

Assessing Fiscal Risks through Long-term Budget Projections

by
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Long-term budget projections are in their infancy. The method described here is a bottom-up approach to measure future fiscal challenges. The sustainability criteria must be regarded as restrictions of the total fiscal aggregates, confronting bottom-up projections with top-down limits. Uncertainties have often given long-term projections little credibility; sensitivity analysis has to be done. This article discusses the main reasons for uncertainty and how to handle them. In most OECD countries the increase in the elderly population is not only a transitory problem created by high fertility rates after the Second World War. Higher longevity will create permanent higher old-age dependency rates in the future. Some projections even indicate that those rates will increase after the baby-boom generation is gone. Thus it is necessary to consider both how pension reforms are formulated and a broader agenda for reform of the public sector. Given the lower supply of labour, it may be important to modernise the public sector and create less public demand for labour. In many countries, policy reforms will be necessary to create fiscal sustainability to avoid future fiscal risks.

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Back in the 1990s few countries made long-term fiscal projections for government revenues and expenditures. Today several developed countries make such projections – a few as a part of their yearly budgeting process, but more commonly as separate, occasionally published analysis. One of the main reasons for this development is an increasing acceptance by many countries that aging populations will in the future increase public spending and make their fiscal positions unsustainable. Permanent fiscal deficits combined with high levels of debt may compel many countries to increase their levels of taxation and/or reduce public services or entitlement programmes.

However, long-term analysis aims at more than just avoiding possible crisis in the future. Currently the public sector has a dominant position in the economy because of its use of resources to finance public services and because of its various programmes to redistribute income. The public sector also plays an important role in financial markets in most OECD countries, owing a large amount of debt to the private sector and, in many countries, holding a large amount of the assets in the economy. In addition, expectations of future increases in public sector debt may also have a large impact on financial markets.

Financing public services and income redistribution in most OECD countries exceeds 40%, and in some countries even approaches 50%, of available resources measured by the gross domestic product (GDP). Because of the public sector's dominance in the economy, fiscal policy has been and will remain the main instrument for stabilising the underlying annual growth in the total economy. Fiscal policy has however also been used to neutralise short-term changes in the economy, not only through automatic stabilisers in the budget but also through counter-cyclical policy measures, resulting in erratic fiscal policy. However there are reasons to believe that fiscal policies may be less erratic than in previous decades. First, in countries with a change in monetary policy from supporting the exchange rates to targeting inflation, monetary policy will also support fiscal stability. This will reduce the need for counter-cyclical fiscal policy measures and will allow for a more stable budget development. Second, there is a growing awareness of the weaknesses of short-term stabilisation policies without a medium-term economic framework. For a long time there has been a growing acceptance that short-term stabilisation policies created inefficient long-run use of resources, creating unintended support for inefficient industries and hindering establishment of new industries. Given that the demographics with a large increase of elderly people from 2010-15 will make public spending grow faster, a medium-term economic framework will require support from long-term economic and budgetary projections to give guidelines for

creating a sustainable path of public services and income redistribution in the future.

Transparency of the budget and the budget process is important for the legislatures and the public to understand the future consequences of current policy decisions. With a growing demand for public services and a limit on the possibilities for raising the level of taxation, many countries must look to reforms in the public sector to increase its efficiency. Efficient use of public and private resources will also require long-term planning to ensure that new public expenditures will have financing, that the core functions of the public sector will be maintained in the future, that the private sector will experience a stable level of taxation, and that the financial markets will be able to rely on a proper level of public saving.

However, the process of developing long-term budgets is in its infancy, and there is neither a single analytical approach nor a fiscal rule for sustainable development that has achieved agreement as best practice. The most common methods used to illustrate the future problems for sustainable development are long-term budget projections and balance sheet analysis. Present value calculation of the expected deficits, fiscal gap analysis, and generational accounting based on long-term projections are alternative approaches for presenting fiscal sustainability.

This article describes how to do long-term budget projections and how to learn from them to assess and reduce fiscal risks. The article aims to give an overview of elements that should be considered when undertaking long-term considerations. As with all budgeting, long-term projections are related to economic forecasting, but this article does not intend to provide a survey of macroeconomic forecasting. Although macroeconomic assumptions are needed for long-term budget projections and the characteristics of these assumptions have to be discussed, there is no attempt to discuss the macroeconomic implications of fiscal or monetary policies in this paper. Instead, long-term projections are discussed under the assumption of current policies (or “unchanged policies”) with no attempts to forecast the future. The process of making long-term projections will itself provide an understanding of probable fiscal paths and of ways to reduce the risks inherent in these paths.

To provide guidance on how to do long-term projections, it is useful to describe methods for making detailed projections of the main assumptions involved. Updated sources for some of these methods are given in the bibliography. Although this article provides some thoughts on how to do detailed long-term budget projections, each government must choose its own way for doing them. The choice will depend on the purposes of the analysis,

on the available statistics and on country-specific assumptions, including how the public sector is organised.

1. The purposes of long-term analysis

1.1. Sustainability in the long term

The main use of long-term projections is to analyse the sustainability of public sector finances. The concept of fiscal sustainability is related to the capacity of a government to finance its desired programmes as well as to service its debt obligations. In 2002 the IMF defined “debt sustainability as a situation in which a borrower is expected to be able to continue servicing its debts without an unrealistically large future correction to the balance of income and expenditure” (IMF, 2002, p. 4). Sustainability excludes “... a situation where the borrower keeps on indefinitely accumulating debt faster than its capacity to service these debts is growing” (*ibid.*).

Professor Allen Schick presented a paper at the Senior Budget Officials meeting in May 2005 on “Sustainable Budget Policy: Concepts and Approaches” (Schick, 2005). He raised questions about the dimensions of sustainability, the modes of sustainability analysis, and the budgeting of sustainable public finances. Four dimensions of sustainability were delineated in his paper:

- Solvency – the ability of government to pay its financial obligations;
- Growth – fiscal policy that sustains economic growth;
- Stability – the capacity of government to meet future obligations with existing tax burdens;
- Fairness – the capacity of government to pay current obligations without shifting the cost to future generations.

Public finances may be described as unsustainable when there are not enough resources from the economy to service both the debt and the current expenditures without increasing taxes. Although taxation always dampens growth to some extent, the incentives for the private sector to grow may be largely eliminated at certain levels of taxation. Economic theory does not say, however, when the level of taxation is too high.

Current deficits increase the levels of debt and interest payments in the future. Because the level of taxation is limited, there must be a trade-off between current expenditures, future expenditures, and the cost of financing public debt. Increasing levels of debt do not mean that a country will necessarily face insolvency in the future. It means that countries with

currently unsustainable finances must eventually either cut spending or increase taxes.

For most OECD countries, questions of fiscal sustainability are relevant only over the long run. For some countries, however, there may be a much shorter perspective. Within many developing countries with a pressing need for new policy programmes, there are few extra resources for financing unexpected additional costs even today. High debt makes such countries vulnerable to internal and external shocks to the economy, where higher interest rates and interest payments may encourage the countries to take pro-cyclical actions, thus increasing their problems.

1.2. Fiscal policy in the short and medium term

Budgets should serve the following purposes:

- They are the vehicle by which the legislature provides the government with money to spend and specifies what this money is to be spent on.
- They are designed to support sound macroeconomic development.
- They are designed to support the efficient use of public resources.

Long-term and medium-term projections can fit into the budget process in a meaningful way to support these goals. Transparency of the future consequences of current fiscal policies can support sound macroeconomic development and the efficient use of available resources in the coming years. Greater transparency can enhance public sector credibility in the financial markets and demonstrate a commitment to future sustainability of the budget. Increased transparency may then have an indirect positive effect on the present budget balances through lower interest rates on public borrowing. Long-term projections can also provide for more efficient use of resources through better long-term planning of investments such as in public infrastructure.

On the other hand, lack of transparency of the future consequences of current fiscal policies will influence financial markets, the decision of consumers whether to save, and the investment prospects of the business sector. Misinterpretations by any of these sectors may result in inefficient allocation of available resources and reduced economic growth. Credible long-term projections can provide private sector actors with the information they need to increase the rate of savings necessary to meet future requirements by themselves. Announcing changes in the entitlement programmes far in advance will give people time to adjust their plans for

saving and for future work, including retirement age, and in this way minimise the overall costs of changes in the entitlement programmes.

The rise in the ratio of the elderly to the working age population will occur at approximately the same time in OECD countries, in eastern European countries and in some large Asian countries such as China. In addition, higher longevity will maintain this higher proportion of elderly so it will not diminish in the foreseeable future. If the challenges of this greater proportion of the elderly are to be met solely through increased savings in the coming years, the need for such savings in countries affected may be so large that it will hurt present core functions of government and curb macroeconomic growth. The needs for savings today may be too large even though pension reforms reducing future costs are now being discussed, proposed and implemented in many countries, including many of the EU countries and the United States. Common proposals are to raise the retirement age, lower the rates of yearly indexation of the pensions, or adjust the level of benefits to changed life expectancy.

Increased public and private savings may affect the balance between savings and investments in the economy. This may be of great importance for capital markets and interest rates. With a highly globalised financial market there may be a need for international reporting and co-ordination.

2. Long-term projections

Long-term projections may be done either from a top-down or a bottom-up approach. The top-down approach starts by setting restrictions for fiscal aggregates. Making projections for the revenues and some of the expenditures, for example demographic-dependent expenditures, the difference gives the possibility for expenditures under other policy programmes. The bottom-up approach studies the effect on the aggregate fiscal measures of current policy in the existing spending programmes and the revenue under an unchanged level of taxation, but without assumptions about how to handle new reforms in long-term projections. The bottom-up approach puts no restrictions on the total level for expenditures, revenues or deficit. This section discusses the long-term projections that are detailed bottom-up projections calculating the revenues, expenditures and surplus/deficit for every year in the projection period. The integration of uncertainty in the evaluations of long-term projections will be discussed in section 3. Section 4 discusses the integration of long-term projections into the process of making budgets fiscally sustainable in the future. Other methods for presenting future obligations, such as balance sheet analysis, present value calculations and generational accounting, will be briefly

discussed in Annex A. Annex B will give a brief overview of long-term projections done in some countries.

The sustainability criteria must be regarded as restrictions of the total fiscal aggregates. They are not criteria for the levels of different parts of government expenditures such as health care or public pension schemes. Projections that set a starting point for sustainability analyses and highlight total fiscal risk must cover all the obligations from previous periods, the present and the future. This sounds obvious but is difficult in practise. Besides all the explicit obligations a government may have, the government may also have to face implicit obligations that the public expects to be fulfilled (even though they have never been stated before as obligations) and there may be a pressure for new policy reforms in the future. To find out if it is possible to bear the total obligations, the government must also include the financing of areas that do not themselves give rise to fiscal pressures in the future, not only the most problematic policy areas.

2.1. Long-term projections versus medium-term projections

The purposes of the medium-term projections and the long-term projections may be different:

- The medium-term projections are often directly included in the yearly policy discussions of the budget priorities in the coming years. Macroeconomic projections based on projections of public revenues and spending after economic classification are used to show the fiscal space for public spending in the next years. On the other hand, projections of public expenditures which prolong the previous year's spending programmes give baseline expenditures under "unchanged policies". The differences between the baseline projection and recommended fiscal limits give the amount allowed for new policy programmes. Recommended reductions in present public services and entitlement programmes have to be taken into account when the limit for new policy reforms is settled.
- The long-term projections are used to see what the restrictions will be on total public finances in the future given "unchanged policies" in the long run. Because the purposes of medium-term analysis and long-term projections differ, the assumptions for the projections differ too, although they still describe the same world. Restrictions for the policies that may be implemented for some years may give unwanted distributional consequences in society if they are applied for many years. For these reasons it may be important to clearly distinguish between medium-term projections and long-term

projections. Long-term projections should not be looked upon as merely medium-term projections extended for more years.

