest payments). This is based on the intuition 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 in which the opposite is true.

### 1.2.2 Structure and Maturity of the Debt

In earlier proposed guidelines, the Debt Office has gradually analysed the issue of the structure and maturity of government debt. At the end of June 2004, this debt comprised approximately 26 per cent foreign currency loans and 15 per cent inflation-linked loans, with the remainder consisting of nominal krona loans. The Debt Office's analyses show that the percentage of foreign currency loans in the debt portfolio should decline in the long term, while the percentage of inflation should increase in the long term. The reason is primarily that foreign currency debt is more risky than nominal krona debt, while inflation-linked borrowing helps to reduce the risk level in the central government debt.

In its guideline decisions, the Government has concurred with the Debt Office's assessment of central government debt structure. In its latest decision, the Government stated that foreign currency debt should be amortised by SEK 25 billion during 2004 and that its aim is to maintain the same pace during 2005 and 2006. The Government also decided that the percentage of inflation-linked loans shall increase in the long term, but that the pace of this increase shall be weighed against the demand for inflation-linked bonds and the bor-

rowing costs of other types of debt, with due consideration to risk.

The Debt Office has also analysed the choice of maturity (duration) of the nominal krona debt and foreign currency debt. The Debt Office's model simulations made in preparation for the guideline decision for 2001 indicate that short-term borrowing in Swedish kronor might have advantages from both a cost and risk standpoint when costs are set in relation to gross domestic product (GDP). The reasons are that short-term interest rates are generally lower than long-term rates and that short-term domestic interest rates tend to co-vary positively with GDP growth. However, the potential gains from short-term borrowing must be weighed against the increased risk that short-term borrowing may cause. Considering that Swedish government debt is already relatively short-term and its maturity was slightly shortened during 2000, the Debt Office has proposed no change in the existing maturity guidelines since then.

In earlier guideline decisions, the Government has concurred with the Debt Office's assessment of the duration of nominal krona and foreign currency debt. In its decision for 2004, the Government stated that the benchmark for the duration of nominal krona and foreign currency debt should remain unchanged at 2.7 years. The Government also decided that its aim for 2004 and 2005 would be unchanged duration.

### 1.3 Priorities in Preparing this Year's Proposed Guidelines

In this year's Proposed Guidelines, the Debt Office has been assigned to make a more thorough analysis of the percentage of foreign currency debt. This has occasioned a renewed analysis also of the percentage of inflation-linked debt and thereby of the structure of the debt as a whole.

To state what is an "optimal" debt structure is difficult, since the connections are plentiful and complex. In addition, the desirable percentages vary over time, *inter alia*

depending on the strains that public finances undergo. The choice of structure is therefore in great parts a question of assessment and ultimately depends on the risk that the central government is willing to take in the central government debt management.

The Debt Office presents in Section 3 its assessment of a balanced structure of the government debt. The assessment is based on the analyses and arguments presented in prior proposed guidelines, but also on the modelling results that are presented in Section 2.

The Debt Office analyses the issue of the maturity of the government debt in Section 4. The benchmark for the duration of the nominal krona and foreign currency debt has been unchanged since 2000. At the same time, the maturity of the entire debt has increased as a result of the percentage of inflation-linked bonds having increased. This has led to a reduction of the risk level of the debt, at the same time as the expected costs have increased. Against this background, there is reason to re-evaluate the choice of maturity. We also examine the possibilities to introduce a comprehensive measurement for the maturity of the entire government debt.

The overall aim of government debt management is to minimise the costs of the government debt, while taking into account the risks inherent in such management. This means that government debt must be structured in a manner so that government finances are capable of coping with situations of crisis. Prior quantitative analyses have shown a limited scope for analysis of situations of crisis. This year we have therefore developed a scenario model in order to be able to analyse the effects of financial shocks. The results of the consequence calculations are summarized in Section 2. A more detailed description of the model and its underlying assumptions is set out in the appendix at the end of this document.

Initially, we will take a look at the consequence calculations. Thereafter we will discuss in Section 3 and 4 the structure and maturity of the government debt. Finally, we will present the Debt Office's proposed guidelines in Section 5.

# 2. Consequence Calculations of Crisis Scenarios

In the work with this year's guidelines, the Debt Office has developed a scenario model to investigate how the costs of the government debt are affected in different crisis situations. By making projections of the primary borrowing needs, interest rates and exchange rates, we are able to calculate the impact that a financial shock would have on costs, both on average and during a specific year.

We focus on two crisis scenarios: an international financial crisis and a currency crisis. The international financial crisis entails a sharp interest rate increase on the Swedish and international interest markets. In the currency crisis scenario we assume a sharp weakening of the krona. In both cases we make comparisons between the present debt portfolio and a portfolio with an alternative structure in order to see how much the different portfolios will cost in relation to the impact of the assumed shock. Finally we repeat the calculations in an alternative scenario where central government finances have a less favourable trend.

It is possible to view the alternative debt portfolios as a way of insuring against excessive interest rate increases in a crisis situation. The cost difference between the portfolios here represents the insurance premium, while the difference in impact of the shock on interest payments represents the "damage".

It should be emphasised that the result of the consequence calculations depends on the assumptions that we make regarding the constituent variables. Therefore, it is not possible to draw too far-reaching conclusions on the basis of the calculations without discussing the underlying assumptions and their reasonableness. With this in mind, we may however view the consequence calculations as an additional piece of the puzzle in our prior analyses of the properties of the government debt and their implications for the management of the debt.

In the next section we report the results of the international financial crisis scenario. In Section 2.2, we examine the effects of the currency crisis. For a more thorough description of the calculation, we refer to the appendix at the end of this document.

## 2.1 International Financial Crisis

In the international financial crisis scenario we assume that the short-term interest rate in the surrounding world

rises by 10 percentage points in 2015. The interest rate increase then spreads to the long-term interest rates and the Swedish interest market. This means that yield curves initially have a negative slope. The interest rate shock however successively subsides, so that interest rates return to their original levels after 5–6 years.

When the interest shock impacts the economy, interest payments for the government debt increase dramatically. Diagram 1 shows the trend of the interest payments. The dotted line shows the interest payments for the present debt portfolio, while the unbroken line shows the interest payments for a portfolio with one year's longer duration. If we compare both portfolios we find that the impact of the interest shock is significantly lower in the long duration portfolio than in the present portfolio. On the other hand, the portfolio with long duration is generally speaking more expensive. Note that the interest shock in 2015 does not impact the interest payments until 2016.

Diagram 1. Central government debt cost in case of a 10 per cent interest rate shock

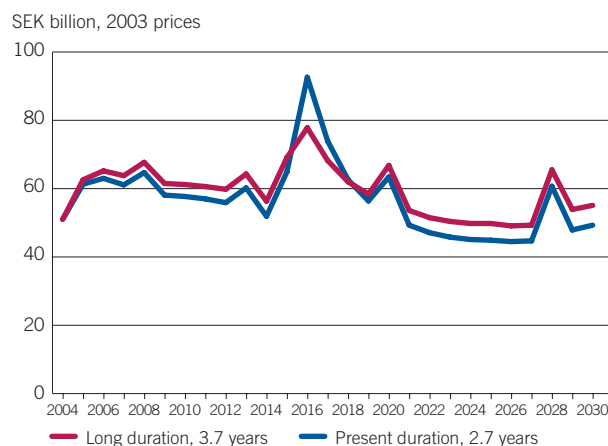


Table 1 shows that the impact in 2016 of the interest shock amounts to SEK 44 billion at the present duration of the government debt. If we study the long duration portfolio we find that the impact is SEK 25 billion. By increasing the duration of the government debt by one year, the central government can thus reduce the immediate impact of the interest shock by SEK 19 billion. Over the period 2016–2020, the aggregate impact is SEK 38 billion less.

The average annual cost of the present debt portfolio amounts to SEK 50.1 billion, while the long duration portfolio costs SEK 54.4 billion. The cost of reducing the refixing risk of the central government debt by extending the duration is thus SEK 4.3 billion per year. This corresponds to approximately 9 per cent of the original interest costs.

If we relate this cost to the savings made by the central government, we find that it takes slightly more than four years for the central government to save the difference in impact by refraining from extending the duration. Expressed in a different manner, the insurance premium amounts to approximately 25 per cent of the immediate “damage”. If we study the period 2016–2020 we find that it takes about nine years to earn the difference in impact.

Against this background, the premium for increasing the duration and thereby lowering the risk in the government debt seems relatively expensive. Accordingly, we are of the opinion that lowering the risk by increasing the duration is not justified.

It should be pointed out that the results of the consequence calculations depend on the assumptions that are made regarding the constituent variables and in particular of the slope of the yield curve. However, it is still interesting to note that even with cautious assumptions regarding the slope of the yield curve it is less expensive in the long term with debt having a short maturity, also in case the economy is impacted by an interest shock. Even though the central government saves a great deal during the crisis years, this cannot compensate for the average higher costs that a long duration strategy entails. The average cost difference between a long duration portfolio and the present portfolio in case the shock occurs amounts to SEK 2.5 billion per year.

**Table 1. Central government debt cost in case of an interest crisis scenario in 2015, SEK billion**

International financial crisis: Interest rate shock of 10 percentage points	Base scenario	Alternative scenario
<i>Impact 2016</i>		
Present duration, 2.7 years	43.8	69.0
Long duration, 3.7 years	24.8	40.6
Difference in impact	19.0	28.4
<i>Impact 2016–2020</i>		
Present duration, 2.7 years	110.3	186.0
Long duration, 3.7 years	72.5	129.0
Difference in impact	37.8	56.9
<i>Average cost, 2004–2030</i>		
Present duration, 2.7 years	50.1	79.0
Long duration, 3.7 years	54.4	85.2
Difference in average cost	4.3	6.2

The trend of the primary borrowing needs is of great significance to the central government debt and its costs. Therefore, we will perform a sensitivity analysis and study an alternative scenario where the primary borrowing needs develop less favourably.

If there is a less favourable trend of the borrowing needs, and the central government debt therefore increases, the effects of a financial crisis will be greater (see Table 1). This increases the need for insurance. This depends on the annual interest costs already from the outset being so great that an interest rate shock would be noticeable to the central government finances, but also on the effect of the interest rate shock in itself being so great. At the same time, however, the cost of insurance increases. In summary, our prior conclusion remains that it is expensive to prolong the duration of the debt in relation to the reduction of the impact on the interest payments that this would entail.

## 2.2 Currency Crisis

In the second crisis scenario, we will study the effects of a dramatic weakening of the Swedish krona in 2015. The TCW index is assumed to increase by 15 per cent, from 124 to 143. In order to isolate the effect, we assume that the weakening of the krona is permanent. Such a weakening would occur, e.g., if the demand for Swedish goods declines so that the real krona exchange rate is weakened. The Swedish and international interest rates are assumed to be unaffected by the depreciation.

Diagram 2 shows how the interest payments on the government debt develop at 25 and 15 per cent foreign currency percentage, respectively, when the krona is permanently weakened by 15 per cent. The cost difference between the two debt portfolios is relatively small. In addition we find that the cost increase that is a result of the depreciation quickly subsides. It is in principle only during the first crisis years that we have a significantly higher cost with the present foreign currency percentage. The reason is that the duration of the foreign currency debt is relatively short. This causes the major part of the currency exchange losses to have an impact in the first year.

**Diagram 2. Central government debt cost in case of a 15 per cent krona depreciation**

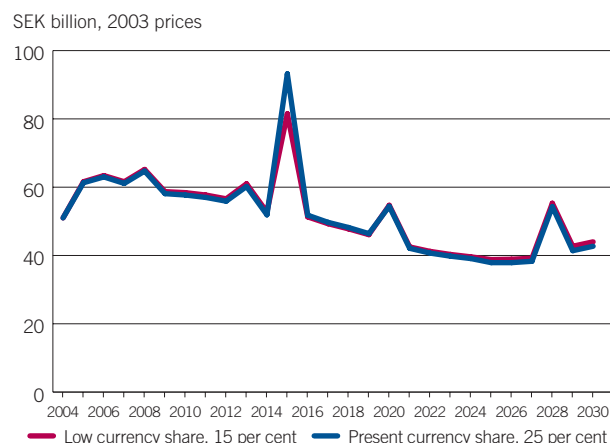




Table 2 shows that the impact of the currency shock on interest payments in 2015 amounts to SEK 28 billion. With a lower foreign currency percentage, the impact is SEK 16 billion. This means that the central government, by reducing the foreign currency debt percentage from 25 to 15 per cent, may reduce this immediate impact of the krona depreciation by SEK 13 billion. If we study the impact in 2015–2019 we find that the impact is SEK 18 billion lower in the portfolio with a low foreign currency debt share.