Medium-term projections, which are the most common today, often have the following characteristics:

- They are baseline projections that prolong the existing policy where the term “existing policy” is given a strict interpretation. The projections show the development of public sector revenues and expenditures given today’s rules and without new policy objectives not yet approved by Parliament. It is often common to base medium-term projections on the same total level of service delivery by the public sector, not taking into account that such factors as demographic changes may change the demand for services. Even long-term plans for specific policy areas that have been approved by Parliament may not be included. In baseline projections, time-limited budget items may not be prolonged when they expire even if it is most probable that they will be replaced by other spending. Such examples may be infrastructure or defence investment programmes. The projections may only build on an economic classification of the expenditures and not a functional classification. In some countries, however, medium-term projections are used to illustrate the government’s budget proposal when it is presented to the legislature and will then also include new proposals not yet approved by Parliament.
- The projections may be based on macroeconomic assumptions coming from medium-term macroeconomic models. These models are built to show how to bring an economic recession back to full employment through fiscal and monetary policies, to a position where the economy is using all available resources. These models are “demand-driven” where public purchases of goods and services and transfers to the private sector increase the total demand for consumption and investment and then create production and new employment. There are few, if any, structural adjustments in the economic solution.
- The baseline projections in the medium term may reflect incorporation of policy decisions taken in the last years. The calculated growth rates for the expenditures and revenues may then not reflect long-term trends in income and outlays, given unchanged service delivery by the public sector.
- In some countries the budget and the financial statements will be affected by specific economic events in the past that are not

expected to happen, nor possible to project will happen, in the coming years. One example is large changes in the exchange rates that may affect surplus for the central bank and thus the transfers from the central bank to the government in the following years. Also, interest payments may vary substantially between years because of short-term changes and transactions in the financial market.

Long-term projections should be:

- Sustainability analyses which are meaningful only when they cover all the future liabilities that the government cannot avoid. Baseline projections must be adjusted for policy changes that are certain to happen. Projecting expenditures by functional classification may give greater flexibility to build in the need to change the level of public services due to changes in demographics and other changes in the economy. There may also be losses on current items of the balance sheet, reserves (outlays, not financial assets) to cover future commitments (both explicit and implicit), and reserves for new policy programmes that probably have to be implemented. The governments often have long-term plans for specific policy areas such as for infrastructural investments or defence strategies that should be included in the long-term projections. However, by building these plans into the projections, future flexibility will often not be substantially reduced because the period for the projections is substantially longer than the normal timeframes for these plans. Increased debt from financing these programmes may, however, lead to higher payments of interest.
- Based on the same assumptions as in long-term equilibrium models. In the long run these models bring the available resources into use as an equilibrium solution. What is important in the long-term projections is that when the economy is in equilibrium there is competition between the public and private sectors for available resources. Changes in public expenditure will change the availability and the use of resources in the private sector.
- Based on “realistic” assumptions of possible policies in the future. Medium-term projections will most often be based on current law and the present rules for adjustments of the yearly budget. Some of the assumptions for the medium-term projections may be difficult to include in the long-term projections. Policies that are possible to carry out in a short period may be difficult to sustain over decades. One example is yearly adjustments of the tax brackets with price indexation and not wage indexation. These adjustments may

increase the level of taxation as a share of GDP to an unintended higher level in just a few years. The purposes of the long-term projections are to show the nature and magnitude of the fiscal problems in the future and, by doing so, to show the alternatives for preventive action. Solving problems in the future by underestimating the expenditure pressure in the projections, or by an unintended increase in tax revenues, will just cover up the problems and not solve them in time. The problems may even be worse if making projections prevents the necessary precautions from being taken.

2.2. Debt and debt management

Long-term projections of revenues and expenditures will normally end in projection of the surplus/deficit and will not give a full balance sheet specifying gross assets and gross liabilities in the future. Financial transactions are normally not projected. In the projections the net debt increase in the future will only be the accumulated deficits in the budgets. The main implication from the debt development in the projections is their effect on future net interest payments.

However, there may be reasons to investigate the present balance sheet before making projections. Assets and liabilities will influence public revenues and expenditures in two ways: 1) by selling or buying them, they may be a source of financing or financial burden and there may also be a risk of losses and gains; and 2) as financial instruments, they may either give revenues (interest, dividends) or the public sector will have to pay interest on their borrowing.

The discussion in the literature on prudent debt is more often on prudent debt management than on a prudent level of debt. If the concern is related to the ability to access the international financial markets and the danger of having to pay higher interest in the future, then data on gross debt might be more relevant than measurement of net debt. Because many assets, such as ownership in public enterprises, are policy measures and not mainly financial investments, it may not be relevant to sell them for the purpose of financing public liabilities.

2.3. Projections of revenues and expenditures

The legislature may decide the revenues and the expenditures in the budget by either giving an exact appropriation for use under a specified purpose (discretionary spending) or indirectly by setting rules and tariffs for taxation or benefits applied by the government (entitlement programmes or

mandatory expenditures). Even if the budget also includes the expected amounts of revenues and expenditures, there are rules and rates that will determine the observed revenues and expenditures. While changes in both taxes and mandatory expenditures will to some extent and often even to a large extent be influenced by unforeseen developments in the underlying macroeconomic assumptions, the discretionary spending may be more easily projected. More important, however, may be that the exact limits for discretionary expenses may be more easily controlled by politicians. The discussion below will distinguish between these two kinds of expenditures.

2.3.1. Revenue

The most important part of the public sector's revenues comes from personal income taxes, corporate income taxes, social insurance taxes and excise taxes such as value-added taxes or sales taxes. In the projections the main focus often will be to get a realistic view of the available resources for the public sector obtained through taxation. In many countries, advanced tax models based on individual tax statistics may be used for these projections, prolonging the current set of tax rates and regulations to a projected tax base.

Not using tax models, projections can be based on prolonging the level of taxation measured as a percentage of GDP over the projection period. Even if this is a good starting point for the projections, one must be aware that this may often not follow from the present tax regulations. Necessary adjustments must be made in some of the tax rules and tariffs in the present tax system for this assumption to be fulfilled. In this way it may be questioned if a constant level of taxation as a share of GDP is "unchanged policies". One should at least consider which changes to the tax regulations have to be made in the future to fulfil this assumption, how to treat economic factors making the tax revenues grow at a different rate from GDP, and if one wants to make adjustments for these factors in the projected total tax revenues.

The following factors may increase taxes and excises more than the growth in GDP:

- **Fiscal drag:** in some countries the tax brackets are adjusted yearly according to the inflation rate not the wage rate. This will bring more and more taxpayers into higher marginal tax brackets and substantially increase taxes as a percentage of income. If not intended this may not be a sustainable development in the long term and may not be a good assumption to include in the projections.

- Income tax on pensions: increased transfers to households will increase tax revenues in the future. In many countries the average real values of pensions rise because the new pensioners have earned larger pension rights through the existing pension system than the present pensioners. This is not the same as the fiscal drag which hits individual taxpayers. Increased numbers of pensioners will also increase the transfers to households and the tax payments from this group. Not to include these aspects in the projections will overestimate the net costs of the aging population. In some countries savings for retirement are tax deductible but taxed when withdrawn. This may also increase tax revenues in the future.
- Tax exemptions: in countries with large tax exemptions today, the relative value of the total exemptions may decrease either because they expire or because the economic importance of the groups that receive these supports vanishes.
- Excise taxes: some countries have special taxes on “luxury” items. Increased household income may spur the demand for such items and increase the excise taxes as a percentage of household consumption.

However, other factors may decrease the tax level as a percentage of GDP:

- In some countries the share of taxable capital income rises at the expense of taxable labour income. Capital income is in some countries taxed less than labour income. In these countries a higher share of income from capital may reduce the overall level of taxation as a percentage of GDP. An undermining of the tax bases may be a problem also in countries where fringe benefits gradually replace ordinary wages if fringe benefits are not taxed at the same level as other income. Also, a relative increasing demand for services instead of goods may in some countries reduce the average level of excise taxes.
- In countries with some degree of wealth-based taxation, a conservative attitude of adjusting the value of the tax base or the tax rate will reduce the tax revenues measured as a share of GDP. Most excise taxes are based on the value of the item purchased. As long as the total consumption keeps up its share of GDP, the revenues from value-based taxes also grow in line with GDP. Some excises are however based on quantity or other criteria such as environmental damage. Not increasing the rates for these excises according to inflation will erode the tax revenues.

Even if some factors for adjusting the tax projections may seem small, one should not underestimate at least three of them: the revenues from taxation arising from higher pension benefits, the reductions in taxation following the decreased share of income coming from labour, and the erosion of the wealth tax base and quantity based excises. In the yearly budget proposals, increased individual taxation from the same tax base will often be adjusted for and, if so, may not be included in the long-term projections.

Even if the most important revenues come from taxes and excises, it is also important to include other revenues such as dividends from public enterprises, grants from other levels of government or international organisations, and other transfers. These revenues are often specific for each country and are not discussed in this article. Charges are discussed in the next section on discretionary spending.

2.3.2. Discretionary spending

Discretionary spending refers to the outlays where the limit for the amount spent is settled directly by an appropriation act by Parliament. Even if the legislature sets goals to be met and there is a responsibility for the government to fulfil these goals, the spending limit shall not be exceeded. Most of the expenditures for producing public services and public investments are restricted in this way. Also some grants for aid to developing countries, subsidies to business activities and grants to municipalities are settled as fixed amounts by Parliament in many countries.

The quality of public services and public investments may for some services be independent of the number of users. National defence may be such a service. In many countries there may be national plans for some parts of the public sector. However there will be few policy assignments that will help settle the expenditure level in the long term. Without specific information, an assumption of constant total real value or as a share of GDP for expenditures not related to individual services may be a normal starting point for unchanged policy in the projections.

Most of the traditional public services such as education and health services are individual services. If the appropriations are kept constant when the demographics change, the availability of the services for the individual user will be changed. There is often pressure to keep the quality of the services to the individual user at least at the present level when the number of users increases. Countries building into their projections constant service delivery for the user or per capita make the projections more informative. Contrary to the entitlement programmes, however, there is a need for policy decisions to make these adjustments; one must be aware of the bias against

adjusting for growth in the number of users but not of the reductions in the real world. One must also take into account that making adjustments in the level of service delivery is not just a question of political will but also the possibility of implementing the adjustments and of doing so by identifying the changes through available statistics. There may also be some arbitrariness in making such calculations. The individual level of costs for delivery of the services is measured in the previous years and the total is projected for the future by combining these observations with demographic projections. However, the uncertainty in such assumptions is large. The year for observations may not be a year with “normal” cost structure or there may not be a constant scale of economics in the production of the services.

In most countries some public services are financed wholly or partly by user fees. In the budget the cost of public service delivery in some countries is shown on a gross base including the fees in the revenues. Other countries show the cost net on the expenditure side. In both cases, however, it is important to consider the changes in the cost and the financing on a gross base when doing long-term projections.

Adjusting the fees for inflationary changes is often done in two ways: either according to the change in the price level measured by the consumer price index or according to the cost of producing the services. Normally the increase in the cost of producing public services will be higher than the increase in the consumer price index due to the high share of employment costs in the production costs. With high productivity growth in a specific public agency, this may not always be the case. Adjusting the fees according to the consumer price index will not, in a normal situation, cover the rise in the production costs and will increase the proportion of the costs financed by the public sector over the long term. A cost-based index will normally keep the public share of the cost approximately constant. One must however take into account that countries may also have an upper limit for private individual spending in both health care and education. If these limits are adjusted according to the consumer prices, a gradually larger part of the users will meet these limits, making the public share of the expenditures rise, even if the prices on the individual services are based on cost adjustments.

2.3.3. Entitlement programmes (benefits or other unrequited expenses)

Entitlement spending or mandatory spending is authority provided and controlled by laws other than appropriation acts, and the outlays result from these budget authorities. Even if the outlays exceed the appropriated

amount, the government must fulfil its obligations as specified in these entitlement laws and regulations.

Most of the entitlement programmes are linked to specific phases of life:

- As a child: children or family allowances;
- In working age: disability insurance, unemployment benefits and sickness allowances;
- In old age: retirement pensions;
- Health care is important throughout life, but the most expensive long-term health care and specialised treatment are linked to the elderly.

The demographic structure of the population will to a large degree determine the structure and level of public expenditures. The age dependency is of course not only linked to the entitlement programmes but also to public services such as kindergartens and schools. For this reason it is necessary to use long-term demographic projections to make reliable long-term fiscal analysis for the public sector.

What is especially important is the ratio between people receiving public transfers or free public services and the share of the population financing public expenditures through taxes. The most common measure to illustrate this is the age-dependency rate which measures the proportion of the population 15 years and under and the elderly 65 years and older in relation to the population aged 16-64. One common alternative is to consider the elderly 65 years and older as a part of the population aged 16-64. The reason for using this alternative is that it is the growing proportion of the elderly that is seen as creating financial problems in the future. In many countries low fertility rates are causing a decrease in the younger population. Even though the public sector finances partly or wholly the costs for kindergartens and schools, the main support for the younger generation comes from their parents. A decreasing younger generation will mean increasing savings for the public sector but the savings would only partly finance the growing expenditures for the elderly.

Social security and other income redistribution programmes are a large and increasing part of the budget. The pension benefits grow strongly for several reasons:

- A growing elderly population will in most, if not all, OECD countries raise the share of the elderly in society.
- The pension systems in many countries may not be fully established. It takes time to build up the rights for full pension benefits. The new

pensioners will have earned higher pension rights than the previous generations of pensioners.

Previously many countries adjusted pension benefits in line with wage increases in society. However, more and more countries have decided as a part of recent pension reforms to adjust pension benefits partly or wholly according to inflation. In some countries these rules for adjustment are set out in law. During the 20 years from retirement age to the end of life, a large degree of price indexation of pensions may substantially bring down the value of the individual pensions relative to wages. One may ask if these assumptions will have implications for other assumptions of the long-term projections. If the real values of the individual earned pension obligations are brought down too much, other public costs may increase. A minimum level for pensions may be introduced, costs for health care for the elderly must perhaps be totally financed by the public sector, and other public services must be given free of charge to the pensioners. Not taking these changes into consideration may overestimate the positive effects of reforms introducing price indexation. One must also expect that although the pensions themselves are price indexed, the pension level at retirement age is linked to the wage level at the beginning of the retirement period or during lifetime. New groups of retiring people will gradually raise the average level of pensions even if the individual pensions are partly price indexed. It is important for the long-term projections that these adjustments will reduce the projected savings for the public sector. The implication of using price indexation of pensions for the uncertainty in projecting future deficits is also discussed in section 3 under the topic of productivity.

Public civil and military personnel pension schemes may raise the same questions as the national social security pensions system. An expanding public sector in the past may increase the number of public pensioners in the future. There are several reasons why the projections for the public sector's pension schemes may differ from the general pensions system. Even if the two parts of the pensions system may be connected, there may be different treatment of the social security pensions and those for public employees. One difference may be that the civil and military personnel pensions may not be restricted like the public pensions from the national schemes, making the occupational schemes grow faster. Most of the civil servant pensions today are based on promised benefits (defined benefit system). Within such a system the government will bear the uncertainty of the level of future benefits, just like the normal situation in the social security system. However some countries have introduced a defined contribution system where the future payments depend upon what one has put into the system. The uncertainty is then shifted to the future pensioners' hands. This makes it

possible for the government to transfer the payments for the future pension obligations up front into privately owned pension funds.

Projecting spending under entitlement programmes may also be difficult for other programmes than pensions. In at least some countries there have been increases in the expenses for disability insurance and sickness allowances not fully explained by the developments in the labour market. Not having a good explanatory model makes future projections unreliable.

In this article, health care costs are discussed under the heading of entitlement programmes. In most countries these costs include both discretionary costs, such as hospitals and long-term care, and entitlement health care costs. However, health care costs are to a large degree linked to the demographic structure of the population, especially the share of the elderly; and the growth in the health care costs may not easily be avoided even if they are formally settled in appropriation laws.

The increases in health care costs are complex and the reasons for the strong increases are not fully understood in many, if any, countries. Given the different structures in the organisation of health care in different countries, it will be necessary to study the distinctive structure in each country. These differences also include to which degree health care services are paid privately or publicly. Important common factors to be taken into account in projections should be:

- Health and long-term care costs rise at the end of life. The demographic trend of an aging population may thus increase health costs. Building and running long-term care institutions are expensive operations and may be one of the reasons health care costs rise. Especially the high proportion of the population aged over 85 may cause an increase in long-term care costs. However there is discussion about to which extent longer life expectancy gives the elderly more years of healthiness or if people will stay sick for a longer period in the last years of their lives. More years of healthiness will not only reduce the growth in total health expenditures for each individual but also postpone in some years the increase in the total health expenditures due to the higher number of elderly.
- Health care costs are growing faster than the growth in GDP in most countries. For this reason, health care has often been looked upon as a “luxury” service with relatively increased demand when there is higher household income. If so, the demand for public health services will grow. Some empirical studies show, however, that there may be other factors than higher income that raise the health

care cost relative to income. In the paper “Projecting OECD Health and Long-term Care Expenditures: What are the Main Drivers?” (Oliveira Martins *et al.*, 2006) the income elasticity for health care is assumed to be near one. This means, however, that other causes must be found to explain the strong growth in health care spending relative to GDP.

- Supply drivers such as technological and medical advances may make it possible to cure sickness and to treat diseases for which there were no cures before. In the health care field, technological advances may raise costs rather than lower them by increasing the possibility for treatment and then the demand for new services.
- Only a part of the cost is directly paid by the users themselves, the rest by the public sector and/or through an insurance company. The consumers have little incentive to restrict their consumption of health care services. There may be a tendency to always choose the newest, more advanced and most expensive treatment even if a cheaper treatment could do as well.

In many countries, however, health care costs are raising spending even to a greater degree than can be explained by these factors alone. In several countries there are constant underestimations of the growth in health care costs. The United Kingdom Pre-Budget Report states: “There are many other non-demographic factors, which could affect future health and long-term care spending. The Wanless Review separated these factors into demand and supply drivers. In addition to demography and health status, the former group comprises health promotion and disease prevention and health seeking behaviour. The latter group comprises technological and medical advances (which should also affect morbidity trends), investment in information and communication technology, and health service workforce productivity. Some commentators have argued that non-demographic drivers are likely to be more important than demographic drivers in determining future health spending.” (HM Treasury, 2005c, p. 46)

Normally it is not advisable to incorporate unexplained changes in the revenues and expenditures as “trends” in the projections. “Trends” are econometrical expressions for the unknown and for lack of explanations. For health care costs, however, there have been considerable amounts of underestimation in many countries; not taking this into consideration may give a seriously misleading perspective of the future. One important problem when estimating such trends may be that the past trends also include the results of past policy priorities through new reforms and strengthening of the health care sector with extra resources, and these results are difficult to distinguish in the estimations.

2.3.4. One-off expenditures

In some countries one-off expenditures may be small and, in principle, included in the calculation of the reserves for unforeseen budget changes and new policy reforms in the yearly budgets; if so the one-off expenditures should also be treated as such in the projections. In some countries, however, there are some expenditures that are unpredictable both regarding when they will occur and what the total costs will be when they occur. There is just a great probability that they will occur sometime in the future and that the costs related to them will be high. Natural disasters may be such infrequent events, creating high extraordinary public costs in some countries. For some countries where one-off events occur frequently and involve large potential amounts, it may be advisable to accord specific treatment to such costs to be sure that the projections show the total liabilities in the future and the estimated amount needed to finance them. One such country may be the United States where floods, droughts and other natural disasters occur some place every year.

Canada manages unexpected developments in the budgets and projections through the inclusion of a Prudence-Contingency Reserve of CAD 3 billion per year along with an economic prudence reserve of CAD 1 billion in the first year of the budget plan, rising to CAD 4 billion in year five. In addition, for programmes currently in existence to manage certain types of disasters – *e.g.* the Disaster Finance Assistance Act which compensates provinces and municipalities for their costs associated with natural disasters – estimates are included in the projections based on historical experience. The contingency and economic prudence reserves are explicitly identified in their Budget Plan. The other provisions are not identified explicitly but incorporated in the projections.

The reasons for “one-off rescue operations” may differ and may not only be the result of an inevitable exogenous event. Often the reason may be insolvency of public enterprises, liabilities from guarantees, and defaulted loans. There are different alternative ways to treat the financing of such probable one-off expenditures in the future:

- Some countries are building up funds in their yearly budgets to meet liabilities from guarantees and defaulted loans. If these funds are treated as private funds and the transfers are classified as outlays, these transfers to the funds should also be included in the projections. Changes in financial reserves will however not normally be included before they are used to finance the outlays.

- If there are no reserves earmarked and treated as a yearly cost, the projections may include a calculated insurance premium in the yearly expenses to cover such unforeseen expenditure.

Often the private sector looks upon costs connected to natural disasters as implicit policy liabilities that the government will cover. In making the long-term projections this may be problematic because if the public sector recognises these liabilities there may be a “moral hazard” problem. Building these costs into the projections may make implicit liabilities explicit liabilities. This may cause the private sector to not take the necessary preventive action and may increase the probability for higher public expenditures in the future.

2.3.5. *Interest payments and debt management*

To determine the assumptions for interest rates is difficult. In several countries pension reforms have been undertaken, and how these pension reforms have been formulated will impact the level of both public and private savings. The relation between the interest rates and the growth of GDP is important for the possibility to handle a certain level of debt in the future. High interest rates increase the burden while an increasing GDP will increase the possibilities to meet the debt burden. If the growth in the GDP is higher than the interest rate, the overall burden of debt may gradually decrease. This may be especially important in the future because slow growth in the labour force may produce a decrease in the hours worked in many countries which means that GDP will only grow as a result of higher productivity. There will be less possibility for the public sector to reduce the burden of debt through economic growth than in the past.

Economic theory for growth shows that, under given certain assumptions for optimal growth, the interest rates may be equal to the macroeconomic growth. Given the uncertainty in the level of interest it is a good precaution to assume that the interest in the future will not be lower than the growth in GDP. However, there are reasons to believe that in some countries the interest level may be substantially different from the growth in GDP:

- In a globalised financial market, the interest rate may partly be determined by the international average growth in GDP and may not equal the national growth in GDP.
- A rise in the public debt in one country might produce a specific country risk and higher interest rates in that country than observed internationally. This should be considered as a risk when projections show an unsustainable development in public debt.

The debts coming from future deficits in the budgets are not the only source for interest payments. Changes in the interest payments on already existing debts will depend on their durability and the agreement for interest payments. To predict the future interest payments, one has to go through the stock of assets and liabilities to see the expected payments in the future of the present debts. The durability for most of these existing obligations will be fixed, so they will have to be refinanced at the future market level of interest at the latest at the moment when they are due. To estimate future interest payments is not straightforward because the borrowing strategy in the future and what kind of interest rates to be applied most often will not be known. However, it is difficult to see that the short- and long-term market interest rates projected for decades into the future will differ substantially in the long-term projections except for markets taking an insurance premium for binding a fixed rate for a longer period.