At the same time, the low foreign currency portfolio is somewhat more expensive than the present portfolio. The low foreign currency portfolio costs on an average SEK 50.9 billion per year, while the present portfolio costs SEK 50.1 billion. The difference is SEK 0.8 billion per year. This corresponds to approximately 2 per cent of the original interest costs.

If we compare the cost to the savings that the central government may make by lowering the share of foreign currency debt, we find that it takes 16 years before the central government has earned the savings. This means that the premium amounts to approximately 6 per cent of the immediate "damage". If we look at the period 2015–2019 we find that it takes approximately 22 years to earn the difference in impact.

In comparison to the interest crisis scenario, where it took four and nine years, respectively, to earn the difference in impact, the insurance premium in this case appears rather low in relation to the "damage". Assuming that the central government wants to reduce the risk in the government debt, we are therefore of the opinion that it is more cost-efficient to do so by reducing the foreign currency debt percentage than by increasing the duration.

Another aspect that however must be taken into consideration is that the krona may strengthen. In that case, the central government would not only make money on a current basis by borrowing in foreign currency, as a result of lower foreign interest rates, but also realise exchange rate gains, as the value of foreign currency debts expressed in krona is reduced. This is something that must be taken into consideration while contemplating the foreign currency share that is desirable in the long term.

**Table 2. Central government debt cost in case of a currency crisis scenario in 2015, SEK billion**

Currency crisis: 15 per cent krona depreciation	Base scenario	Alternative scenario
<i>Impact 2015</i>		
Present foreign currency share, 25 per cent	28.3	42.3
Low foreign currency share, 15 per cent	15.8	23.9
Difference in impact	12.3	18.5
<i>Impact 2015–2019</i>		
Present foreign currency share, 25 per cent	38.9	57.5
Low foreign currency share, 15 per cent	21.2	31.5
Difference in impact	17.6	26.0
<i>Average cost, 2004–2030</i>		
Present foreign currency share, 25 per cent	50.1	79.0
Low foreign currency share, 15 per cent	50.9	80.5
Difference in average cost	0.8	1.5

If the borrowing needs develop less favourably than we have assumed until now, the need for insurance against currency shocks will increase. This depends as before on the interest payments already from the outset being so large that a currency shock would be noticeable to the central government finances. In addition, the less favourable central government financial situation leads to greater effects of the currency shock *per se*. At the same time, the cost of reducing the foreign currency debt increases. This does not however change our prior conclusion.

## 2.3 Summary

The results of the interest crisis scenario shows that it is relatively expensive to insure against higher interest costs in a crisis situation by extending the duration. The savings made during the crisis years cannot compensate for the average higher costs. If the borrowing needs develop less favourably than assumed in the base scenario, the need for such insurance however increases.

In comparison to the interest crisis scenario, the cost of reducing the foreign currency debt share appears to be relatively low in relation to the effects on the interest costs in the event of a currency crisis. Assuming that the central government wants to reduce the risk in the central government debt, we are of the opinion that it is more cost-efficient to do so by reducing the foreign currency debt percentage than by increasing the duration.

# 3. Structure of the Government Debt

For the proposed guidelines of this year, the Government has requested a collective assessment of how the government debt should be allocated between the different types of debt in the long term. To state what is an "optimal" debt structure is however difficult, since the connections are plentiful and complex. In addition, the desirable percentages – or, differently expressed, acceptable risk levels – vary over time, depending on the strains that public finances undergo. The choice of structure is therefore in great parts a question of assessment.

In this section, the Debt Office presents its assessment of a balanced structure of the government debt. The assessment is based on the analyses and arguments presented in prior proposed guidelines, and on the modelling results that are presented in Section 2. Ultimately, however, the choice of structure depends on the trade-off between cost and risk that the Government is willing to take in the central government debt management. Our analysis aims to provide a foundation for the Government's deliberations in order to facilitate a decision regarding a reasonably structured debt portfolio.

The section is divided into three parts. We commence by examining the share of the foreign currency debt. Thereafter we take a look at the share of inflation-linked debt. The section is concluded by a discussion regarding the disadvantages associated with providing guidelines for central government debt management in terms of percentages and the demands that should be placed on such a management system.

## 3.1 Foreign Currency Debt

The Debt Office has since the end of the 1990's amortised the foreign currency debt. The foreign currency debt has been reduced from a high of SEK 435 billion in 1998 to SEK 320 billion at the end of June 2004. The foreign currency debt percentage has during this period been reduced from 30 to 26 per cent. In comparison to other countries, Sweden has a relatively high percentage of foreign currency debt. Before the introduction of the common currency in the EU, most Member States had a foreign currency debt share of 5 per cent or lower.

The Debt Office has in prior proposed guidelines argued that the percentage of foreign currency debt should be reduced in the long term. The reason is that the foreign currency debt is associated with higher risk than nominal krona

debt. This depends on interest payments in foreign currency varying with the value of the krona. This causes interest payments on the foreign currency debt to become more volatile than interest payments on domestic debt. Moreover, there is a risk that the foreign interest payments increase due to a weak krona in situations where the central government finances are strained on the whole. This is attributable to the krona tending to depreciate when the Swedish economy develops more weakly in relation to other countries.

Higher risk may be justified if the expected cost is lower. There is however no reason to believe that foreign currency debt in the future will be systematically cheaper than krona debt. There is certainly still a certain interest spread in relation to foreign countries, but taking into consideration the trend of the Swedish economy in relation to other countries, there are strong arguments for the interest spread continuing to diminish in the long term.

What percentage of foreign currency debt should the central government then aim for? The answer depends on several factors. As mentioned above, foreign currency borrowing is riskier than nominal krona borrowing, at the same time as it should in the long term neither be less or more expensive. One question that might be asked in this connection is how great the risk of a high percentage of foreign currency debt is expressed in monetary terms.

In the scenario model that is accounted for in Section 2, the krona is assumed to weaken by 15 per cent in the year 2015 and then to remain at that weaker level. With the present foreign currency share of 25 per cent, the impact on the interest payments of the krona depreciation during the crisis year will be approximately SEK 20 billion higher than if the foreign currency debt percentage had been 15 per cent. This corresponds to 15–20 per cent of the assumed interest costs in 2015. The lower percentage applies to the alternative scenario, where the central government debt is greater.

To borrow another SEK 20 billion on the margin in a single year should in and of itself not be particularly problematic, at least if the central government finances develop as in the model. If the shock occurs in a situation with a greater central government debt, or when there is greater strain on the central government finances, the impact would be greater to a corresponding extent. It is therefore not possible to consider the risk of a foreign currency share of 25 per cent as negligible.

The model includes a cost to reduce the foreign currency debt percentage. It is calculated to be approximately SEK 0.8–1.5 billion per year, which approximately corresponds to 2 per cent of the total interest costs. The increase in cost reflects the assumption in the model that the interest in the foreign currency is marginally lower than in krona. This corresponds to the currently prevailing situation, but which may not prevail in the long term, for reasons mentioned above.

However, the issue regarding the foreign currency debt percentage also has more qualitative aspects. Foreign currency borrowing is a flexible instrument in the sense that the central government may borrow a lot of money in a short time. This is not in the least illustrated by Sweden's experiences at the beginning of the 1990's. It may also be favourable to have access to several sources of finance in situations when borrowing in the domestic market appears as particularly costly. Such flexibility however assumes that the foreign currency debt is not excessive at the outset. A reduction of the foreign currency debt would thus expand the freedom of action from a government debt policy viewpoint in case a disturbance were to suddenly increase the borrowing needs.

It is furthermore possible that the amount of the foreign currency debt may also affect the investors' assessment of the sensitivity of Swedish central government finances to disturbances affecting the value of the krona. A lower percentage of foreign currency debt is also compatible with the ambition to safeguard liquidity in the krona bond market and to increase borrowing in inflation-linked bonds.

The aim should not however be to eliminate the foreign currency debt. Borrowing in several currencies reduces the interest risk by reducing the dependence on interest levels in individual countries, including Sweden. If, for example, Swedish interest rates were to rise sharply without a corresponding change in international interest rates, at the same time as the krona exchange rate remains constant, the foreign currency debt contributes to reducing the increase of the total interest costs. In order for the diversification effects to be noticeable, the foreign currency debt should not be too small.

In summary, the Debt Office is of the opinion that the present foreign currency debt percentage is too great and that the percentage therefore should be reduced. There are however arguments against eliminating the foreign currency debt altogether. The Debt Office's concluding assessment is that the foreign currency debt percentage in the long term should remain around 15 per cent. Such a percentage provides a reasonable trade-off between the advantages and disadvantages presented above.

In the assessment of the foreign currency debt percentage, we have not taken into consideration expected short-term exchange rate movements. To the extent the krona is expected to strengthen or weaken the Debt Office has a continuous assignment to take this into consideration

within the framework of the deviation interval around the benchmark for the amortisation.

It should be noted that on the assumption that the percentage of foreign currency debt at the outset is approximately 25 per cent and that the foreign currency debt may be adjusted only gradually, it will take some time before the aim of 15 per cent is reached. The differences in risk are not however so great that this may be deemed to be a problem. In the short term, there may also be certain cost advantages associated with foreign currency debt, as long as the interest spread does not disappear and there is a favourable trend of the value of the krona. We will revisit the issue of the pace at which the foreign currency debt percentage should be adapted in Section 5.

## 3.2 Inflation-linked Debt

The Debt Office started to issue inflation-linked bonds in 1994. The percentage of inflation-linked loans in the central government debt has since then gradually increased and now amounts to 15 per cent. In comparison to other countries, Sweden has a relatively high percentage of inflation-linked debt. Only Great Britain has a higher percentage.

The Debt Office has in prior proposed guidelines argued that the percentage of inflation-linked debt should increase in the long term. The argument has primarily been that inflation-linked debt contributes to a reduction of risk in central government debt. The reason is that inflation-linked borrowing in certain respects is a mirror image of nominal borrowing. If inflation falls below the expected inflation, inflation-linked borrowing becomes less expensive than nominal borrowing. Conversely, if inflation exceeds the expected inflation, inflation-linked borrowing becomes more expensive than nominal borrowing. By including both nominal and inflation-linked loans in the central government debt portfolio, the central government can therefore reduce the risk of excessive cost fluctuations for the debt.

The positive aspects of inflation-linked debt are amplified if the central government debt is viewed in an ALM perspective. The reason is the in situations when the economy shows a weak development and central government finances are weak, inflation is in general also low. Conversely, central government finances are often good in times of strong economic development and high inflation. To include inflation-linked debt in government debt means against the background of these conditions that the costs for the debt are low when the central government finances are already strained and vice versa.

The technical design of inflation-linked bonds however results in this connection not holding true for the cash interest payments. The cash payments for the inflation-linked debt do not diminish to the same extent that the central

government's income diminishes in an economic downturn with lower inflation. The reason is that the dominant part of the inflation compensation is not paid until an inflation-linked bond becomes due and payable. In periodised terms, however, inflation-linked debt does have the properties discussed above. It should also be pointed out that there are situations when inflation is high at the same time as the economy and central government finances are developing slowly. In such situations of stagflation, inflation-linked debt is disadvantageous.

Not only does inflation-linked borrowing have favourable risk properties, there also are reasons to assume that it is less expensive than nominal borrowing on an average. The reason is that nominal borrowing is associated with an inflation risk premium. With respect to inflation-linked loans, the central government assumes the inflation risk from the investors, and thus should be able to accrue the inflation risk premium. The greater the uncertainty with respect to future inflation, the greater the inflation risk premium would reasonably be. Deficient liquidity in the inflation-linked bond market may occasionally reduce the cost advantages of issuing inflation-linked bonds. In later years, the inflation-linked bond market has however developed favourably, which means that the expected cost of inflation-linked borrowing is presently lower than that of nominal borrowing in view of maturity.

The issue of what percentage of central government debt should be comprised of inflation-linked loans depends on a number of factors. One of the primary arguments for having inflation-linked debt is that it contributes to the diversification of risk in central government debt. In order to have noticeable diversification effect, the inflation-linked debt should however represent a fairly large percentage of government debt.

The need for a great percentage of inflation-linked debt is however reduced as a result of Sweden also having foreign currency debt. The reason is that the effect of inflation on the debt costs for foreign currency debt is similar to that of inflation-linked debt. If inflation in Sweden is lower than in the surrounding world, the krona tends to appreciate, which means that the debt in foreign currency becomes less expensive. If on the other hand inflation rises more than in the surrounding world, the krona tends to depreciate and the foreign currency debt becomes more expensive. The effect is thus the same. Inflation-linked debt has however better diversification properties from an ALM perspective. In addition, exchange rates may vary for more random reasons, without connection to inflation, which makes foreign currency debt appear to be associated with more risk.