3. Uncertainty in the projections: exposing future fiscal risks

Detailed medium-term projections and even projections for not more than some years ahead have proved to be uncertain and often have little credibility. To handle this lack of credibility over the long term, sensitivity analysis has to be done. To deal with uncertainty in the projections, scenario building is a helpful tool for decision makers to understand how different the future will be if the main assumptions for the projections do not materialise. Small changes in the assumptions might affect the future financial position seriously when going far into the future. However, to make reforms affecting the future one must still have projections to rely on, even though they may be uncertain. Many reforms have to be implemented on the basis of uncertain projections because when reforms are first started they are difficult to change. As an example, reforming pensions takes time to agree on and to implement, so not taking notice of the large possible bias in the projections on which the reforms are built may give suboptimal solutions for public finances in the future.

There are several reasons for uncertainty in the projections and these uncertainties will to some extent have different characteristics. In this article, the discussion of uncertainties is split in the following way: 1) macroeconomic long-term modelling; 2) demographic assumptions; 3) labour market participation; 4) productivity; 5) specification of programmes for public revenues and expenditures; and 6) interest rates. In a short article like this it is not possible to present in detail how to estimate the values of these factors. This article will just emphasise the main characteristics of these assumptions.

The bibliography contains references to recent work done in the OECD and by others. Readers who wish to go into more details on how to produce reliable assumptions for projections may find useful information both in the OECD papers and in “The 2005 EPC projections of age-related expenditure (2004-2050) for the EU 25 Member States: Underlying assumptions and projection methodologies” (Economic Policy Committee and European Commission, 2005a).

3.1. Macroeconomic long-term modelling

When making long-term projections some countries use long-term equilibrium models. Many and maybe most countries do however use a more informal approach. The important thing is that economic reasoning based on economic growth theory and long-term equilibrium modelling is kept as a basis for the long-term projections. Long-term models differ from medium-term models in one of the main assumptions: in long-term models, all the available resources in the economy will in the long run be fully used. The growth in the economy will be explained to a large extent by technological improvements, capital formation and growth in the labour force. In medium-term models the labour participation will be more determined by demand factors like public and private consumption, investments, and exports and imports. In the medium-term models there may be inequality between labour supply and demand, creating unemployment.

While medium-term models are often used to describe a policy that reduces unemployment where remaining unemployment is shown as a part of the model solution, there is no unemployment because of lack of demand in the long-term model when it is in steady state equilibrium. In the most common cases this means that the labour market participation rates must be settled by the model user as assumptions before running the model. Economic theory says that, through changes in prices, market adjustments will bring the labour market into equilibrium. There is no reason to believe that this is not generally correct in the long run. However, the unemployment rates in some countries have remained high for decades. If there are reasons to believe that this will also be the case in the future, the labour participation may be adjusted when stating labour market assumptions before running the long-term model.

The long-term equilibrium models are often dynamic models. One problem in estimating the economic relations in such models is to find the correct time lag for the dynamic relations. There is often great uncertainty in such models about how much time it will take to reach the equilibrium solution. The economy will probably reach equilibrium one day but it is difficult to predict when this day will come.

The uncertainty in the dynamic structure of the model may be a large problem if it influences the first years in the long-term projections. Often a medium-term policy strategy or economic projection for these years has been created by use of medium-term macroeconomic models. If there is a more reliable medium-term policy strategy or economic projection for these first years, a possible solution is to include this medium-term strategy at the start of the long-term projections using medium-term modelling for the first years and then prolonging the projections using long-term modelling in the following years.

3.2. Demographic assumptions

The changes in demographics will come from three main sources: fertility rates, immigration rates and longevity. Demographic projections may seem to give fairly stable assumptions looking at the changes in updates from one year to another. The main problem, however, is that the yearly changes are additive, and even small changes in these variables in the long run will produce large discrepancies from the previous projections. These updates give changes in the public sector deficit which may accumulate into a large amount of debt and interest payments.

In the long-term fiscal projections, the age structure of the population will be more important than the absolute size of the population. The calculations are best done by age distribution specified for each age; some calculations, however, are done by five-yearly age groups. The structure is often illustrated with the dependency rate defined as the proportion of population under age 16 and over 65 in relation to the population from 16 to 65. Due to the growing proportion of the elderly in the population and the magnitude of transfers and health cost spending for this group, there has been special interest in the old-age dependency rate defined as people age 66 and over in relation to the population in working age 16-65 when illustrating the causes of growth in public spending. However, most of the public spending, including on education, is linked to specific periods in life. Demographic projections showing the whole population divided into age group are important for the total level of public spending.

3.2.1. Fertility rates

In many countries there has been a decline in fertility rates during the last decades. In most of northern and western Europe the fertility rates seem to be stabilised just below 2% which is lower than the natural replacement rate of 2.1%. The rates are still very low in some Asian countries and in eastern and southern Europe. One uncertainty regarding future trends in

Europe is whether the fertility rates in eastern and southern Europe will increase, as it is not clear if the low rates in eastern countries are a result of the extraordinary situation both before and the decade after the fall of the Iron Curtain. An increase in southern Europe may be expected if it follows the development seen in the northern part of Europe. However, historically large changes in the fertility rates have been observed without a reasonable explanation. To predict such changes in the future may thus be risky.

Changes in the fertility rates will influence the need for public services for children and young people. The main part of the cost of supporting young people is covered by their parents. Entitlement programmes for children, such as family allowances, are not usually a large part of public spending. Most of the public services for this group are kindergartens and educational services where unforeseen and normally small changes in the fertility rate may change the quality of the public services more than create uncontrolled growth in child-related public spending in the coming years.

It will take several decades before changes in the fertility rates will start to change the labour supply; it will take even more decades before the impact on the labour supply will significantly reduce the old-age dependency rate and substantially longer before people born in the coming years reach the retirement age. It does not seem that changes in the fertility rates are a crucial uncertainty for the long-term fiscal projections for the next 30-40 years. Projections based on the low fertility rates observed today may also have eventual biases against higher fertility rates in the future in many countries if the development in northern and western Europe is also to be seen in these countries. In the long run higher fertility rates may ease the problems of an increasing proportion of the elderly in the population.

3.2.2. Immigration rates

Large changes in immigration raise questions about how to integrate immigrants into society and the costs of this integration. These are important questions but they are not discussed in this article. This article discusses the influence of a permanent change in the immigration rate on demographics. Since the end of the 1990s an increasing international movement has been observed following the fall of the Iron Curtain and globalisation of the labour market. These immigrants are often highly skilled.

A large part of the new immigrant population is normally of working age. Changes in immigration impact directly on the age dependency rate in society. However there must be a lasting yearly growth in immigration for it to result in a significant permanent reduction in the age dependency rate. Otherwise changed immigration will not in the long run influence the overall composition of the population to any extent. Immigrants will also

settle as families, have children and start to retire. With a demographic structure of the group of immigrants approximating the structure of the rest of the population, the long-term economic consequences of immigration on the public deficit may be small – beyond of course a general growth in the economy because of a larger population.

One should not exaggerate the importance of the uncertainty in the immigration rates. Immigration to the United States in the past has had a more important influence on the labour market than in other countries; this is still the case today. The Congressional Budget Office report on long-term budgeting (CBO, 2005c) discusses the impact of immigration on the federal, state and local government finances. It concludes that even doubling the present rate of immigration will probably only fill a small portion of the projected gap between government spending and revenue. This is still true even if the immigrants are skilled workers without children.

A New Zealand Treasury paper presented in February 2006 stated that “one way of keeping the aged-dependency ratio under 20% (where it was in 2005) all the way out to 2050 would require 300 000 net immigrants each year from 2020 onwards (4.9% of the population in 2020). Immigration, in short, is not a long-term solution to population ageing ...” (Rodway and Wilson, 2006, p. 23). The present projection assumes a yearly net immigration of 10 000.

3.2.3. The longevity assumptions

Longevity assumptions may change the magnitude of both the direct transfers to the elderly and the health care costs. There have been important underestimations of life expectancy in previous projections in some countries, with an underestimation of the public sector pension liabilities as a result. Due to the revised estimates of life expectancy, updated projections of the old-age dependency rates in several countries show an increase even in the years after most of the baby boom generation has died. In some countries this may indicate that there will be a problem with constantly growing public spending as a share of GDP even after the baby boomer generation is gone, with serious implications for what kind of measures have to be taken on the expenditure side of the budget. It may not be enough to reduce the level of spending; one must also curb the constant growth in public spending. Higher longevity creates a permanent problem, not just a transitory one following high fertility in the two decades after the Second World War.

The main effect of longer life expectancy will in many countries come in 30-40 years time. At present the group of people aged over 80 is not so large, and the average life expectancy will only increase moderately a few

years from now. Uncertainty in the observed life expectancy may thus not be important in the first decade to come. However, in 2050 the share of the elderly over 80 in the population will have increased substantially and the accumulated growth in the average life expectancy is expected to have done the same. In the EU the share of the elderly over 80 is expected to increase from 4% of the population to around 11% (Economic Policy Committee and European Commission, 2006). In this study, life expectancy is estimated to increase by 6.3 years for males and 5.1 years for females from 2004 to 2050. If however the accumulated growth in life expectancy until 2050 is 4 or 8 years, it will have a tremendous effect on public spending for the group of elderly. Going further into the future, the uncertainty will of course increase further. However, there are reasons to believe that the growth will decrease in the future – that there is a limit on longevity – but this may occur quite far into the future.

The longevity assumptions in most OECD countries today will not influence the work force to a large degree. However, some changes in longevity may both have an impact on the labour force and cause large changes in the dependency rate in the short term. One example of such a change was seen in sub-Saharan Africa due to the HIV/AIDS epidemic where not only the labour force but also the labour market participation rates are decreasing.

3.3. Labour market participation

The labour market participation rates are important for public finances in several ways:

- The hours worked, the capital invested and the productivity together determine the growth in gross domestic product and then the base for collecting public sector revenues.
- A greater supply of labour gives the public sector room to grow without crowding out the private sector.
- A rise in the participation rates brings down the number of disabled and unemployed.

To project labour market participation is very difficult for several reasons. The participation rates will not just widely change as a result of general changes in demographic structure such as age and gender. Participation rates are also often culture-dependent and may thus depend on factors such as future immigration. Another important factor may be how a general increase in income from higher productivity would influence the future choices among work, leisure and education.

Many policy objectives aim to influence labour participation. Pension reforms already undertaken must be expected to have a substantial positive effect on labour participation. The magnitude of the increase, however, will be uncertain. For example, some pension reforms gradually raise the formal retirement age. The extent of the effect on labour market participation will depend on how many will take up disability pensions instead and how many will remain in the work force. In the future both how many individuals participating in the labour market and the average hours worked per individual will be uncertain.

Because of the complexity in projecting labour force participation rates, different methodologies in forecasting have been developed. The OECD presented a cohort component methodology in the paper “Labour Force Participation of Groups at the Margin of the Labour Market: Past and Future Trends and Policy Challenges” (OECD, 2003). Both the EU Economic Policy Committee projections presented in February 2006 and the Australian Productivity Commission report from March 2005 built on this methodology.

There is a larger problem of simultaneity between the policy variables, the result of the projections and the assumptions of labour market participation than for the other assumptions. If the projections under unchanged policies show unsustainable development, then reforms increasing the labour market participation rates may be one necessary measure. If no measures are taken under an unsustainable fiscal position, the market will respond. Changes in the labour market may of course be positive or negative, such as either resulting in more elderly workers or the people in the work force working less. There is volatility in the assumptions for the labour market.

It may be possible to interpret the volatility of the labour market assumptions in a positive way, as variables that can be influenced to create a policy for sustainable development. However, both the difficulties of projecting the labour participation rates under unchanged policies and the possible large impact of changes in the policies make it necessary to keep assumptions about labour market participation under observation. “Unchanged policies” will not be unchanged after the presentation of the next year’s budget.

Labour market participation rates together with demographic changes, capital formation and productivity growth determine the growth of the economy. The increase in revenue from taxes is to a large extent dependent on the growth in the economy. Large uncertainty in the labour participation will be mirrored in large uncertainty in revenues. If low participation also results in high numbers of unemployed and disabled, the benefit transfers

will also increase. The results of the projections will be highly dependent on the values chosen for these assumptions about labour market participation.

3.4. Productivity

One main factor for growth in GDP, together with the growth in hours worked, is the growth of productivity in the economy. Productivity growth alone will probably make the average income level double in the next 40-50 years. Long-term projections most often are presented in relation to the level of GDP. It is then easy to forget that the absolute level of income will be substantially higher in the future. How this will affect variables such as private spending, average working time and the private sector acceptance of a higher tax burden is difficult to predict because there have never been earlier observations of a similar level of income and consumption. Growing income may make it easier for the public sector to get acceptance for the burden of the present tax level. If so, there will be a similar rise in public sector revenues from income taxation and duties on private spending as the growth in GDP. On the other hand, rising household income will tend to increase the demand for services compared to goods, including publicly produced or financed services. Higher productivity growth may then produce an increased demand for public spending. This may of course partly be met if there is also an increase in public sector productivity.

Productivity growth has differed substantially between countries and between time periods in each country. It has been difficult to project these changes and even to explain the reasons for the observed changes afterwards. If there is a substantial positive effect from productivity growth on public deficits and if the projections have to rely on uncertain assumptions of productivity growth, the projections will be very uncertain.

In the long term (and in long-term macroeconomic models) the general increase in the real wage is assumed to be equal to the labour productivity growth in the economy. It is also normal to assume that the rate of growth in public wages and salaries will increase at the same rate as in the private sector. The largest part of public consumption is wages and salaries, so an increase in total revenue due to higher productivity will to a large extent be offset by higher nominal expenses.

Higher productivity growth will most probably have some positive effect on the sustainability of public sector finances because prices of goods and services delivered from the private to the public sector may be reduced and because higher productivity in the public sector may reduce the number of employees in that sector given the same level of services. Higher productivity growth may result in substantially lower expenditures measured as a per cent of GDP in some problem areas. One area is the health care

sector where the inflationary increases in health costs have been high and a main reason for concern. The effect on total public spending may however be small. The share of public purchases of goods and services without wages and salaries is small, and a general productivity factor may often not be included when evaluating whether changes are needed in public employment.

Projections in some countries assume, however, that there is a substantial positive effect on the budget balance from higher productivity growth in the economy. The most important explanation for this seems to be linked to the indexation of pensions and other benefits. The 2006 report on the impact of aging on public expenditures prepared by the Economic Policy Committee and the European Commission states that: “a change in the labour productivity assumption only has a significant impact on pension spending in countries where pension benefits are indexed to prices. In this case, pension spending as a percentage of GDP will be lower with a higher productivity growth rate assumption.” (Economic Policy Committee and European Commission, 2006, p. 15)

In several countries there are pension reforms under way that suggest that the nominal indexation of pensions wholly or partly should be linked to a price index instead of the general wage index. The choice of indexation has an important impact on both the results and the characteristics of the long-term projections.

Adjusting the taxes and the social security premium revenues according to increases in nominal wage rates and the pension payments according to consumer price indexes will produce savings for the budget dependent on the difference between these nominal adjustments. This difference equals the real wage rate or the productivity growth. Because the productivity estimates are very uncertain, savings in the expenditures relative to the revenues will depend on a highly unpredictable variable. If the productivity estimates change, the estimated deficits in the projections will also frequently change. This may create little trust in the projections.

Projections relying on full price indexation of the pensions will be based on the most favourable assumptions for public sector finances. The projections will be “best case” scenarios. The bias in the projections will most probably reduce the budget surplus or increase the deficit when the calculations are updated in the coming years. Countries using price indexation in their main projections may thus also want to do alternative projections based on wage indexation to show both the potential adjustment in the surplus or deficit and the worsening bias in the calculations.

3.5. Specification of programmes for public revenues and expenditures

Uncertainty in the projections may come from both misspecification in the modelling of public programmes in the projections and misunderstanding of how public programmes really work. Some dependencies may be too complicated to be modelled in a realistic manner. There may also not be sufficient statistical information about the groups the programmes are meant to support. Building experience in modelling and collecting new information will reduce these problems.

Making long-term projections that constantly have to be revised may, however, also indicate that the formulations of the entitlement programmes are not accurate enough, either giving benefits to too many receivers and/or giving a higher than intended support to the individual beneficiaries. Even if it may be said that this should be a case for the yearly budget, frequent misestimating in long-term budgeting may help bring pressure to reformulate the structure of the programmes and to increase the emphasis on their purposes.

3.6. Interest rates

With the present high level of debt of many governments, the need for increased savings to meet future obligations may be large. More knowledge for the private sector about the public sector's future pension obligations and about how reforms in the pension systems are formulated will highly determine the private sector's saving behaviour. How other countries will meet these obligations is also unknown and may bring uncertainty into the assumptions about how international interest rates will develop in the coming years. The uncertainty will depend on whether other countries change their saving rates, how the interest rates change when public savings change, and how the private sector reacts to changed interest rates.

Given that it is difficult to project both if there will be large future changes in the interest rates and if so the magnitude of the changes, a possible solution may be to supplement the projections with sensitivity analysis of what a rise in the interest rates means, to see if the fiscal position is still manageable with a higher interest rate scenario. A scenario with an interest rate corresponding to the growth in GDP may be informative to see if this option is sustainable. This is of course necessary only if the country has a high level of debt or will have a high level in the future.

3.7. Total uncertainty in the projections

Given the discussion above, the main uncertainties to be emphasised are:

- Demographics, especially life expectation;
- Labour force, especially labour market participation rates;
- Labour productivity, especially the increase in the real wage rate if not compensated for in the pension benefits;
- Interest rates, for countries with a high level of debt; especially the impact if the interest rate levels rise.

In its presentation in February 2006 (Economic Policy Committee and European Commission, 2006), the Economic Policy Committee (European Commission) came up with the exact same list of factors to be studied in its sensitivity tests. Especially instructive is its specification of the sensitivity tests for the labour market participation rates, testing for both changed employment rates reflected in a parallel change in the NAIRU unemployment rates and the participation rates for older workers aged 55-64. In the EU both these tests are important, with several countries observing high stable unemployment rates in the past decade and with several countries implementing pension reforms. The productivity and interest rates sensitivities are both tested for higher and lower alternatives.

The total uncertainty in the projections will be a combination of the uncertainty in the different assumptions. One main problem in modelling uncertainty may be that the different observations of the assumptions are not independent. The dependency is very clear with the productivity assumptions which, together with the number of hours worked, will determine the future real income. People's income will certainly influence the demographic assumptions (through the fertility level), the labour market participation (through the choice between work and leisure), and the need for public entitlement programmes. The importance of the level of income may easily get lost in projections where the results of the calculations are denominated by the gross domestic product.

There are two main ways to present uncertainties in the projections:

- The traditional way is to display different scenarios showing a range of values or combination of values for the most important variables including scenarios of the worst and the best assumptions.
- One alternative is to draw input assumptions from the probability distributions for each input variable and run projections with these

sets of assumptions. It is then possible to present probability distributions for the possible outcomes.

Best and worst scenarios may be presented for:

- **Policy reforms:** In many countries there have been reforms where indexation of pensions is linked to price indexes and not wage indexes. An obvious worst case scenario in this instance is if the pensions are still adjusted with the wage level in the future.
- **Worked hours:** There has been a decrease in the labour market participation rates for both young people and the elderly and a decrease in total average hours worked. These assumptions are important for the results of the projections, and many policy objectives aim to influence these variables. For this reason, illustrative sensitivity projections may be important.
- **Life expectancy:** Life expectancy has been constantly underestimated in long-term projections in several countries. One main problem is that even if life expectancy is growing at present, this increase has to slow and even stop sometime in the future. Econometric calculations may tell how much the increases have been but not when the growth will decrease in the future. Given the large magnitude of both pension and health costs for the group of elderly, life expectancy will also be one of the major uncertainties in the future and should be illustrated as such.

The main problem with the best/worst scenarios approach is that there may be very little probability that the worst scenarios will occur. Building the probability distribution for the assumptions in the estimations may clarify this. A probability-based method has the advantage of also assigning a probability that the outcome should occur for all of the results. Even if the model becomes complex, it should be possible to build in interdependencies between the assumptions and the restrictions of the values of the observations into such models.

A probability-based presentation of the uncertainty has advantages when illustrating the uncertainty concerning assumptions where there are observations of a probability distribution in the past and the observations are assumed to be representative for the future. This may be true where the assumptions are only partly or not at all influenced by future policy objectives. Examples of such assumptions may be:

- **Productivity growth in the economy:** Productivity growth in the economy has changed between different periods. The yearly changes may be large, but most important for the long-term

projection is that just small changes in the average productivity rate will have a major additive impact for the magnitude of the gross domestic product and the levels of public revenues and for the possibility of nominal spending in the future. Even if some countries have concluded that changed productivity has little impact on the government's deficit, the calculations should be checked to give such a result.

- Fertility rates: For projections going beyond the next 50 years, fertility rates will be important for the level of the working force and then the level of the gross domestic product. Historical data tell us that there may be large permanent changes in the fertility rates. Probability analysis based on historical values may be useful for illustrating possible alternative developments in the projections.
- Interest rates: Interest rates are very volatile and difficult to predict. Interest rates influence both the debt in the future through accumulated yearly interest payments and the level of interest payments on the debt at the end of the projections. It is essential to know the magnitude of the interest payments at the end of the projections in order to determine if the fiscal situation is sustainable or not. For this reason, sensitivity analysis based on probabilities should be done in all long-term projections if the country has a substantial level of debt.

There may be arguments for not making sensitivity analyses that show the probabilities of the outcome too far into the future:

- Even if the probability distribution of the assumptions is known today, it may change in the future. The projected distribution may thus give a misleading picture of the accuracy of the projections for the future.
- If the worst possible scenarios cannot be allowed to happen they will not happen. The market will take corrective actions or the government will have to take them. Labour market participation rates will not decrease to zero. If in the future there is not enough financing of the health care cost estimates given by the projections, the supplied quantity and/or quality of health care has to be decreased. There will be time to do so before reaching such a possible situation 40 years in the future.

3.8. Time horizon for the projections

The time horizon for the projections will partly depend on the nature of the problems to be analysed. When analysing a specific problem that has an end and will not last forever, one may want to be certain to cover the whole period of the problem's existence or development. If the projections analyse the consequences of economic and policy adjustments to deal with the problems, the projections must then also cover the time it takes for the adjustments to change and influence public finances.

One of the main reasons for doing long-term projections today is to show the consequences of an aging population. For most countries there will be a steep increase in the number of the elderly compared to the working population in the coming decades. For some countries this increase will last as long as 2050. If projections for these countries fall shorter than 2050, the projections will not encompass the whole magnitude of the problems the countries will face. Also, adjustments done in the national pension systems may in many countries take more than 40 years before they become fully incorporated in the benefit level for pensions. This situation also indicates that the time horizon has to be beyond 2050.

Updated projections in several countries show that even after the baby boom generation is dead, the old-age dependency ratios will continue to grow. Some projections of demographic developments with an increasing life expectancy show growth in the old-age dependency rate just below the steep growth rates when the baby boomers retired. The consequences of such a result, in contrast to a situation where the spending stabilises as a part of GDP after the baby boomers are gone, are that the measures that have to be taken are to curb the growth in spending, not just a one-time adjustment of the expenditure level to meet a transitional stage because of two decades of high fertility rates after the Second World War. By not projecting beyond the retirement and aging of the baby boomers, information may be lacking that could otherwise ensure a budget strategy to curb the growth in the expenditure also after 2050, regardless of the fact that the magnitude of the problem may be difficult to estimate.