The liquidity of each of the nominal and the inflation-linked bond markets, is also of significance to the percentage that should be strived for. If we choose a high percentage of inflation-linked loans, the nominal bond portfolio must be reduced. This may have negative effects on

the liquidity, which will drive up interest costs. On the other hand, also the inflation-linked bond market must have sufficient volume in order for the liquidity to be acceptable. Thus it is necessary to balance the cost of the liquidity premiums in the different markets.

It is also important to keep in mind that nominal bond markets still form the basis of the financing of the central government debt and that it is therefore strategically important that the nominal market functions well. If the Debt Office were to be forced to borrow large amounts in a short time, this would be feasible only in nominal instruments. Neither in Sweden nor internationally is the inflation-linked market sufficiently large in order to handle great short-term fluctuations in the borrowing needs.

Finally it is reasonable to contemplate which macroeconomic disturbance that is the most likely – inflation or deflation. With Sweden's history of inflation, it must still be assumed that the risk of high inflation is greater than the risk of deflation, even if trends in later years have made this conclusion less self-evident. This means that the probability that the costs of the inflation-linked debt will be unexpectedly high is likely higher than the probability that they will be unexpectedly low.

The Debt Office's concluding assessment is that the inflation-linked debt should increase to a percentage of approximately 20–25 per cent. At that point, the inflation-linked bond market will have sufficient volume in order to be liquid and the percentage is sufficiently large in order for positive diversification effects of the inflation-linked debts to have an impact. In combination with a lower foreign currency percentage this will at the same time provide ample opportunity for a large and liquid nominal bond market.

### 3.3 Future Trend of the Debt Percentages

Table 3 summarizes the Debt Office's assessment of how the government debt should be structured.

**Table 3. Proposed structure of the central government debt**

	Percentage
Foreign currency debt	15
Inflation-linked debt	20–25
Nominal krona debt	60–65

Table 4 shows a calculation example of how the debt percentages may develop in the next few years. In the calculation example, we assume that government debt is constant and that the amortisation pace of the foreign currency debt is SEK 25 billion. We furthermore assume that the inflation-linked debt increases by SEK 20 billion per year.

The table shows that the central government debt reaches an inflation-linked percentage of 20 per cent in

2008. The proposed foreign currency debt percentage of 15 per cent will be reached in 2009–2010. It will thus still take a few years before the inflation-linked and foreign currency debt reaches the proposed percentages, on the assumption of the present pace of increase and decrease.

**Table 4. Effect on the structure of the debt, percentage shares**

	2004	2005	2006	2007	2008	2009	2010
Foreign currency debt	25.8	23.8	21.8	19.7	17.7	15.7	13.6
Inflation-linked							
krona debt	14.6	16.2	17.9	19.5	21.1	22.7	24.4
Nominal krona debt	59.6	60.0	60.4	60.8	61.2	61.6	62.0

If the central government debt increases in the calculations instead of remaining constant, the foreign currency debt percentage decreases faster, while the inflation-linked debt percentage increases more slowly. If the central government debt increases by, e.g., SEK 50 billion per year, the proposed foreign currency debt percentage is reached in 2008, while the proposed inflation-linked debt percentage is not reached until 2010.

### 3.4 Debt Percentages as a Management System

From the perspective of a traditional portfolio selection, it may seem natural to state guidelines in terms of debt percentages. An overly strict application of such a management system may however make both the foreign currency and the inflation-linked borrowing more expensive. The disadvantages of stating guidelines in terms of portfolio structure are most readily apparent with respect to the foreign currency debt.

If the krona loses value, the foreign currency debt share of the aggregate increases. With a benchmark stated in per cent of the debt, the Debt Office would, in order to neutralise that effect, need to redeem foreign currency loans during periods when these have a high valuation. Conversely, the central government would borrow extra in foreign currency during periods when the krona is strong, since the percentage declines at that time. There are reasons to assume that exchange rate movements in many cases are temporary and that exchange rates have a tendency to return to some mean value. In such case, a principle to keep the percentage of foreign currency loans constant will cause the central government to both borrow

and amortise when it is expensive to do so. This would be in obvious contravention of the aim to minimise costs.

It should also be taken into consideration that the structure of the central government debt may change for reasons outside the control of the Debt Office. This was, e.g., the case with the transfer from the AP Fund in 2001. The transfer was partially comprised of government bonds denominated in krona, which reduced the krona debt to a corresponding degree. Concurrently, the percentage of inflation-linked and foreign currency loans increased as a result. Assuming that such changes appear unannounced, an overly inflexible management on the basis of percentages would force the Debt Office to undertake costly or otherwise inappropriate restructurings of the debt portfolio. In the alternative, the Debt Office must turn to the government for new guidelines.

The size effects of temporary changes in borrowing needs may be illustrated by an example. If we were to receive an unannounced payment of SEK 50 billion, the borrowing in nominal krona would be reduced by a corresponding amount. At present debt figures, this would reduce the nominal debt share by 1.7 percentage points and increase the foreign currency debt percentage by 1.1 percentage points. An even greater effect may occur when an inflation-linked loan becomes due and payable. If we repay an inflation-linked loan of SEK 50 billion and finance this through nominal krona borrowing, the inflation-linked debt percentage is reduced by 4.1 per cent at the same time as the nominal krona debt increases by the same number. In practice however, the debt percentages are not affected to this extent since we normally exchange due and payable inflation-linked loans against new inflation-linked bonds. But the example shows that the debt shares may vary considerably within the framework of the normal debt management.

Against this background, the guidelines should thus be articulated in a manner so that they leave scope for flexibility in the management. One possibility is that the guidelines will comprise a fluctuation interval around the benchmarks of the debt percentages. The size of these intervals and the exact design of the management system should however be further investigated. With the present guidelines for the foreign currency and inflation-linked borrowing, it will take a number of years before the central government debt reaches the proposed debt percentages. The National Debt Office thus intends to come back to the issue in future proposed guidelines.

# 4. Maturity of the Central Government Debt

For the proposed guidelines of this year, the Debt Office has returned to the issue of the maturity of the central government debt. Today, the maturity of the nominal part of the debt is managed by the assistance of a benchmark for the duration. The benchmark thus operates as a restriction on the borrowing. It is not possible to borrow too much at long maturities or at short. Thereby, the Government is able to manage the refinancing risk of government debt (the risk that we cannot procure funds) and the refixing risk (the risk that we have to borrow at a high interest rate).

The inflation-linked part of the debt is not comprised by the duration benchmark. In a strategic perspective it would however be desirable for the government to issue guidelines for the maturity of the entire debt. This is particularly important in phases where the debt structure changes and the different debt components have a different maturity. With a comprehensive measurement of maturity for the entire debt, it would be possible, within the stated guidelines, to balance an increased risk-taking with a reduction of the risk exposure in another part of the debt.

In this section we discuss the possibilities for introducing a comprehensive measurement for the maturity of the entire central government debt. Thereafter, we account for how the maturity of the central government debt has developed in later years. Finally we discuss the choice of benchmark for the duration of the nominal krona and foreign currency debt in this year's proposed guidelines.

## 4.1 A Maturity Measurement for the Entire Government Debt

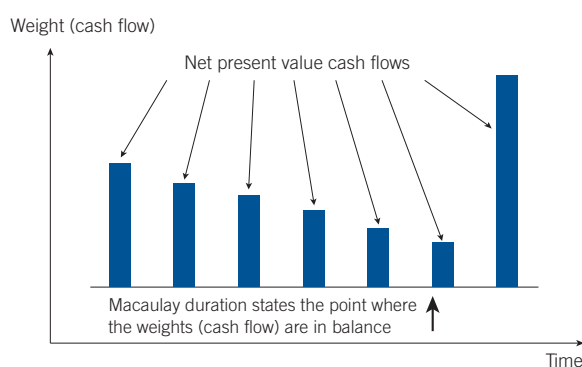
For the proposed guidelines of this year, the Debt Office has investigated the possibilities for introducing a comprehensive measurement for the maturity of the entire central government debt. The first question that arises is what type of measurement is appropriate for such management.

The present guidelines for the maturity of the central government debt are formulated in terms of duration. The reasons that it is duration that is used are primarily practical. First, duration is a well-known and widely used term on the interest market. Second, the Debt Office has for a long time used duration in its operational management of the foreign currency debt in order to control risks.

To include the inflation-linked debt in a comprehensive measurement of duration for the entire government debt meets with no obstacles of principle, as long as we interpret duration as maturity. It is however common for duration to be interpreted as a measurement of the interest risk. Such an interpretation is however not possible when the debt portfolio is comprised of several different types of debt, since the interest rates do not move in the same manner. But this is a problem that arises already when we state a benchmark for the nominal debt since this consists of both debt in Swedish krona as debt in foreign currency. If we interpret duration as maturity there is no issue in weighing the duration of the different types of debt together.

As a measure of maturity, duration tells us how the cash flows of a bond or debt portfolio (discounted to present value) are allocated over time; since duration may be interpreted as a *time of balance*, which states at which point in time that the cash flows are in balance. This means that half of the cash flows are before time of balance and the other half is after. See Diagram 3.

Diagram 3. Duration as a measurement of maturity



That the Debt Office has a duration of 2.7 years for the nominal debt thus means that half of all payments of the debt (in terms of present value) will not be made before 2.7 years and the remainder after 2.7 years. It could also be expressed in the manner that half of the debt will be turned over within 2.7 years. Yet another way to view the matter is that the borrowing on an average is made at a maturity of 2.7 years.

The Debt Office's investigation of a comprehensive measurement of the maturity has given rise to a number of questions concerning the type of management that is appropriate for central government debt management. It is difficult to

manage the duration of the inflation-linked debt or the nominal krona debt within too restrictive intervals. The reason is that there are no short term inflation-linked treasury bills that can be used to fine-tune the duration of the debt or any derivatives. In addition, the inflation-linked debt market is not always as liquid as would be desirable in order to handle the debt.

To manage the duration of the nominal krona debt is also problematic, since it may lead to unnecessarily high transaction costs. The reason is that the debt is great and therefore requires extensive transactions in order for the duration to be affected, but also that the duration is affected by factors outside the control of the Debt Office, which may moreover be difficult to predict.

The difficulties in managing the duration of the inflation-linked debt and the nominal krona debt leaves the foreign currency debt as the only remaining instrument to manage the collective duration of the central government debt. Large transactions may be required, which may give rise to potentially large transaction costs. The issue is whether it is appropriate to make adjustments in the duration of the foreign currency debt in order to compensate for changes in duration in the inflation-linked and nominal krona debt. One precondition to answering the question may perhaps be first to state the frequency by which the aggregate duration should be adjusted.

The answer to these questions requires a more in-depth analysis of what relatively short-term fluctuations in the maturity of central government debt will mean to the cost and risk levels. The less weight that needs to be attributed to variations in the maturity, the lesser is the value of continuous management of the duration through more or less automatic mechanisms. It is furthermore not possible to disregard the fact that the guideline process is annual, which means that the issue of an appropriate maturity will be considered at least once a year.

The Debt Office is of the opinion that the issue of a comprehensive measurement of the maturity of the central government as a starting point for the Government's management of the Debt Office should be investigated further. It is *inter alia* important to study in greater detail any differences between how the maturity of different types of debt affect the risk level. Therefore, we do not propose such a measurement in this year's proposed guidelines. We will however take the trend of the maturity of the entire debt when we propose a benchmark for the nominal krona and foreign currency debt.

## 4.2 Trend of the Maturity of the Aggregate Government Debt

The Debt Office has in later years increased the percentage of inflation-linked loans in the central government debt. In relation to the nominal debt, the maturity of the inflation-

linked debt is very high. This has resulted in an increase of the maturity of the aggregate debt.

Table 5 accounts for the trend of the percentage of inflation-linked loans in the central government debt since 1998. This shows that the percentage of inflation-linked loans has increased from 8.6 per cent at the end of 1998 to close to 14 per cent in 2003. At the end of June 2004, the inflation-linked debt percentage had increased somewhat further and amounted to almost 15 per cent.