At the same time, going into the future will make the projections more and more uncertain. The analyses that are done today are partly based on demographic trends created by fertility rates already observed in the past. Projections going 60-80 years in the future have to rely on fertility rates not yet observed. In the future the increase in the number of the elderly will to a large degree depend on the higher average life expectancy. It is difficult to project the average life expectancy 60 years from now. It is also very uncertain to predict how the higher life expectancy will influence health care costs. Adjustments will probably need to be made to the benefit level of the

pensions or to the retirement age, and such pension reforms may have a large influence on the participation of the “younger” elderly in the work force. The increase in household income will affect the choice between leisure and work. The uncertainties in all these assumptions indicate that the possibility to forecast beyond the next 50 years may be low.

However, despite the fact that the magnitude of the problem may be difficult to estimate, the main reasons for going so far into the future may be that long-term projections may help in creating a budget strategy to meet the problems that are certainly coming. Going beyond 50 years may provide information to help reformulate present entitlement programmes and build a strategy to deal with the future challenge. One example may be the pension reforms that are now under way in many countries. One measure to create a sustainable pension system has been to increase the retirement age to a specific age. Even if this causes a reduction in the total pension obligations it will not be a permanent solution, given that there will be a constant increasing life expectancy in the future. As mentioned above, some projections give these results. A reformulation that everyone has the right to a pension for the last 16 years of his/her life, given the life expectancy at the time of retirement, may solve some of this problem. If the life expectancy does not grow further, the results of the two reformulations will be the same. (But if, for example, obesity makes the life expectancy fall, the public sector will suffer a loss with this reformulation.)

Given the uncertainty in long-term projections, there is of course a question of how long a period the projections should cover; going 80-90 years from now means that nearly all of the people who will be alive at that time have not been born yet. Knowing that there are large uncertainties in the fertility rates in some countries in the next decades must influence the time perspectives for the projections in these countries.

There has been some criticism that setting a specific time limit will always be arbitrary. Jagadeesh Gokhale and Kent Smetters discuss this as a part of their paper “Fiscal and Generational Imbalances: New Budget Measures for New Budget Priorities” (Gokhale and Smetters, 2003). They point out that if the purpose of the projections is to show the present fiscal imbalances in the public sector, even a time perspective of 75 years will be too short. There will be large earned pension obligations during the 75-year period that have to be met after the period. The projections will include the contributions to the national insurance scheme but not the contributions to the pensioners coming later. Gokhale and Smetters argue for using other methods to measure these imbalances. Some of these alternatives are commented on in Annex A to this article. Generational accounting is however not a topic in this article, so Gokhale and Smetters’ “fiscal

imbalances” and “generational imbalances” indicators are not discussed in the annex.

4. Creating fiscal sustainability to meet future fiscal risks

4.1. Fiscal strategies to meet the long-term challenges

The only way to prepare for fiscal risks in the future is to ensure that the public finances are sustainable and have flexibility to also meet unforeseen events. Long-term projections in both Norway and the United States show that “unchanged policies” in these countries in the future are not sustainable. In the United Kingdom, updates of the yearly pre-budget projections have shown that even after the period when all baby boomers have retired in 2030-40 there may be continued growth in the old-age dependency rate. The same tendency is foreseen in Norway. This growth is a result of the fact that after a steep increase in the number of elderly per worker, the number of elderly will not be reduced but will remain high and, with growing average life expectancy in the future, will further increase. This will make both pension benefits and health care costs grow constantly in the future. The challenge of constantly growing public expenditures may be met with different approaches or a combination of these:

- Support for economic growth;
- Increased level of taxation;
- Decreased level of spending;
- Decreased growth in spending.

Most countries will have to meet the problems of rising deficits with a combination of these measures. The problem is so large that it cannot be solved only through reforms that decrease the level of spending. For many countries there may be a need for significantly higher tax revenues than they have seen in the past if they are going to maintain the present core functions of the public sector. But even with higher taxation there may be less room for new expenditure programmes than in previous years.

There is no line separating sustainable and unsustainable debt. Not only the present level of debt but also the macroeconomic growth in a country will influence the level of acceptable debt today, increasing the possibility to pay back the debt in the future. What may be considered prudent at a given moment is influenced by the prevailing structure of the economy and its vulnerability to shocks, the cost of debt servicing in relation to total public spending and total revenues, and the structure of the government’s balance

sheet. Future demographic changes may also influence the possibility to adjust the public sector's financial position in the future and the government's capacity to handle future debt. The factors which influence sustainability and their importance will change over time.

Projections are of course uncertain, not giving the exact magnitude of the future problems but pointing out that there is a probability that they will come. The more lead time the public sector has to adjust to such changes, the less disruptive the process will be. In many countries there will be a substantial increase in the growth rates for spending under the entitlement programmes and for health costs after 2010-15. Thus, it is advantageous for any long-term policy changes to be formulated soon if they are to be in place when they are needed.

4.1.1. Support for economic growth

It may be most important to keep the economy in a stable growth position, preventing unemployment from increasing. Unemployment will often create a depreciation of labour force skills that is important to avoid. Short-term labour market measures may be used but it is often difficult to tell if unemployment is a result of a short-term lack of demand or a structural problem. If it is a structural problem, labour market measures may in some cases prevent necessary structural changes.

Public expenditures may support growth in the economy through structural measures including support for research and development, industrial support and investments in infrastructure. One other important part is support through the educational system. It is important that the tax system emphasise broad tax bases and low marginal tax rates. Because inefficiencies in the economy grow disproportionately with increased taxes, smoothing the tax rates between years may be important to increase the incentives for economic growth.

In the 2000 Lisbon Summit for EU member countries and in previous OECD documents, the importance of raising the labour market participation has been emphasised. For the sustainability of the public sector, labour market reforms that reduce the age-dependency ratio are the most important ones; however, reforms increasing the quality of labour are also important for the general increase of welfare in countries.

Many countries have concluded that increased immigration will not solve the budgetary problems in the future although it gives overall support for economic growth. This is especially true if the present taxpayer contributions to the pension system generally are too small to finance the

corresponding future pension obligations earned by the contributions. If so, the fiscal problems in the future may increase.

4.1.2. The level of taxation

One argument for raising taxes may be that the average income level will rise and the ability to bear higher tax burdens will then rise. For some countries this may be true to some extent, but the possibility for raising taxes may be limited. The most obvious arguments against higher taxation are that it decreases economic growth through rising preferences for leisure, a rising hidden economy, and less specialisation by people doing the work themselves instead of hiring workers.

What is then the maximum level of taxation? The highest observed tax rates today are in the Scandinavian countries. Both Denmark and Sweden had tax ratios measured against GDP of approximately 50% in 2004. Norway and Finland had 43.4% and 44.2% respectively. Any countries going above 50% will be on unexplored ground. The Scandinavian countries are relatively small and very homogeneous societies; thus there may be a greater acceptance of higher taxes in these countries than in others. Several countries in Europe have had a tax level of 40-45% in recent years and the room for further increase may be limited.

The Scandinavian welfare model also includes high levels of public services, social insurance against loss of income, and retirement savings. In other countries health care, education and retirement savings may to a larger extent be financed privately, although sometimes with a significant tax subsidy. In some countries, a more common cultural resistance against taxation may limit the possibility to increase taxes up to the level seen in Scandinavia.

Revenue projections are normally based on an unchanged tax level during the projection period. One argument for tax smoothing not only in the projections but also in a fiscal strategy is that it gives predictability for the private sector when it is planning its investments, which leads to more efficient use of the resources in the economy. The limited possibility for raising the tax level and the progressive increased disturbance from a higher tax level are other arguments for tax smoothing to run a surplus in good years to meet bad ones.

4.1.3. Level of and growth in expenditures

The study by the United States Congressional Budget Office, “The Long-Term Budget Outlook” (CBO, 2005c, p. 1), emphasises: “Under

current policies, the aging of the population is likely to combine with rapidly rising health care costs to create an ever-growing demand for resources to finance federal spending for mandatory programs ...” The largest source of uncertainty is the growth of costs for the government’s major health care programmes. Projected spending for the social security programme grows more slowly and is far more predictable, something that may be seen as a result of a less demanding demographic development than in some European and Asian countries. However, without reforms in the health care sector that curb the growth in the expenditures, not just reduce the level of the expenditure, the United States government may be confronted with this problem as a permanent one every year in its future budget process.

Projections in some other countries also indicate that under unchanged policies they will observe permanent growth in their expenditures. These countries may also include in their considerations whether the measures taken will curb growth permanently and not just create a one-time downward shift in the expenditures. Labour market reforms may impose a downward shift in the disability and unemployment rates and decrease the level of public expenditures; however only reforms curbing the growth in the pension and health care programmes will provide a permanent solution for the excessive growth in public expenditures.

To meet the growth in expenditures in the future one must consider several measures:

- Pensions and health care reforms;
- Restructuring and modernising the public sector;
- Reducing interest payments by decreasing the level of debt.

Pensions and health care reforms are one of the most important issues to cope with permanent growth of expenditures. In many countries reports have been produced on pension reforms, and many countries have decided to undertake such reforms. Common proposals are to increase the retirement age and partly adjustments of the yearly cost of living index relying on price indexation instead of wage indexation. However there are alternatives such as decreasing the initial benefit level at retirement age or decreasing the monthly benefits for the retired when life expectancy goes up. For pension benefits the problems are connected to an increase in both the number of pensioners and the average pension levels. Increasing the retirement age will both increase the economic growth and reduce the pension payments. However in some countries an increased retirement age may give greater pension entitlements in the future. In such a case, the benefit for the public sector will mostly be higher tax revenues and a delay in the pension

payments. In society as a whole, longer participation in the workforce will of course increase the overall welfare.

The increase in the old-age dependency rates, however, is so large in most OECD countries that it cannot be offset only by a reduction in the benefits of the pensioners. Simulations done by the OECD show that even though reforms indexing the retirement age to life expectancy are a powerful tool to stabilise dependency ratios, they will not fully prevent a growth in dependency rates in most OECD countries (Oliveira Martins *et al.*, 2005). This means that in many countries there will also have to be public reforms in other areas combined with the reforms in the pension and health care areas.

Restructuring and modernising the public sector are important in the long-term sustainability perspectives because this may increase the possibilities to reduce public employment. In many countries in the future, labour will be a limited resource. In the next decade higher labour participation rates for women may increase the total hours worked, but in one or two decades the demographic trends will make the total number of employees decrease in several countries. This will not only put pressure on the public sector to produce more and better services with the present level of employment; it may also force the public sector to reduce the total number of public employees. To free labour resources from the public sector it may be necessary to increase capital investment (capital deepening) not only as a part of modernising the government but also as a restructuring of the services that are delivered by the public sector. Military defence may be such an area where not only the present units can be modernised but where there also may be reconsiderations of which defence units to support. Innovative use of market-type mechanisms may also be a useful part of such restructuring in areas where the private sector can produce services with fewer resources than the public sector, so there will be a total gain of free resources for society.

There have been several ongoing reforms in the public sector in the last two decades. There may be different motivations for these reforms: to better meet users' needs; to increase transparency in the public sector; or to make better use of the available resources. It is important to have a realistic view of the impact of these reforms on the total level of public spending. One kind of reform is outsourcing of the services previously produced internally (cleaning, printing) or outsourcing the service delivery to private companies, still financing them through public spending. When doing long-term projections one must be realistic about the importance of the reforms for future public spending. Although there are savings from more efficient use of the resources, the main part of the costs still remains and has to be paid by the public sector. In some of the public-private partnerships, the public

sector still bears the main fiscal risk in the projects if something goes wrong. Undertaking these reforms may put the public sector in a better position to meet modern demands. However, delegation of decisions to respond to public demands of course also reduces the possibility for political control of what to produce and the quantity of public services to be delivered.

It may seem that the level of discretionary spending is mainly a question of the will to give priority to the total more than to new policy programmes, but it is more than that. There will be pressure for increased public services partly due to a higher income level for the household sector, higher participation rates in the labour market, and new technical possibilities in the health sector. Especially, higher participation rates in the labour market will depend on increased participation of women and, if so, the public sector will have to deliver some of the services women are providing at home today (child care, care for the elderly). In long-term care for the elderly, many believe that the possibilities for productivity growth may be limited. This, together with the fact that a large share of the costs in the sector is for salaries, will make the costs grow faster than in other sectors (Baumol effect¹). As a result, a restructuring of the public sector may be necessary.

Reducing interest payments by decreasing the level of debt will mainly be a function of the will to set a level of taxation that corresponds to today's expenditure level and the level desired in the future. The level of debt is however also a result of decisions that initially are believed not to increase the future expenditures, such as giving guarantees and loans, and underestimations of the costs of reforms in the entitlement programmes. Realistic reports of the consequences of policy decisions are necessary to avoid future problems and reduce the future total fiscal risks.

Reduction of debt is for some countries the main instrument to meet the foreseen development in demographics and the budget. Higher interest rates only create problems for public sectors with high debt. There may also be a possibility to avoid short-term changes in the interest rates for a certain period by borrowing in the long-term financial market, and the uncertainty may also be reduced by differentials in the due dates. However this will mainly be a delay for adjustment to market rates.

The structure of the budget expenditures will be important for the ability to respond to macroeconomic changes by decreasing total spending. A large share of both entitlement programmes and interest payments in the total spending will reduce the possibility for action, because this spending cannot easily be cut on short notice.

4.1.4. Prudent debt

A sustainable fiscal position may be defined as a situation where the debt will not grow as a share of GDP. The definition does not give a recommended level of debt. To a large extent this is a question of policy priorities between consumption at present and in the future given the consumption in the past. For a given level of the primary deficit (not including interest payments), the rate of interest and the growth in GDP will also determine the level of debt when measured as a percentage of GDP. Given a constant level of the primary deficit and as long as the rate of interest is lower than the growth in GDP, the debt will convert into a fixed ratio of GDP. If the interest rates exceed the growth in GDP, the public sector has to have a primary surplus; if not, the debt will grow. If there should be an increase in the interest rates in the future, this must be offset by either reductions in other expenses or increased taxation so that the debt burden not shall increase.

Because the theoretical approach to sustainability does not make it possible to set a value for the maximum level of debt, it has to be settled as a result of the macroeconomic analysis and the policy priorities. In connection with its Stability and Growth Pact, the EU formulated a target for gross government debt not to exceed 60% of GDP. Even using a gross, not net, debt as a limit, the limit is linked to a defined sustainable level of the budget deficit at 3% of GDP. When the concept “net debt” is not used, this may partly be seen as a result of difficulties to measure gross assets. One example of a category of assets that is difficult to measure is the value of financial investments in public enterprises. By setting a limit of gross debt at 60% of GDP, both a debt level over this limit and a deficit leading to a higher debt level in the long run will be defined as an unsustainable situation for public finances in the EU countries.

The EU criteria are maximum levels and are not to be looked upon as recommendations for all member countries intending to be members of the euro zone. To make targets like these operational, there should be individual limits for the countries to take into account the growth in the economy, the interest level, and the policy preferences between the present and the future. Knowing that demographics will give increasing expenditures in the future, one country may also consider if the target for the debt limit should be more restricted in the first coming decade, allowing the debt to increase to some extent up to a higher limit in the future.

As a part of its fiscal rules the United Kingdom has a limit for net public debt. The formulated Golden Rule requires balance in the current account, including depreciation of capital. This is combined with a target for a stable and prudent level of debt over the cycle and the condition that, other things

equal, net debt shall be maintained below 40% of GDP over the economic cycle.

4.1.5. Handling uncertainty in the future

Long-term projections are a tool to observe long-term trends in the fiscal position of the government. Learning from unexpected developments in the future is important. Sensitivity tests will tell if the observations are in line with past expectations.

Many projections in the past have seriously underestimated the growth in expenditures. This may be due to both unexpected developments in the underlying assumptions for the projections and the specification of policy programmes. It is important to run sensitivity tests for the total effect of policy reforms including their indirect effect on the other assumptions, such as the possible impacts of pension reforms on labour participation rates when structuring public pension reforms.

Through the development of the “welfare society”, the public sector has gradually taken over risks borne earlier by the private sector. One strategy to reduce public fiscal risks in the future is to shift these back to the private sector. The underestimations of expenditures have to a large extent been connected to benefit payments and health costs. To avoid such uncertainty in the future one may specify the entitlement programmes in such a way that unexpected changes in the assumptions do not increase public expenditures but that the consequences are borne by the beneficiaries. When linking the retirement age to life expectancy, changes in the latter will not increase public expenses. Another method that has been used is to link the level of the monthly benefits to life expectancy so that increased life expectancy reduces the monthly payments.

Shifting the pension system from a benefit-defined system to a contribution-defined system will also shift the uncertainty from the public sector to the pensioners. This will only work if the changes are also policy sustainable in the future. One way to ensure this is to make the public payments up-front by transferring assets to funded pension schemes established outside the public sector, thus removing the obligations from the public sector financial statements. The main reasons for establishing funded pension schemes may be to build up a pension system where the payments are defined by contributions to the fund more than to secure a future benefit level for the pensioners. Keeping a governmental guarantee for the level of the benefits from the funds will still cause the government to bear the risks.

The problems concerning uncertainty may be that the estimates may be volatile even if the expected values of the estimates are known. Uncertainty

connected to specific areas may be reduced by sharing the risk with the private sector through insurance or partnership. One other way may be to reduce governments' contingent liabilities.

One special problem is connected to the exploration of natural resources. The quantities produced are often decided technically and the prices are volatile, which gives unpredictable yearly revenues. To unchain the use of petroleum revenues from the volatile revenues, the Norwegian government has established a petroleum fund. All the governmental petroleum revenues are transferred to the fund but the transfers from the fund are approved by Parliament each year following a fiscal rule for use of petroleum revenues. To limit the uncertainty, withdrawal from the fund is based on the capital in the fund at the beginning of the budget year not including the very uncertain present value of future revenues from the petroleum sector.

One should be aware that general trends in the economy may erode the effect of existing public measures in the long term. These trends may create "unexpected" development in public spending. In many countries user fees are introduced to limit the use of public services. A higher income level may decrease these limiting effects. Reducing the pension level relative to the wage level will increase the subjective feeling of poverty, raising the demand for means-tested support. Considering income distributional effects of the public reform may reduce this uncertainty. Policy reforms may in the same way prevent uncertainty. Labour market reforms building up the possibility for the elderly to remain in the workforce may not only increase present participation rates but may also prevent unexpected increases in unemployment among the elderly and higher disability rates.

One of the main uncertainties is the future interest level. To reduce this uncertainty, it may be useful to enter into debt obligations with long durability and fixed interest rates. Today there are demands for assets with long durability in the financial market from pension funds which need to secure future pension obligations. As a result, the United Kingdom Debt Management Office in May 2005 launched conventional ultra-long gilt, maturing in 2055. Since then both Agence France Trésor and the European Investment Bank have issued bonds with a durability of 50 years. For the government to reduce the uncertainty, it is however necessary that the borrowing is not from a benefit-defined pension scheme where the government guarantees the future level of pensions. If so, the risk will still remain in the hands of the government.

With the historical observed volatility in the interest rates, there may be a chance that the rates may change substantially in the coming years. Each country's possibility to influence the international interest rates may be

small. If public sectors in many countries plan to increase their savings, there may be a need for international reporting and co-operation to ease the uncertainty.

4.2. Incorporating the long-term projections in the budget process

Doing long-term projections in an integrated budget process may be more important than the numerical results of the calculations. The projections are not forecasts of what will happen in the future, but they are instruments to change the future. Presenting results from and assumptions for the projections will change the economy both in the present and the future. One of the important parts of the process is that by updating the projections yearly, one will discover that there may be unknown systematic changes in the assumptions and that it may be possible to respond to these at an early stage. One important aspect is learning by doing.

One must be aware that there may be reasons for not taking action at present even if the projections show unsustainable development. For decisions to start reforms it is not always enough to know that there will be a problem; the solution will also depend on the magnitude and characteristics of the problem. Uncertainty in the projections may be too large to decide what to do at the moment and it may be necessary to collect more information. Some investments, for example, will be irreversible when they are done. One example may be the capacity of electrical power plants when the dam is built. One other example is pension reforms. One of the main purposes for maintaining a rule-based pension system is that the public shall be able to adjust in a meaningful way to the future benefits from the pension system. Also, because pension reforms often include a long policy discussion, reforms cannot happen too often. A pension reform which includes too small adjustments in the pension system may block any further reforms for many years to come. On the other hand, waiting to do reforms may increase the magnitude of the reforms and the disruptive impacts of the changes.

In some countries today the long-term projections are done as separate studies not included in the budget process. The yearly budgets are legal documents; the long-term projections are illustrations of possible budget developments given the present policies. Presenting long-term projections in separate reports, and even sometimes by an independent agency, will to a large extent emphasise that the projections are illustrations of possible developments under “unchanged policies” and not the government’s programmes for the next decades. Separate and infrequent reports are however often forgotten easily. The long-term projections may end up as information that is “good to know” or “not so good to know”.

To take full advantage of the results of the long-term projections, it is important to incorporate the results of the work into the integrated yearly budget process. The sooner negative trends are addressed through policy measures, the less the preventive spending cuts or tax increases have to be. The long-term projections will also provide a continuous reality check in the annual budget process.

To make long-term projections may be essential in countries building up medium-term policy strategies. One way of doing so may of course be to develop fiscal rules that integrate the knowledge from the long-term projections. However, the uncertainty in the projections illustrated by the sensitivity scenarios will probably be too large to build up exact numerical rules just based on these projections. The projections could however give support for how to build up strategies for strengthening fiscal policies to meet the future.

The results may emphasise the need for high economic growth in the coming decades to finance public spending, increase the priority of infrastructural programmes and research and also indicate a need for reducing public spending to free resources, mainly labour, for growth in the private sector. It is also important that the budget projections are integrated into the yearly macroeconomic framework. Many of the long-term projections will show a present need for financial savings in the public sector to meet future needs. These future needs cannot be judged independently of the macroeconomic consequences of the potential increases in public savings today. Many countries have experienced how higher unemployment after a while becomes permanent and is difficult to reduce to the earlier level. If reduced public use of resources is not compensated with higher growth in the private sector, the public sector may encounter approximately the same level of revenues but higher expenditures under entitlement programmes in the future. The total welfare in the country will also decrease. There is still a need for making long-term projections in countries that are struggling with high unemployment today. If the projections show that the fiscal situation is unsustainable, the conclusions will however not be a need for increased savings today but a message that there will be restricted possibilities for the expenditures built into the projections in the future.

The organisation of the process for producing long-term projections is important for both learning from the projections and obtaining accuracy in the evaluations. Policy feedback on how to adjust the projections to achieve sustainable development is an important part of the budget process. To include all the agencies that normally are involved in the budget process gives an integrated process that makes it easier to include impacts of changes in current policy on the long-term fiscal outlook.

This article gives an introduction to a bottom-up approach to long-term projections. In the political process one useful method to evaluate the results from these projections is to confront them with top-down projections. The top-down projections set restrictions for fiscal aggregates such as total level of taxation, level of expenditures, the level of public deficits and/or the total amount of debt. Confronting the two approaches will reveal if there are possible reserves for new reforms and if so the magnitude of the reserves. One important advantage with top-down projections is that it is possible to settle a policy target for the public debt and because of this make more reliable estimates for future interest payments. It is possible to calculate the total magnitude for necessary future policy adjustments in the budget either through changed taxation or spending.