**Table 5. Structure of the central government debt, 1998–2003**

	1998	1999	2000	2001	2002	2003
Central government debt, SEK billion	1,526	1,423	1,344	1,211	1,204	1,229
Nominal krona debt, per cent	60.8	62.0	60.4	56.7	55.7	59.2
Inflation-linked debt, per cent	8.6	9.5	10.3	9.7	13.2	13.9
Foreign currency debt, per cent	30.6	28.5	29.4	33.7	31.2	26.9

*Note: The figures represent the amount of the debt as per 31 December*

Table 6 accounts for the duration as per December 31 in the different debt percentages. Furthermore, the aggregate duration in the nominal krona and foreign currency debt is accounted for, along with the aggregate duration of the entire debt. As the table shows, the benchmark for the duration of the nominal krona and foreign currency debt has been unchanged at 2.7 years since 2000. The increase of the percentage of inflation-linked debt, in addition to the inflation-linked borrowing having been made at longer maturities, however causes the duration of the aggregate debt to increase from 3.2 to 3.7 years. The maturity of the central government debt has thus increased by 0.5 years since 2000.

**Table 6. Duration of the central government debt, years**

	2000	2001	2002	2003
Nominal krona debt	3.0	2.9	2.8	2.9
Foreign currency debt	2.1	2.1	2.1	2.2
Inflation-linked debt	9.3	9.1	10.3	10.6
Total excl. inflation-linked debt	2.7	2.6	2.5	2.7
Total incl. inflation-linked debt	3.2	3.1	3.4	3.7

*Note: The figures represent the amount of the debt as per 31 December*

Assuming that the guidelines for the inflation-linked debt percentage are not changed, this trend will continue in the coming years. This is something that we should take into consideration when analysing the benchmark to propose for the nominal krona and foreign currency debt. Longer duration entails lower risk, but also greater expected costs. Therefore it is important that the duration of central government debt is not longer than what corresponds to the central government's risk preferences.

### 4.3 Choice of Maturity

The guidelines for the central government debt must on a continuous basis be adapted to prevalent external circumstances and the central government financial prospects. The present benchmark of 2.7 years (measured in terms of duration) for the nominal debt has been unchanged since 2000. Since the increase of the inflation-linked debt percentage has increased the duration of the total debt, there is reason to re-evaluate the choice of maturity, in particular since this trend is expected to continue. This may however not lead to a mechanical management of the debt, whereby we reduce the duration in one of the other types of debt in order to counter lengthening of the duration of the entire debt by a higher percentage of inflation-linked debt. The different types of debt have different risk properties also in other connections, which means that such a mechanical management is not appropriate.

The Debt Office has in prior proposed guidelines noted that the choice of benchmark for the duration is a trade-off between expected cost and the refixing and refinancing risks. With a positive slope of the yield curve, it is always less expensive to borrow at short maturities, everything else being equal. The risk that is taken is that the debt must be refinanced more often, which makes the interest cost more volatile.

One interesting exercise is to attempt to quantify the impact of an interest shock on the costs for the central government debt at different maturities. In the scenario model, we study the effects of a sharp rise in interest rates in 2015. We compare the cost of the present central government debt portfolio with a portfolio where the duration has been extended by one year. Since the yield curves in the model are positive, it will on an average be approximately SEK 4–6 billion more expensive *per year* to borrow at longer maturities. On the other hand, the result when the interest rate shock occurs will be SEK 20–30 billion lower with a longer duration. The conclusion from the scenario model is thus that in relation to the risk it is expensive to insure against higher interest costs in the event of a crisis situation by extending the debt.

At the same time, our calculations in the preceding section show that the aggregate duration of the nominal and inflation-linked debt has increased from 3.2 to 3.7 years since 2000 (see Table 6). Even if inflation-linked and nominal loans partially have different properties, it is reasonable to assume that the ever greater and long-maturity inflation-linked debt has reduced the risk of fluctuations in interest costs as a result of interest rate shocks. But since it is generally speaking more expensive to borrow at longer maturities, this trend has also meant that the costs for the debt have increased. It could thus be said that the central government, through its borrowing policies in later years, has accepted higher costs in exchange for lower risk in central government debt.

It may be interesting to assess how much this increase in duration would cost the central government. In order to do so we have used the scenario model presented in Section 2. We analysed how great the costs of the central government debt would be if we reduce the duration of the nominal krona debt so that the aggregate duration reverts to the level that prevailed in the year 2000. The results are accounted for in Table 7.

**Table 7. Central government debt cost at different aggregate maturities**

	Present duration	Duration according to 2000
<i>Average annual cost at 2003 prices, 2004–2030, SEK billion</i>		
Nominal krona debt	30.8	28.9
Inflation-linked debt	7.4	7.3
Foreign currency debt	11.9	11.7
Total	50.1	47.8
Difference in average cost		2.3
<i>Average duration, years</i>		
Nominal krona debt	3.0	2.2
Inflation-linked debt	9.3	9.3
Foreign currency debt	2.0	2.0
Total	3.7	3.2

In order to achieve an aggregate duration of 3.2 years at the present debt shares, we must reduce the duration of the nominal krona debt from 3.0 to 2.2 years. Such an issue strategy would entail that costs would be on an average SEK 2.7 billion lower per year than at the present duration. The central government could thus reduce the costs for the government debt by on an average SEK 2.3 billion per year if it reduced the maturity of the debt to the level of the year 2000.

In the calculations we have used the LU's projections of the primary borrowing needs. If we instead use the alternative track for borrowing needs, where the central government finances develop less favourably, we find that the cost reduction from reducing the duration becomes greater. In that case, the central government would be able to reduce costs of the government debt by an average of SEK 3.3 billion per year.

It should be emphasised that these calculations may only be viewed as an estimate of costs under certain assumptions. For example, the interest rates and inflation do not vary during the calculation period. In addition, the positive slope of the yield curves in the model by definition result in it being less expensive to borrow at shorter maturities. Nevertheless, the calculations make a valuable contribution to the analysis, since they give us at least some idea of the amounts of the cost reductions that would be the result of a reduction of the duration.

It should also be emphasised that in the choice of benchmark for the maturity, it must be taken into consideration that the different types of debt have different properties. For that reason, it is not possible to select one benchmark



without having regard to the structure of the central government debt as a whole. To have an equally mechanical management as in this example, where we reduced the duration of the nominal krona debt in order to compensate for a higher percentage of inflation-linked debt pushing up the duration of the total debt, is thus not appropriate.

What duration will then provide an appropriate trade-off between expected cost and refixing and refinancing risk in government debt? The answer depends on several factors. The argument for the borrowing being made at a relatively short maturity is that the yield curve generally speaking has a positive slope. This makes it less expensive to borrow at shorter maturities. At the same time, short-term borrowing increases the refixing and refinancing risk. The results of the scenario model and of earlier analyses show however that it is relatively profitable to shorten the duration in relation to the increased risk exposure.

Presently, the benchmark for the nominal debt is 2.7 years. This is a relatively short maturity by international standards. The argument for the maturity being somewhat further reduced is that the maturity in the aggregate debt has increased in later years as a result of the percentage of inflation-linked loans in the debt having increased, which has reduced the refinancing and refixing risk. This trend can be expected to continue in also in the future. There is consequently room for increasing the refinancing and refixing risk in the nominal debt somewhat.

Another circumstance that also indicates that the maturity should be somewhat reduced is that the overall

risk has declined since 2000, partially due to the debt as such having been reduced, partially because the foreign currency debt percentage has been reduced. The latter is also a trend that can be expected to continue in the future.

In summary, the Debt Office proposes that the benchmark for the maturity of the nominal debts be reduced from 2.7 to 2.5 years. This would result in the expected costs of the central government debt being somewhat reduced. It should be emphasised that the amount of these savings to a great extent depends on the trend of the yield curve. The flatter the yield curve is, the smaller will the savings be.

In the proposal for a new benchmark, we have not taken expected short-term interest rate fluctuations into consideration. For that reason we have furthermore not discussed whether it presently would be advantageous to carry out the proposed duration reduction or whether it would be more advantageous to wait. The reason is that the cost to reduce the duration depends on the future interest trend. If interest rates were to rise, and remain at a higher level, there is a risk that a decision to reduce the duration right now in hindsight would appear as costly.

On the other hand, the Debt Office has since before the possibility to choose its own benchmark for the nominal krona and foreign currency debt within the scope of a certain interval around the benchmark stated by the Government. The Debt Office has noted before that such a decision should be handled as a position and be assessed in terms of market value.

# 5. Proposed Guidelines

In its guideline decision, the Government establishes overall limits for central government debt management. The main points of earlier guideline decisions are that the Government states benchmarks and limits for managing the foreign currency debt and for inflation-linked borrowing. It follows from this that the remaining gross borrowing need must be covered by nominal krona borrowing. The Government has also 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.

In this year's proposed guidelines, the Debt Office is mainly following the same structure as previously. One exception is that we have made a comprehensive assessment of how the debt should be allocated between the different types of debt in the long term. We moreover propose that the guideline for the maturity of the inflation-linked debt be removed.

The time perspective in the guidelines is three years. The Debt Office is thus presenting proposed guidelines for 2005 and preliminary guidelines for 2006 and 2007.

## 5.1 Foreign Currency Debt

**The Debt Office's proposal:** The Debt Office proposes that the percentage of foreign currency debt should be reduced in the long term. Our assessment is that the percentage should be approximately 15 per cent. The proposed benchmark for amortisation of foreign currency debt during 2005 is SEK 25 billion. The Debt Office should be allowed to deviate from this benchmark by SEK  $\pm 15$  billion. The benchmark for amortisation of foreign currency debt in 2006 and 2007 is proposed to be SEK 25 billion per year.

### 5.1.1 Guidelines Now in Force

In November 2003, the Government decided that the benchmark for the Debt Office's amortisation of foreign currency debt during 2004 should be SEK 25 billion. It also decided that the Debt Office may deviate from this benchmark by SEK  $\pm 15$  billion. This flexibility is to be used to promote the aim of minimising costs while taking into account the risk. The Government established a medium-term benchmark for the pace of amortisation during 2005 and 2006 of SEK 25 billion per year.

### 5.1.2 Deliberations and proposal

#### *Percentage of Foreign Currency Debt*

In its proposed guidelines for 2001, the Debt Office carried out an in-depth analysis of the characteristics and role of the foreign currency debt in the central government debt. Its conclusion was that the percentage of foreign currency debt should be reduced in the long term. The reason is that foreign currency debt is associated with greater risk than krona debt. In subsequent guideline decisions, the Government has concurred with the Debt Office's conclusion.

At the end of June 2004, the central government debt was comprised of approximately 26 per cent foreign currency loans, 15 per cent inflation-linked loans and the remainder nominal krona loans. The Debt Office has in this year's proposed guidelines made a comprehensive assessment of the structure that the central government debt should have in the long term. The assessment of the foreign currency debt percentage is based on several factors.

First, foreign currency debt is associated with exchange rate risk and is therefore associated with greater risk than nominal krona debt. On the other hand, foreign currency borrowing is a flexible instrument. Experience shows that if borrowing needs increase drastically, it may be advantageous to borrow in foreign currency. Not only does it reduce the pressure on the domestic market, it can also provide cost advantages to the extent the great borrowing need pushes up the krona interest rates and weakens the krona. In order for the central government to have room to borrow a lot in foreign currency in the event of a crisis, the foreign currency debt may however not be too great at the outset.

The aim should not however be to eliminate foreign currency debt. The foreign currency debt contributes to a diversification of central government debt. Including foreign currency debt in the central government debt reduces exposure against the Swedish interest rates. The foreign currency debt is comprised of five different currencies. Since the interest rates in the different countries are not perfectly correlated, the currency borrowing contributes to reducing the interest the risk in the aggregate central government debt. In order for these diversification effects to be noticeable, the foreign currency debt should not be too small.

In the short term, there may also be certain cost advantages to foreign currency debt, provided that the interest spread does not disappear and that the value of the krona develops favourably. In the scenario model that is presented in the appendix, we have calculated that it on an average

costs approximately SEK 0.8–1.5 billion per year to reduce the percentage of currency debt by 10 percentage points. This corresponds approximately to 2 per cent of the original interest costs.

In summary, the choice of benchmark for the percentage of the foreign currency debt represents a trade-off between the positive properties of the foreign currency debt and the exchange rate risk. The Debt Office's concluding assessment is that a foreign currency debt percentage of around 15 per cent provides a reasonable trade-off between these factors.

#### *Pace of amortisation*

The Debt Office has formerly proposed a gradual reduction of the foreign currency debt. The guidelines for the pace of amortisation should be based on long-term and structural considerations. In last year's guideline decision, on the basis of such an analysis the Government stated that the benchmark for the pace of amortisation in 2005 and 2006 should be SEK 25 billion. In the opinion of the Debt Office, nothing new has emerged to indicate that this pace should be changed. For the same reason, the Debt Office makes the assessment that the pace of amortisation in 2007 should be SEK 25 billion.

Even with a constant pace of amortisation, it will take a number of years before the central government debt reaches the proposed foreign currency debt percentage of 15 per cent. Given an unchanged central government debt (and assuming that the value of the krona is stable), this pace of amortisation would reduce foreign currency debt from 25 per cent of the debt portfolio to approximately 20 per cent by the end of 2007. The central government will thus during a number of years in the future have a foreign currency debt that is greater than desirable in the long term. The fact that the Swedish economy is relatively strong, however, makes this less of a problem. The assessment is instead that the greater share of foreign currency debt will contribute to reducing the costs for the central government debt since international interest rates are presently lower than the Swedish ones.

The Debt Office's flexibility in deviating from the Government's benchmark should remain at SEK  $\pm 15$  billion. This interval will be utilised to promote the aim of minimising costs with due consideration for risk. The exchange rate trend is an important factor in the event of decisions to take advantage of this flexibility. The budget trend may also affect the pace of amortisation, for example in order to prevent an excessive portion of borrowing from burdening the same borrowing instrument.

In light of this, the Debt Office proposes that the benchmark for amortisation of foreign currency debt during 2005 be set at SEK 25 billion, consistent with the Government's preliminary guidelines in last year's decision. As during the

present year, the Debt Office should be allowed to deviate from this benchmark by SEK  $\pm 15$  billion. The pace of amortisation for 2006 and 2007 is proposed to be SEK 25 billion per year.

## 5.2 Inflation-linked debt

**The Debt Office's proposal:** The percentage of inflation-linked loans in the central government debt should increase in the long term. In our opinion, the percentage should be approximately 20–25 per cent. 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 for risk.

### 5.2.1 Guidelines now in force

The Government decided last year that the percentage of inflation-linked debt in government debt is to increase in the long term. Unlike foreign currency debt, however, it specified no quantitative aims, either for the percentage of inflation-linked loans or for the pace of change. The Government instead stated that the rate of increase will be weighed against the growth in demand for inflation-linked bonds and the borrowing costs of other types of debt, with due consideration for risk.

### 5.2.2 Deliberations and proposal

#### *Percentage of inflation-linked debt*

The basis for the guidelines now in force is the conclusion that inflation-linked borrowing helps decrease the risk in the central government debt portfolio. The reason is that inflation-linked debt contributes to a more diversified central government debt than if the debt is comprised merely of nominal instruments. The risk of great fluctuations in interest costs is reduced if the debt is comprised of several types of debt.

The expected inflation-linked borrowing costs may, as a principle, be expected to be lower than for the corresponding nominal borrowing since investors should be willing to pay a premium for protection against inflation uncertainty. The yield requirements are in such case lower than with respect to nominal loans. The central government can thus be expected to borrow at a lower cost by assuming the inflation risk from the general public. The greater the uncertainty with respect to future inflation, the greater the inflation risk premium would reasonably be. The premium that will accrue to the central government by assuming inflation risk is thereby the greatest for bonds with long maturities.

When we assess what is a reasonable inflation-linked debt in the long term, we need to take into account certain additional factors. The inflation-linked debt should be sufficiently great in order for the inflation-linked bond market to have a satisfactory liquidity. If the percentage of inflation-linked bonds increases excessively at the expense of the nominal krona debt, this may however result in negative effects for liquidity in the nominal krona market, which will drive up interest costs. It is strategically important that the nominal market is well functioning. It is still this market that acts as a buffer in case of great fluctuations in borrowing needs.

The concluding assessment of the Debt Office is that the inflation-linked debt should be permitted to increase to a percentage of approximately 20–25 per cent. At that point, the inflation-linked bond market will have sufficient volume in order to become liquid and the percentage will be sufficiently large in order for the diversification effects of the inflation-linked debt to accrue to the central government. In combination with a continued reduction of the foreign currency debt, the proposed percentage at the same time provides room for a large and liquid nominal bond market.

#### *Pace of Increase*

Interest-linked borrowing comprises a trade-off between the aim to minimise the expected costs and the possibility to reduce the risk. It is therefore important that the Debt Office as before is provided with the ability to assess the market situation and is not forced to issue inflation-linked bonds in situations when these appear expensive in relation to nominal bonds.

The aim should thus be to increase the percentage of inflation-linked loans in the central government debt in the long term, while weighing the borrowing against the growth in demand of inflation-linked bonds and costs of other types of debt, with due consideration for risk.

## 5.3 Nominal Krona Debt

**The Debt Office's proposal:** With 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 borrowing.

### 5.3.1 Guidelines now in force

The Government decided last year that in addition to inflation-linked borrowing and foreign currency borrowing, the central government financing needs should be met by nominal krona borrowing.

### 5.3.2 Deliberations and proposal

The guidelines for central government debt management are based on dividing the debt into three components: inflation-linked loans, foreign currency loans and nominal krona loans. With stated guidelines for inflation-linked borrowing and foreign currency borrowing, it therefore follows by definition that the remaining portion of the borrowing need should be met by nominal krona loans. Since the Debt Office regularly holds auctions for both bonds and treasury bills, it is easy in this market to cope with changes in the gross borrowing needs. The nominal krona market thus functions as a buffer in the event of fluctuations in the borrowing need, or if plans for the other two types of debt should change.

## 5.4 Maturity

**The Debt Office's proposal:** The benchmark for average duration of the nominal krona and foreign currency debt is proposed to be lowered to 2.5 years. The adaptation to the new benchmark should be made gradually during the course of the year. The Debt Office should be allowed to decide on benchmarks providing an average duration for the nominal debt that deviates by a maximum of  $\pm 0.3$  years from the benchmark. A decision to deviate from the Government's guidelines should be handled as a position and be assessed in terms of market value. The guideline for the maturity of newly issued inflation-linked bonds should be removed.

### 5.4.1 Guidelines Now in Force

The Government decided last year that the average duration of the nominal krona and foreign currency debt should be 2.7 years in 2003. The aim for 2004 and 2005 is for the duration to remain unchanged. In setting benchmark portfolios, the Debt Office may decide on an average duration for the nominal debt that deviates by a maximum of  $\pm 0.3$  years from the benchmark. The Government also decided that inflation-linked borrowing should have a long duration. Newly issued inflation-linked bonds should therefore have maturities of at least five years.

### 5.4.2 Deliberations and Proposal

#### *Nominal Krona and Foreign Currency Debt*

In earlier proposed guidelines, the Debt Office has concluded that the central government can achieve lower borrowing costs in its nominal krona and foreign currency debt by borrowing at comparatively short maturities, without thereby increasing risk excessively for that reason. A 2.7-year duration has been deemed appropriate in the nominal krona and foreign currency debt.

The Debt Office has in later years increased the percentage of inflation-linked loans in the central government debt. In relation to the nominal debt, the maturity of the inflation-linked debt is very high. This has resulted in the maturity of the aggregate debt having increased. This trend will continue given that the inflation-linked debt percentage increases. This means that the level of risk in central government debt is decreasing. This risk reduction may be used to take a somewhat greater risk in the other debt management and thereby reduce the expected costs.

The consequence calculations that the Debt Office has carried out in preparation of this year's proposed guidelines show that it is more profitable to increase the risk in the debt by lowering the duration in comparison to increasing the percentage of foreign currency debt. To insure against higher interest costs in a crisis situation by having a long duration is expensive. This indicates that the duration should be reduced.

Against this background, the Debt Office proposes that the duration of the nominal krona and the foreign currency debt should be lowered. The benchmark for the duration of the nominal krona and foreign currency debt should be 2.5 years. In consideration of the size of the krona debt in relation to the market, the adaptation of the duration to the new benchmark must be made gradually so the transaction costs do not become unnecessarily high.

In the proposal for a new benchmark, we have not taken into consideration expected short-term interest fluctuations. The Debt Office evaluates on an ongoing basis whether the interest situation and the interest trends are such that the average maturity needs to be changed. The Debt Office's board of directors may at any time during the course of the year decide on strategic duration deviations. According to the guidelines in force, the Debt Office may in the adoption of benchmark portfolios decide on an average duration of the nominal debt that deviates by a maximum of  $\pm 0.3$  years from the benchmark.

Even if it is well-known that it is difficult to predict interest trends, it is possible to note that both Swedish and

international interest rates are at historically low levels. This makes it necessary to consider whether it today is appropriate to reduce the duration. If the Debt Office is of the opinion that it is appropriate to wait with a reduction of duration, this is possible within the scope of the deviation interval. Any decision to choose a different maturity should be handled as a position and be assessed in terms of market value. This is the same method used to assess the Debt Office's dollar-euro position.

In summary, the Debt Office proposes that the benchmark for average duration of the nominal krona and foreign currency debt be lowered to 2.5 years. The adaptation to the new benchmark should be made gradually during the course of the year. For 2006 and 2007 it is proposed that the maturity of the nominal krona and foreign currency debt be 2.5 years. The Debt Office should be allowed to decide on benchmarks providing an average duration for the nominal debt that deviates by a maximum of  $\pm 0.3$  years from the benchmark.

#### *Inflation-linked Debt*

The guidelines now in force for the maturity of the inflation-linked debt state that the inflation-linked borrowing is to have a long maturity. In the guideline decision for 2003, the Government stated that inflation-linked borrowing shall be made at long maturities and that this is to be interpreted as at least five years. Five years is a relatively short maturity of an inflation-linked bond, but experience shows that the difference in cost between short and long inflation-linked bonds generally speaking is minor.

The Debt Office is of the opinion that the choice of maturity should be controlled by the demand for inflation-linked bonds and the borrowing costs in other types of debt, with due consideration for risk. This would create additional possibilities to adapt the issuances to the demand of the market place in an effective manner.

The Debt Office therefore proposes that the limitation to bonds with maturity longer than five years be removed. The properties of the inflation-linked bond still cause the major part of issuances to be made at long maturities.



# Appendix: Government Debt Costs in Case of Extreme Shocks

## 1 Introduction

The overall aim of central government debt management is to minimise the government debt costs while taking into account the risks inherent in such management. This means that central government debt must be structured in a manner so that the central government finances can cope with different crisis situations. Even if the likelihood of a crisis situation is relatively low, there must be margins to handle extreme shocks.

In order to obtain an understanding about how different shocks affect the interest payments on the central government debt, we have developed a scenario model. With the assistance of the model, we are able to calculate the impact that a shock would have on interest payments. We are also able to calculate the average cost of the debt.

Within the model we are able to control how the central government debt is financed and thereby the structure of the debt portfolio. In that manner we can compare the different portfolios by placing the long-term cost in relation to the impact of the shock on the interest payments.

In the following section, we present the crisis scenarios we are examining together with the different debt portfolios. We also account for the time perspective underlying the calculations, after which we account for the design of the scenario model and the assumptions underlying the calculations. Finally we present the results and conclusions.

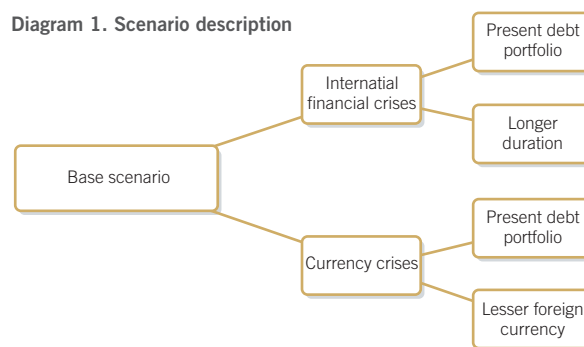
## 2 Crisis Scenarios and Debt Portfolios

In the calculations, we examine two different crisis scenarios: an international financial crisis and a currency crisis. The international financial crisis results in a sharp increase in the Swedish and international interest markets. In the currency crisis scenario, we assume that the krona weakens dramatically. Both scenarios are described in detail in Section 5.

When we calculate the trends and costs of the central government debt, we use the present size and structure of the debt as a point of departure. This means that the central government debt is approximately SEK 1,230 billion. The foreign currency debt percentage is slightly over 25 per cent of the aggregate debt and the inflation-linked debt percentage is slightly over 15 per cent. The duration of the nominal part of the debt is 2.7 years.

The present debt portfolio is then compared to two other debt portfolios. In the international financial crisis scenario, the present portfolio is compared to a debt portfolio with longer duration. In the currency crisis scenario, it is compared with a portfolio with a lower percentage of foreign currency debt. Alternative portfolios are created by changing the issuing strategy in order for the debt to reach, on an average, the stated properties. Diagram 1 contains a schematic depiction of both scenarios.

Diagram 1. Scenario description



The alternative debt portfolios may be viewed as a manner of insuring against excessive cost increases in the event of a possible shock. This may, in combination with an assessment of the likelihood of each crisis situation assist us in determining the appropriate structure of the central government debt.

One important issue is what time perspective to use in the calculations. In prior proposed guidelines we have discussed how the demographic trend may affect future central government debt policy. One interesting analysis to make would therefore be how the central government debt costs will be affected by a shock that occurs after the demographic changes have had an impact and the central government finances are under significant strain.

According to the Survey of the Swedish Economy 2003/04 (SOU 2004:19) the central government will not however come under strain until 2030, i.e., in 25 years. And it will not be until approximately 2045 that the primary borrowing needs are expected to increase dramatically. This is so far ahead in time that it would not have any practical consequences for the management of the central government debt today – there is no reason at this point to change the issuing strategy to safeguard against the effects of any

shocks in 25–40 years. Consequently, it is not interesting to make consequence calculations for such a scenario.

A more interesting analysis is to examine the resultant costs of the central government debt in the medium term. We will therefore study the effects of shocks that occur around 2015. In the next section we present the scenario model and the assumptions made in the analysis.

### 3 Scenario Model

In the scenario model, we use the actual size and structure of the debt as a point of departure. But we will also make some simplifying assumptions. First, we use the present coupon interest rates of the present loans to calculate future interest payments on the existing debt. This means that we disregard any premiums or discounts. Second, we will treat the individual currencies in the foreign currency borrowing as one type of debt only. At the outset, the foreign interest rates and the exchange rates are calculated as a weighted average of existing coupon interest rates and exchange rates.

In order to make projections of the central government debt trend and costs we must make a few additional assumptions, since we need to have information about the trends of certain other variables. These are:

- primary borrowing needs
- Swedish and foreign interest rates
- exchange rates

The primary borrowing needs will be obtained from the projections for the Swedish economy until 2030 made by the made by the Survey of the Swedish Economy (“LU”).<sup>1</sup> The LU’s projections are however based on relatively optimistic assumptions for future trends. It may therefore be interesting to make a sensitivity analysis. Thus, we will study an alternative scenario where we assume that the primary borrowing needs develop less favourably. A more detailed description of the alternative scenario is set forth in Section 4.1.

In the calculations, we maintain interest rates and exchange rates constant (at least until the occurrence of the shocks). The exchange rate is assumed to be the same as today (TCW =124 per 31 December 2003), while the interest rates on new borrowing will be determined by a standardised yield curve for each of the types of debt.

In order to obtain the standardised yield curves we must make certain assumptions regarding long-term conditions in the interest market. We must specify the slope and curvature of the yield curve, but also state how the nominal and inflation-linked interest rates relate to the interest rates on the international market. These assumptions are critical to the

results of the consequence calculations. Since we do not want the results to be affected by excessively strong assumptions about interest rate levels, we have strived to be relatively cautious when specifying the slope of the yield curve, the interest rate spread in relation to foreign countries and the inflation risk premium. We will return with a more detailed discussion about these assumptions in Section 4.

The gross borrowing need that each year must be financed is comprised of loans that become due and payable, the primary borrowing need and the interest rates on central government debt. This borrowing need is allocated to nominal krona debt, inflation-linked krona debt and foreign currency debt. Thereafter, we will determine the maturities to borrow at. From a model-technical point of view, we will issue new loans on a continuous basis, i.e., there is no correspondent in the model to the benchmark loans that exist in reality. This means that if we elect to issue, e.g., ten-year bonds, we will issue a new ten-year bond each year. This differs from how the central government debt is managed in practice, but it simplifies the calculations and does not noticeably affect results.

In the next section we present our assumptions about the constituent variables in more detail. Those who are not so interested in these, may skip directly to the results in Section 5.

### 4 Assumptions

We will now examine a little closer the primary borrowing needs and the assumptions made regarding the slope of the yield curve, interest spreads compared with foreign countries and the inflation risk premium.

#### 4.1 Primary Borrowing needs

In the consequence calculations we will examine two different scenarios for the primary borrowing need trend. In the base scenario we assume that the primary borrowing need develop in accordance with the LU’s projections of the borrowing need. In this scenario, the primary borrowing need amounts to an average of -1.27 per cent of the GDP during the period 2004–2030 (i.e. a primary surplus).

In the alternative scenario we assume that the primary borrowing need develops less favourably than in the base scenario. In order to obtain a different track for the primary borrowing need we will increase the LU’s calculation proportionately so that the average borrowing need until 2015 amounts to -0,22 per cent of GDP (i.e. a lower primary surplus in comparison to the base scenario). This is at the same level as the June forecast of the central governments financial savings 2004–2005 by the National Institute of

1) We calculate the primary borrowing need as the change in the central government debt minus the interest on the central government debt.

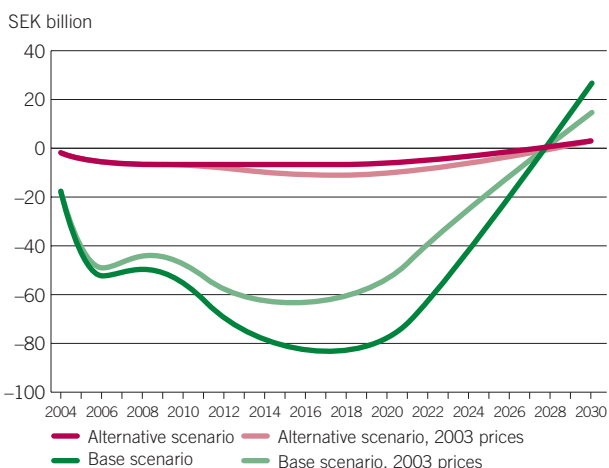


Economic Research. For the entire period 2004–2030, the primary borrowing need amounts to an average of -0.16 per cent of GDP.

The primary borrowing needs trend in the base and alternative scenarios, respectively, are accounted for in Diagram 2. In the base scenario, the primary borrowing need is SEK -17 billion in 2004. This means that the central government budget shows a surplus of SEK 17 billion before the interest on the central government debt has been paid. Thereafter the primary surpluses will increase expressed in net present value until 2016. The surplus will then amount to SEK 62 billion. After 2016, surpluses will diminish relatively rapidly and will in 2027 change to a deficit (i.e. a positive primary borrowing need).

In the alternative scenario, surpluses will also peak in 2016. The surplus will then amount to SEK 8 billion. This is SEK 54 billion lower than in the base scenario. It should be noted that even if the *primary borrowing needs* are negative from time to time, this does not exclude that the *net borrowing needs* are positive as a result of great interest payments on the government debt.

**Diagram 2. Primary borrowing need**

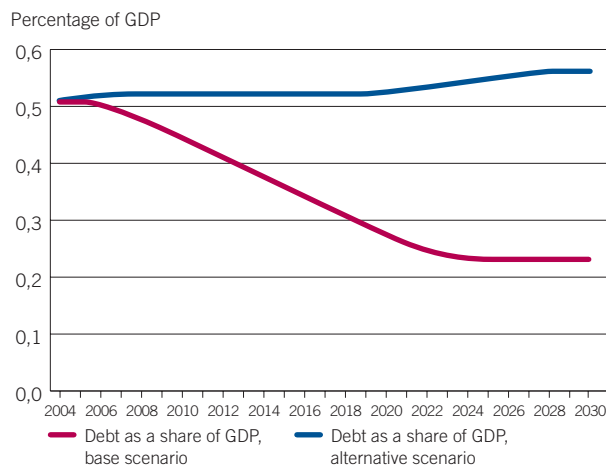


It may be interesting to put the central government financial trends in the base and alternative scenario in relation to the balance target for the public sector. We note then that the trend in the base scenario, which follows the LU's calculations, is compatible with the target that states that financial savings in the public sector should be 2 per cent of GDP up until 2015. Thereafter, the financial savings amount to an average of 1.1 per cent. In the alternative scenario, the financial savings of the public sector until 2015 are approximately 1.5 percentage points lower than in the base scenario and 0.3 per cent lower thereafter.

The primary borrowing needs are of great significance to the central government debt trend. Diagram 3 accounts

for the debt in relation to GDP in our base and alternative scenarios, respectively. In the base scenario, the debt ratio decreases from 51 per cent in 2004 to 23 per cent in 2030. In the alternative scenario, however, the debt ratio rises by 5 percentage points – from 51 per cent of GDP in 2004 to 56 per cent of GDP 2030.

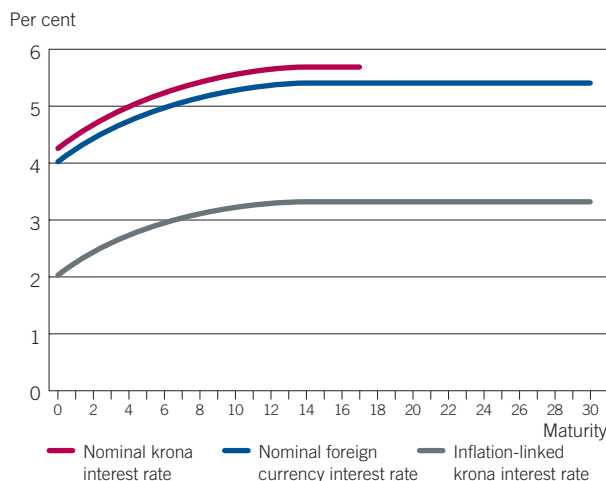
**Diagram 3. Central government debt as percentage of GDP**



## 4.2 Yield Curve

Diagram 4 shows the standardised yield curves for the nominal krona interest rate, the inflation-linked krona interest rate and the foreign currency interest rate that we use in our calculations. We assume that the yield curves have a positive slope except when shocks impact the economy.

**Diagram 4. Yield curve**



Since we are primarily interested in comparing interest costs of different debt portfolios, rather than calculating the absolute cost of a certain portfolio, the exact level of the yield curves is of lesser significance to our calculations. Of greater importance are the assumptions we make about the slope of

the yield curve, the spread between Swedish and foreign interest rates and the inflation risk premium that nominal borrowing is assumed to be associated with. This is a result of these being determinative for how changes of maturity and debt percentages, respectively, affect costs. These assumptions are critical to the results of the consequence calculations.

In order for the results not to be determined by unrealistic assumptions about yield curves, we use historical information and make only very cautious assumptions. Thus, we assume that the yield curve is relatively flat and that the spread between Swedish and the foreign interest rates is relatively small.

In the following two sections we provide a more detailed description of our assumptions and account for the historical appearance of and relation between the Swedish and foreign yield curves.

#### Slope of the Yield Curve

Table 1 presents the spread between the 3-month interest rate and the 2-year interest rate, along with the spread between the 2-year interest rate and the 10-year interest rate from Sweden, the Euro area and the United States during the period 1994–2004. As a comparison, we also account for the present interest spreads (July 2004), and the assumptions we make in the consequence calculations.

**Table 1. Slope of the yield curve**

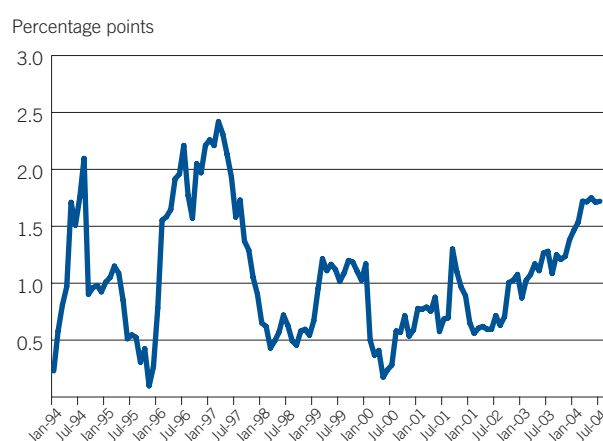
		3 months–2 yrs	2–10 yrs
Sweden	Jan. 1994–July 2004	0.64	1.05
	July 2004	0.84	1.72
Euro zone	Jan. 1994–July 2004	0.36	1.35
	July 2004	0.50	1.60
USA	Jan. 1994–July 2004	0.80	0.89
	Jan. 1976–July 2004	1.02	0.75
	July 2004	1.31	1.86
Model assumptions (standardised yield curve)	nominal Sweden	0.51	0.86
	inflation-linked Sweden	0.25	0.69
	nominal foreign	0.41	0.80

Source: EcoWin and own calculations

As the table shows, we assume that yield curves are relatively flat. The spread between the 3-month interest and the 2-year interest in Sweden is fixed at 50 points, and the spread between the 2-year interest and the 10-year interest at 90 points. In comparison to the historical appearance of the interest spread, this is lower than the average since 1994.

In reality, the yield curves will periodically be both steeper and flatter than we assume here. This is not in the least shown by a review of the historical appearance of the interest spread (see Diagram 5). Our ambition is however that the yield curve in the model shall reflect some kind of normal condition in the interest markets, so as to enable us, with reasonable precision, to analyse the long-term effects of a change of the structure and maturity of the debt.

**Diagram 5. Slope of the yield curve, 2 years–10 years, 1994–2004**



Source: EcoWin

#### Interest Spread in Relation to Foreign Countries and Inflation Risk Premium

The spread between the Swedish and the foreign interest rates is assumed to be relatively small. With respect to short-term interest rates, the spread is assumed to be approximately 15 points, while the spread at longer maturities is assumed to be 30 points. Historically, the interest spread has been greater, but since the spread has been reduced in later years, we elect to deviate from historical data. We are however of the opinion that an interest spread of between 15 and 30 points can be justified by the fact that investors still require a certain risk premium in order to invest in Swedish krona against the background of Sweden's historically higher inflation in relation to the surrounding world. In addition, the Swedish market is less liquid than the international, which may also serve to explain part of the interest spread. In Table 2 we present the average interest spread in relation to foreign countries during the period 1994–2004 and today's interest spread.

**Table 2. Interest rate spread in relation to foreign countries**

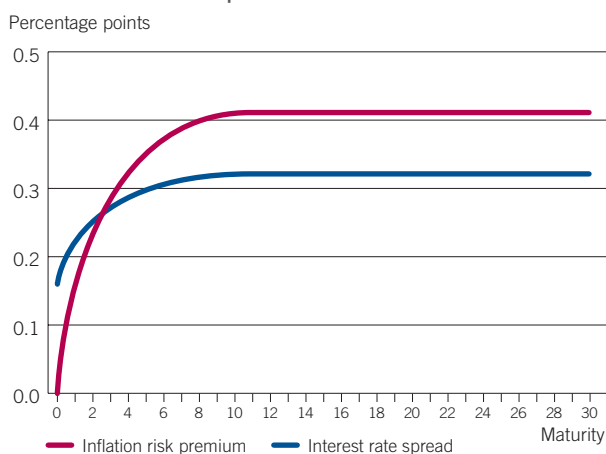
	3 months	2 years	10 years
Swedish interest rate – Euro interest rate			
Jan. 1994–July 2004	1.10	1.38	1.09
July 2004	-0.12	0.21	0.34
Swedish interest rate – US interest rate			
Jan. 1994–July 2004	0.74	0.59	0.75
July 2004	0.67	0.19	0.05
Svensk ränta – TCW-ränta			
Jan. 1994–July 2004	1.16	0.84	1.26
July 2004	0.00	0.23	0.45
Assumptions in the calculations	0.16	0.26	0.32

Source: EcoWin and own calculations

Diagram 6 illustrates the spread between the Swedish and foreign interest at different maturities. Moreover, we are showing the risk premium that the central government is

expected to save by issuing inflation-linked bonds. In the model, the nominal interest is comprised of three components: inflation-linked yield, inflation expectancy and an inflation risk premium. By issuing inflation-linked bonds, the central government assumes the inflation risk associated with nominal bonds. Consequently, the central government is relieved from paying the inflation risk premium demanded by investors in order to invest in nominal bonds. Even if insufficient liquidity in the inflation-linked bond market may serve to counteract this, we assume that inflation-linked borrowing, at a certain maturity, is less expensive in the long term than nominal borrowing. A common assessment is that the risk premium is around 0.5 per cent. We have here elected to fix the risk premium at 0.4 per cent for inflation-linked bonds with long maturities.

**Diagram 6. Interest rate spread in relation to foreign countries and inflation risk premium**



## 5 Results

What we wanted to examine in the consequence calculations is the impact that a shock would have on central government debt interest payments at different debt structures. At the same time we are interested in how much each respective debt portfolio costs on an average. The alternative debt portfolios that we study may be considered as a way to insure against excessive cost increases in the event of a possible shock. Assume for example that we increase the duration of the central government debt in order to reduce the impact of sharp interest rate increases (i.e. reduce the refinancing risk). In case of a yield curve with a positive slope, this will give rise to a higher annual interest cost. On the other hand, the impact of an interest rate shock would be less severe. The issue is how much we are willing to pay for this.

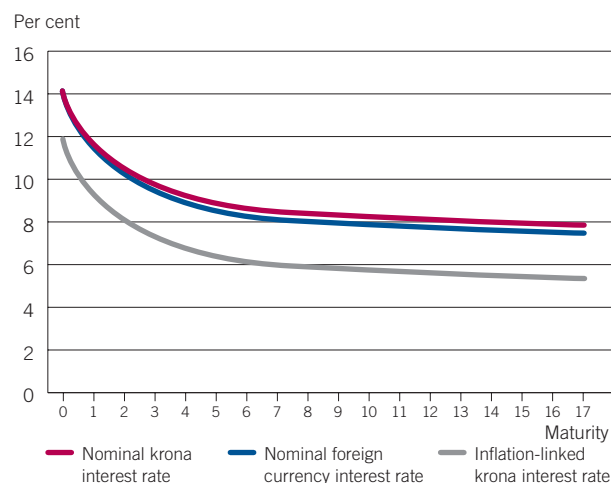
The following section accounts for the consequences of an international financial crisis where the foreign and Swedish interest rates are assumed to rise dramatically. In Section 5.2 we will examine the effects of a currency crisis where the Swedish krona depreciates sharply in relation to

foreign countries. In both cases we make comparisons between two different debt portfolios. Thereafter we will repeat the calculations in an alternative scenario where the central government finances develop less favourably than in the base scenario. All costs are expressed in net present value. In order to convert the costs to net present value we will use the GDP deflator of the Long-Term Analysis Committee. The same deflator is used in all scenarios.

### 5.1 International Financial Crisis

In the first scenario we imagine an international financial crisis where the short-term interest rate in the surrounding world rises by 10 percentage points in 2015. The interest rate rise then spreads to the long-term interest rates and the Swedish interest market. Diagram 7 shows the initial effect on the yield curves.

**Diagram 7. Yield curves in 2015 in case of an interest rate crisis**



The interest rate shock is then assumed to successively subside. We assume here that the interest follows an autoregressive process with the autoregressive parameter fixed at 0.5 (AR 1,  $\rho=0.5$ ). This means that it will take approximately 5–6 years before interest rates have returned to their original level.

The impact of the interest shock on the central government debt interest payments depends *inter alia* on the maturity of the debt. A long maturity results in a low refinancing risk. This means that an interest rate shock will not have as much of an impact on costs. The reason is that only a small part of the debt becomes due and payable each year. Accordingly, a smaller part of the debt will need to be refinanced in a situation when the interest rates are high. However, generally speaking, the yield curve has a positive slope. This means that the longer maturity at which the central government borrows, the higher the interest costs will be. The central government will thus have to pay a price in order to reduce the refinancing risk in the central government debt.

In order to obtain an understanding of how much it would cost to reduce the refinancing risk of the central government debt, we compare the present debt portfolio with a

portfolio where the maturity (measured as duration) of the nominal the debt is one year longer. We can view the cost difference between the different debt portfolios as the premium we must pay in order to insure against unexpected interest rate increases. The following section presents the results of the base scenario. Thereafter we present the results of the alternative scenario.

#### International Financial Crisis – Base Scenario

When the interest rate shock impacts the economy in 2015, the government debt interest payments increase dramatically. The trend of the interest payments is shown in Diagram 8.<sup>2</sup> The blue line shows interest payments for the present debt portfolio, while the solid line shows the interest payments for the portfolio with a duration that is one year longer. If we compare the two lines we find that the impact of the interest rate shock is much smaller than the long duration portfolio. On the other hand, the long duration portfolio is generally speaking more expensive.

**Diagram 8. Central government debt cost in case of a 10 per cent interest rate shock, base scenario**



Table 3 shows that interest payments in 2016 amount to SEK 49 billion at the present duration of the central government debt. If the interest rates rise by 10 percentage points, interest payments increase to SEK 93 billion. The impact of the shock is thus SEK 44 billion. If we study the long duration portfolio we find that interest payments increase from SEK 53 to 78 billion. This corresponds to an impact of SEK 25 billion.

The difference in impact between these two portfolios is SEK 19 billion. This means that the central government, by extending the duration by one year, is able to reduce the immediate impact of the interest rate increase by SEK 19 billion.

The central government debt cost is also affected after the year in which the interest rate shock occurs. If we study the impact 2016–2020 we find that interest payments increase by an aggregate of SEK 110 billion at the present

duration. With one year longer duration, the interest payments increase by SEK 73 billion. The impact of the interest rate shock is thus SEK 38 billion lower than in the debt portfolio with a long duration.

If we examine the average yearly cost of each strategy we find that the cost during the period 2004–2030 amounts to SEK 50.1 billion per year for the present portfolio and SEK 54.4 billion for the long duration portfolio. The cost of reducing the refixing risk by extending the duration by one year is thus SEK 4.3 billion per year given the assumptions of the model. This corresponds to approximately 9 per cent of the interest costs. We can view this cost as the insurance premium that the central government would have to pay to reduce the impact on interest payments in the event of an interest crisis.

**Table 3. Central government debt cost in case of a 10 per cent interest rate shock, base scenario, 2003 prices, SEK billion**

	10 per cent interest rate shock		Base scenario	
	Long duration	Present duration	Long duration	Present duration
<i>Interest payments</i>				
2016	77.8	92.6	53.0	48.8
2016–20	333.2	348.9	260.7	238.6
<i>Impact of the interest rate shock 2016</i>				
Present duration, 2,7 years				43.8
Long duration, 3,7 years				24.8
Difference in impact				19.0
<i>Impact of the interest rate shock 2016–2020</i>				
Present duration, 2,7 years				110.3
Long duration, 3,7 years				72.5
Difference in impact				37.8
<i>Average annual cost</i>				
Nominal debt	36.8	35.3	33.5	30.8
Inflation-linked debt	7.9	7.6	7.8	7.4
Foreign currency debt	14.7	14.0	13.1	11.9
Total	59.4	56.9	54.4	50.1
<i>Insurance premium, difference in</i>				
average cost in the base scenario				4.3
Difference in average cost if the shock occurs				2.5
<i>Average duration, years</i>				
Nominal debt	4.0	3.0	4.0	3.0
Inflation-linked debt	9.3	9.4	9.2	9.3
Foreign currency debt	3.0	2.0	3.0	2.0
Total*	3.7	2.7	3.7	2.7
<i>Average debt shares</i>				
Nominal debt	0.60	0.61	0.60	0.60
Inflation-linked debt	0.14	0.14	0.15	0.15
Foreign currency debt	0.25	0.25	0.25	0.25
Total	1.00	1.00	1.00	1.00

Note: \* Total duration in nominal krona and foreign currency debt

2) It should be noted that the effects of the interest shock in 2015 do not have an impact until 2016. The spikes that we see in 2015, 2020 and 2028 are a result of the inflation-linked loans obtained before 2004 come due and payable at those points and that the central government in connection therewith pays the inflation compensation for these loans.

In summary, the consequence calculations show that it is expensive to insure against higher interest costs in the event of a crisis situation by extending the duration. Given our assumptions regarding the slope of the yield curve, the average cost of extending the duration of the debt by one year amounts to SEK 4.3 billion per year. This corresponds to approximately 9 per cent of the interest costs. The issue is whether it is worth it to pay this cost in order to reduce the risk.

One interesting exercise is to place the cost in relation to the savings that the central government would make in terms of impact on the interest payments. We then find that it takes a little over four years for the central government to earn the impact difference in 2016 by refraining from obtaining insurance. Expressed differently, the insurance premium amounts to approximately 25 per cent of the immediate "damage". Viewed over the period 2016–2020 it takes approximately nine years to earn the difference.

Against this background, the insurance premium appears relatively high in relation to the "damage". Against the background that the crisis we are studying must be considered extremely grave and thereby relatively unlikely, we are of the opinion that lowering the refixing risk in the central government debt by increasing the duration is not justified.

It should be pointed out that the results of the consequence calculations depend on the assumptions that are made regarding the constituent variables and in particular of the slope of the yield curve. However, it is still interesting to note that even with cautious assumptions regarding the slope of the yield curve it is less expensive in the long term with debt having a short maturity, also in case the economy is impacted by an interest shock. Given the assumptions made in the model, the savings made by the central government during the crisis years cannot compensate for the average higher costs that a long duration strategy entails. The average cost difference between a long duration portfolio and the present portfolio in case the shock occurs amounts to SEK 2.5 billion per year.

#### *International Financial Crisis – Alternative Scenario*

If the borrowing needs develop less favourably than in the base scenario, the effects of a financial crisis will be greater. Table 4 shows that the impact of the interest rate shock in 2016 will be SEK 69 billion with the present debt portfolio and SEK 41 billion with the long duration portfolio. By extending the duration of the central government debt by one year, the central government may consequently reduce the immediate impact of the interest rate shock by SEK 28 billion. For the period 2016–2020 the reduction is SEK 57 billion.

Concurrently, however, the cost of insurance increases as a result of the central government debt being greater. On an average, the cost of extending the duration amounts to SEK 6.2 billion per year. This is thus the insurance premium

that the central government must pay in order to extend the duration of the debt and thereby reduce the refixing risk.

It is interesting to note that also in this scenario, the long duration strategy is more expensive than the present central government debt portfolio also in case there is a financial crisis. In other words, even if there is financial crisis, the cost savings made during the crisis years cannot compensate for the increased costs that the long duration strategy entails. The average cost difference between the long duration portfolio and the present portfolio will, if the shock occurs, amount to SEK 3.7 billion.

**Table 4. Central government debt cost in case of a 10 per cent interest rate shock, alternative scenario, 2003 prices, SEK billion**

	10 per cent interest rate shock		Alternative scenario	
	Long duration	Present duration	Long duration	Present duration
<i>Interest payments</i>				
2016	120.2	143.0	79.6	74.0
2016–20	555.6	581.3	426.6	395.4
<i>Impact of the interest rate shock 2016</i>				
Present duration, 2,7 years				69.0
Long duration, 3,7 years				40.6
Difference in impact				28.4
<i>Impact of the interest rate shock 2016–2020</i>				
Present duration, 2,7 years				186.0
Long duration, 3,7 years				129.0
Difference in impact				56.9
<i>Average annual cost</i>				
Nominal debt	59.3	56.8	53.4	49.3
Inflation-linked debt	11.7	11.4	11.3	10.9
Foreign currency debt	23.3	22.4	20.5	18.8
Total	94.3	90.6	85.2	79.0
<i>Insurance premium, difference in</i>				
average cost in the alternative scenario				6.2
Difference in average cost if the shock occurs				3.7
<i>Average duration, years</i>				
Nominal debt	4.0	3.0	4.0	3.0
Inflation-linked debt	10.4	10.7	10.5	10.7
Foreign currency debt	3.0	2.0	3.0	2.0
Total*	3.7	2.7	3.7	2.7
<i>Average debt shares</i>				
Nominal debt	0.60	0.60	0.60	0.60
Inflation-linked debt	0.15	0.15	0.15	0.15
Foreign currency debt	0.25	0.25	0.25	0.25
Total	1.00	1.00	1.00	1.00

Note: \* Total duration in nominal krona and foreign currency debt

In summary, it is our opinion that the central government's need to insure against interest rate shocks increases if the borrowing needs develop less favourably. This is attributable to the annual interest costs already from the outset being so great that an interest shock would be noticeable to

the central government finances, but also to the effect of the interest rate shock *per se* being great. At the same time, the analysis shows that it is expensive to extend the duration of the debt. Given our assumptions about the slope of the yield curve, the average cost for extending the duration of the debt by one year amounts to SEK 6.2 billion per year. Overall, this does not change our earlier conclusion that the duration should not be extended.

## 5.2 Currency Crisis

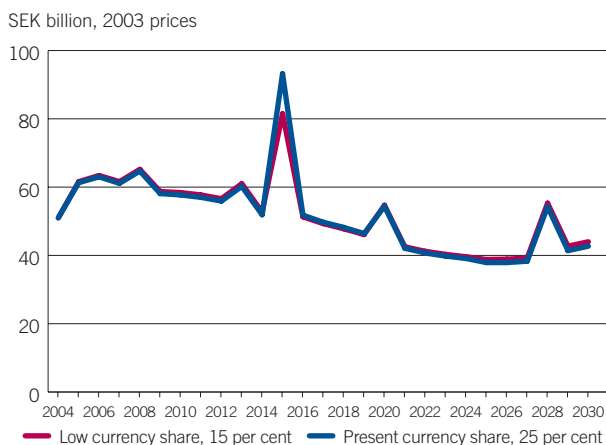
In the following scenario we examine the effects of a dramatic weakening of the Swedish krona in 2015. TCW index is assumed to rise by 15 per cent from 124 to 143. In order to isolate the effect, we assume that the weakening of the krona is permanent. Such a weakening would occur, e.g., if the demand for Swedish goods declines so that the inflation-linked krona exchange rate is weakened. The Swedish and international interest rates are assumed to be unaffected by the depreciation.

The impact of the currency shock on the central government debt interest payments primarily depends on how large the central government foreign currency debt is. At a high percentage of foreign currency debt, the impact of the shock will be greater. In order to obtain an understanding of the costs and risks that are associated with different percentages of foreign currency debt, we will compare the present central government debt portfolio with a portfolio where the foreign currency debt percentage is 10 percentage points lower.

It should be noted that the lower foreign currency debt percentage will cause the duration of the nominal debt to increase even though the duration of each individual type of debt is unchanged. This is a result of the duration of the foreign currency debt being lower than the nominal krona debt.

In the following section we will present the results with respect to the base scenario. Thereafter we will present the results for the alternative scenario.

**Diagram 9. Central government debt cost in case of a 15 per cent krona depreciation, base scenario**



### Currency Crisis – Base Scenario

Diagram 9 shows the trend of the central government debt interest payments at each of a 25 and 15 per cent foreign currency percentage, when the krona is permanently depreciated by 15 per cent. The cost difference between the two borrowing strategies is relatively small. In addition, we find that the cost increase as a result of the depreciation quickly subsides. It is in principle only during the first crisis years that we will have a significantly higher cost with the present foreign currency percentage. The reason is that the duration is relatively short in the foreign currency debt. This causes the major part of the exchange rate losses to have an impact during the first year.

Table 5 shows that the interest payments in 2015 will amount to SEK 65 billion at the present percentage of foreign currency debt in the central government debt. If the krona is weakened by 15 per cent, the interest payments will rise to SEK 93 billion. The impact of the shock is thus SEK 28 billion. If we reduce the foreign currency debt percentage, the interest payments increase from SEK 66 to 82 billion. This corresponds to an impact of SEK 16 billion.

By reducing the foreign currency debt percentage from 25 to 15 per cent, the central government can thus reduce the immediate impact of the krona depreciation by SEK 13 billion. In a corresponding manner, the aggregate impact during the period 2015–2019 will be SEK 18 billion less.

At the same time the low foreign currency portfolio is generally speaking somewhat more expensive than the present portfolio. Between 2004 and 2030, the average cost amounts to SEK 50.9 billion for the low foreign currency portfolio and SEK 50.1 billion for the present portfolio. The difference is SEK 0.8 billion per year. This corresponds to approximately 2 per cent of interest costs.

In summary, a lower foreign currency percentage results in the impact of the krona depreciation in 2015 being SEK 13 billion lower in comparison to the present portfolio. On the other hand this will cost the central government SEK 0.8 billion more per year. If we put the cost in relation to the savings the central government will make in impact on the interest payments, we find that it will take 16 years before the central government has earned the difference in impact by refraining from insurance. This means that the premium corresponds to approximately 6 per cent of the immediate "damage". Viewed over the period 2015–2019, it takes 22 years to make the corresponding savings.

In comparison to the interest crisis scenario, where it took four and nine years, respectively, to earn the difference in impact, the insurance premium in this case appears rather low in relation to the "damage". Assuming that the central government wants to reduce the risk in the government debt, we are therefore of the opinion that it is more cost-efficient to do so by reducing the foreign currency debt percentage than to increase the duration.

**Table 5. Central government debt cost in case of a 15 per cent krona depreciation, base scenario, 2003 prices, SEK billion**

	15 per cent krona depreciation		Base scenario	
	Currency share Low	Currency share Present	Currency share Low	Currency share Present
<i>Interest payments</i>				
2015	81.5	93.2	65.8	64.9
2015–19	276.0	289.4	254.8	250.5
<i>Impact of the currency shock 2015</i>				
Present currency share, 25 per cent				28.3
Low currency share, 15 per cent				15.8
Difference in impact				12.5
<i>Impact of the currency shock 2015–2019</i>				
Present currency share, 25 per cent				38.9
Low currency share, 15 per cent				21.2
Difference in impact				17.6
<i>Average annual cost</i>				
Nominal debt	36.0	30.9	35.9	30.8
Inflation-linked debt	7.5	7.4	7.5	7.4
Foreign currency debt	8.4	13.6	7.5	11.9
Total	51.9	51.9	50.9	50.1
<i>Insurance premium, difference</i>				
in average cost in the base scenario				0.8
Difference in average cost if the shock occurs				0.0
<i>Average duration, years</i>				
Nominal debt	3.0	3.0	3.0	3.0
Inflation-linked debt	9.4	9.3	9.4	9.3
Foreign currency debt	2.0	2.0	2.0	2.0
Total*	2.8	2.7	2.8	2.7
<i>Average debt shares</i>				
Nominal debt	0.70	0.60	0.70	0.60
Inflation-linked debt	0.15	0.15	0.15	0.15
Foreign currency debt	0.15	0.25	0.15	0.25
Total	1.00	1.00	1.00	1.00

Note: \* Total duration in nominal krona and foreign currency debt

Another aspect that however must be taken into consideration is that the krona may strengthen. In that case, the central government would not only make money on a current basis by borrowing in foreign currency, as a result of lower foreign interest rates, but also realise exchange rate gains, as the value of foreign currency debts expressed in krona is reduced. This is something that must be taken into consideration while contemplating the foreign currency share that is desirable.

#### *Currency Crisis – the Alternative Scenario*

If the borrowing needs develop less favourably than in the base scenario, the impact of the currency crisis will be significantly greater.

Table 6 shows that the impact of the krona depreciation is SEK 42 billion at the present foreign currency percentage, and SEK 24 billion at a percentage of 15 per cent. The low foreign currency strategy thus reduces the impact of a currency crisis by SEK 19 billion. During the period

**Table 6. Central government debt cost in case of a 15 per cent krona depreciation, alternative scenario, 2003 prices, SEK billion**

	15 per cent krona depreciation		Alternative scenario	
	Currency share Low	Currency share Present	Currency share Low	Currency share Present
<i>Interest payments</i>				
2015	112.5	129.6	88.6	87.3
2015–19	431.2	449.7	399.7	392.2
<i>Impact of the currency shock 2015</i>				
Present currency share, 25 per cent				42.3
Low currency share, 15 per cent				23.9
Difference in impact				18.5
<i>Impact of the currency shock 2015–2019</i>				
Present currency share, 25 per cent				57.5
Low currency share, 15 per cent				31.5
Difference in impact				26.0
<i>Average annual cost</i>				
Nominal debt	58.4	49.4	58.3	49.3
Inflation-linked debt	10.9	10.9	10.9	10.9
Foreign currency debt	12.6	21.2	11.3	18.8
Total	81.9	81.5	80.5	79.0
<i>Insurance premium, difference in</i>				
average cost in the alternative scenario				1.5
Difference in average cost if the shock occurs				0.4
<i>Average duration, years</i>				
Nominal debt	3.0	3.0	3.0	3.0
Inflation-linked debt	10.7	10.7	10.7	10.7
Foreign currency debt	2.0	2.0	2.0	2.0
Total*	2.8	2.7	2.8	2.7
<i>Average debt shares</i>				
Nominal debt	0.70	0.60	0.70	0.60
Inflation-linked debt	0.15	0.15	0.15	0.15
Foreign currency debt	0.15	0.25	0.15	0.25
Total	1.00	1.00	1.00	1.00

Note: \* Total duration in nominal krona and foreign currency debt

2015–2019 the total costs will be SEK 26 billion less at the lower foreign currency debt percentage.

The greater borrowing needs will however increase also the price of reducing the foreign currency debt percentage and thereby insuring against foreign exchange losses. On an average, the annual cost to reduce the foreign currency debt percentage amounts to SEK 1.5 billion. This means that it would take approximately 13 and 17 years, respectively for the central government, through lower annual costs, to earn the greater impact in 2015 and during the period 2015–2019.

In summary, the analysis shows that the value of the insurance is greater if the central government debt trend is less favourable. This is attributable to the annual interest costs already at the outset being so great that a currency shock would be noticeable to the central government finances, but also to the effects of the currency shock *per se* being great. At the same time, the analysis shows that also the insurance cost will increase. This does not however change our earlier conclusion.