If the projections indicate that even under “unchanged policies” the taxes have to be raised and expenditures decreased, one may still consider if there are possibilities to include “reserves for new reforms in the future” on the expenditure side of the budget. The reason for doing so is to emphasise that there is an important policy pressure for new programmes that have to be taken into account when budgets are established. If these amounts have to be small, there is a message that there is little room for new programmes; if the amounts are zero, the message may be that for there to be room for new programmes there have to be similar reductions in existing expenditure programmes. The increases in public sector spending in the last decades are to a large extent based on policy decisions for new services and transfers and only partly on demographic trends. This attitude will not disappear by itself. These are important policy considerations that have to be a part of the judgements based on the projections. These considerations may lead to an increased awareness against taking new policy programmes into the yearly budgets without proper statements up front.

Annex A.

Alternatives to long-term projections for presenting long-term fiscal sustainability

Balance sheet analysis

The balance in the financial statements normally includes all financial assets and liabilities that the public sector has or owes to a second party. These assets and liabilities represent transactions in the past and the present where the assets represent reserves for future possibilities to finance public spending and the liabilities represent future burdens.

One has to consider if a balance sheet evaluation should be taken on a gross or net debt basis. In many countries the amount of assets is small except for ownership in public enterprises which is established to meet special policy objectives. Ownership in public enterprises may be investments to support specific purposes such as transportation infrastructure or to keep control over natural resources such as oil and minerals. Some of these ownerships – for example, in transportation – may sometimes be a source of probable losses rather than future revenues. To evaluate this is difficult without doing an audit of the whole company. There is a greater probability that future financial obligations have to be fulfilled.

There is not full agreement on how to include revisions of the values of the assets and the liabilities in balance sheet analysis, even under accrual accounting. The statements will be better updated to the present values if the changes in the values of assets and liabilities due to changes in market values, exchange rates and interest rates are included in the present statement. Many of the obligations however have a fixed durability and a face value at that date. If it is not traded by the government before this date, the face value will represent the future value of the obligation for the government.

Following the accrual principle for budgeting and accounting, the governments sometimes include their obligations in the financial balance at an earlier stage than in the cash-based system. These liabilities are mainly

earned pension rights for public employees. The liabilities may also be accrued but not paid interest and other issues where there are time lags between the occurrence of the obligation and the actual payment.

Formal public balance sheets today normally include only explicit debt to specified persons or entities from the past. Even though accrual-based budgets may recognise more than cash-based budgets, they still do not cover possible obligations to unidentified receivers. The United Kingdom is working on a Whole of Government Accounts project expanding accrual accounting to all public entities defined as entities exercising functions of a public nature or to be entirely or substantially funded from public money. The project also introduces obligations with uncertainty both about the amount and the timing (provisions) and liability for future public service pension schemes in the balance.

There may be specific large items that may change the public sector's financial position in the future that are not included in the formal financial statements. These may be explorations of non-renewable resources and the population's general rights for pensions from the national insurance schemes. The formal financial statement may be complemented by calculations showing the importance of these items. The most common way to include such items in the balance sheet analysis is to calculate the present value of the income or outlays by discounting the future revenues and outlays. The discount rate should be the free-of-risk rate of interest for borrowing to the public sector. If one want to include an adjustment for uncertainty from possible lower prices for the natural resource or the possibility of a smaller quantity produced, this should be done by reducing the price and quantity estimates, not by increasing the discount rate.

The most important asset for the government – the ability to collect taxes and excises – will not be included in balance sheet analysis. This and the present level of the deficit will decide if it is possible for the public sector to meet its present and new obligations in the future. However, from a sustainability point of view not only the total amount of obligations in the balance sheet is important but also when the different shares of obligations have to be met. For this reason, a balance sheet analysis cannot give a complete picture of the sustainability of the public sector.

Present value calculation/fiscal gap

The use of present value calculations has long traditions in the public sector. This is the ordinary method to bring present outlay and future income into a common value to consider if an investment project is profitable. While evaluating investment projects it is common to discount for financial

cost, uncertainty in the future income projections, and preferences for present consumption to future consumption. In sustainability analysis it is not common to include the last two factors when calculating the present value of future deficits. While present value calculation of investment projects includes all revenues and outlays and in principle goes to infinity, it has been more common to calculate if the present value of “unchanged policies” is sustainable over a selected finite period.

The most common way to find out if the fiscal situation is sustainable over a given period is to make a fiscal gap analysis. The fiscal gap is the adjustment that has to be done so that the present value of income minus outlays, given the present level of debt, equals a specified amount of wealth or debt at the end of a selected period. Since interest payments are included in the discount rate, it is revenues minus outlays excluding interest (the primary deficit) that are included in the calculations.

The first definition of sustainability was Domar’s definition in 1942 where the criterion for sustainability is limited to not having to increase the level of taxation. A necessary condition is that the level of debt will increase up to a limit. Domar’s definition however does not give help for calculating such a limit. Blanchard extended the definition in 1990 by including a condition for a sustainable deficit that the limit of debt should be the initial level of debt. Such an extension of the definition of sustainability is necessary to calculate a fiscal gap adjustment that leads to this restricted definition of sustainable deficit. The chosen value for the debt at the end of the period may of course be changed.

Fiscal gap calculations have some important advantages over long-term projections when presenting the degree of fiscal unsustainability:

- They give a single number representing the need for fiscal adjustment, either by reducing spending or by increasing taxes, which is easy to communicate.
- They ensure that the debt level at the end of the period is as expected.

There are however also some objections:

- When the growth in the population receiving public support is to a large extent different from the growth in the population that pays taxes, there is not neutrality between reducing expenditures on entitlement programmes and increasing taxes with the same amount.
- The calculated need for adjustment will depend on an arbitrarily chosen debt level at the end of the period and the length of the period.

- There is no condition ensuring that the deficits in the last years of the period are sustainable in the future. Even if these analyses find that the budget is in balance in the given period, there may still be fiscal problems in the future.
- Updating the calculations in the coming years may constantly increase the calculated need for adjustment of the fiscal policy. All of the projections presented today indicate that shifting the period for calculation one year into the future will replace a good first year with a bad year at the end of a period. The need for adjustment will always increase from one year to the next. This will reduce trust in the calculations.
- Fiscal gap calculation will not lead to a strategy to implement adjustments in the fiscal policy. If the fiscal gap analysis shows that there is a large need for increasing taxes or reducing expenditures to avoid an unsustainable situation, it may not be realistic to assume that this is done during a short period. There may be a need for a combined strategy increasing taxes gradually in the coming years and reducing the expenditures both for entitlements and other expenditures in the future. If so it is necessary to develop detailed yearly projections to take into consideration the time path for both increasing taxation and reducing expenditures.
- Fiscal gap analyses do not indicate the future uncertainty in the calculations.

Expanding the calculation period into infinity and equating the present value of the future primary deficits to the present level of debt will decrease the arbitrariness of the projections. This is often referred to as the Intertemporal Budget Constraint (IBC).

Generational accounting

There has been an increasing concern that the present generation will spend more resources than it creates and will leave the bill for coming generations. One important area for such concern is the use of non-renewable natural resources. Some countries have built calculations into their budget process to show the impact for coming generations of current budgetary decisions. Some countries have set up fiscal rules to prevent the present generation from shifting the burden of present consumption to the next generation. The United Kingdom has established a Golden Rule saying that there shall be a balance in the fiscal current account including capital depreciation making the present generation pay for the present yearly costs.

Borrowing may only be used for investments and net debt may not exceed 40% of GDP over the economic cycle.

Neither long-term projections nor fiscal gap analysis will give an answer to the question of intergenerational imbalances. Nor does federal debt give a direct measure of the future burdens that current policy places on current and future generations. However, to the extent that current generations receive federal benefits that are not fully financed by current revenues, the costs of those benefits must inevitably shift to some future generations.

Auerbach, Gokhale and Kotlikoff presented in 1991 a method called “generational accounting” to calculate the fiscal burden that the current generation passes to the next generations. Distributing revenues and expenditures in the present budget according to the age of present taxpayers and receivers allows calculation of the net present value during a lifetime given the present structure for the revenues and expenditures. It is assumed that the generation born today must pay the same as future generations. If it is not so, the balance must be restored either by increasing taxes or reducing spending.

Defining intergenerational justice is difficult. Considerations about injustice according to generational accounting are also difficult partly because the technical method does not support a discussion to determine what will be just and partly because of the uncertainty in the calculations. The calculations are highly dependent on the structure of public finances in what is a highly arbitrary base year for the calculations.

One alternative way to treat generational justice in a less ambitious manner may be to:

- Through the long-term projections, ensure that the level of taxation will also be sustainable in the future;
- Ensure that income from non-renewable resources also benefits the future generations;
- And through fiscal and monetary policy, ensure stable growth in the economy so that the labour force will remain skilled and labour participation in the future will be kept high.

Annex B.

The presentation of long-term projections in some countries

Australia

The Australian Treasury's first intergenerational report was published in May 2002. The Australian Charter of Budget Honesty requires that an intergenerational report must be published at least once every five years, which implies that the next intergenerational report must be published by May 2007.

In March 2005, the Australian Government Productivity Commission published a report on the economic implications of aging. This report projected that the fiscal pressure due to more spending than revenues was slightly higher than in the 2002 report.

Canada

In the 2004 budget the Canadian government set an objective to reduce the ratio of federal debt to GDP to 25% within ten years. The 2005 budget reaffirmed this objective. Given a commitment to balance budgets in each of the next five fiscal years and based on the average private sector forecast for nominal GDP growth, it is estimated that the federal debt-to-GDP ratio will decline to about 30.6% in 2009/10. The IMF concluded that the federal fiscal position is sustainable provided that the budget policy remains prudent. The IMF reports that pension reform has ensured that the Canada Pension Plan is actuarially sound. However this does not cover the whole public pension system.

Denmark

Denmark has integrated long-term projections in its political process. In 1997 the government presented its goals for the macroeconomic performance until 2005. In 2001 a further report presented "*En holdbar*

fremtid – Danmark 2010” (A sustainable future – Denmark 2010). The report sets targets for the fiscal deficits each year from 2001 to 2010. These targets are followed up in each budget year in the period. These presentations are complemented by a presentation of the “adjusted” deficit where the deficit in the coming year’s budget is adjusted for such items as further obligations due to the aging population and adjustments for future changes in taxation. As a member of the EU, Denmark has committed itself to fulfil the convergence criteria. The targets in the national plan are however more restrictive than these criteria.

The new government from spring 2005 has supported the earlier government’s plan and announced that in 2006 it will present a new plan covering at least the period up to 2015.

New Zealand

In 2004 the New Zealand Parliament passed the Public Finance Bill (Act). Among other new improvements in the public management system, this act requires the Treasury to prepare, at least once every four years, a statement on the long-term fiscal position, covering a period of at least 40 years. The New Zealand Treasury published its first report by the end of June 2006. This report gives projections up to 2050. The act does not specify the contents of the statement. It simply requires a statement of responsibility asserting that the Treasury has used its best professional judgments about the risk and outlook, and the disclosure of significant assumptions. The act does not require the use of a specific analytical tool (for example, intergenerational accounting). But the act does allow consideration of projections spanning a range of issues (for example, retirement income, health, education, and the aggregate fiscal position).

United Kingdom

Each year since 2002 the United Kingdom has presented a long-term public finance report in its pre-budget report in December. These projections complement the long-term projections presented in the budget in the spring. The Code for Fiscal Stability requires the government to publish illustrative long-term fiscal projections, covering a horizon of at least ten years. In practice a 30-year horizon has been chosen. The projections presented in the budget in the spring are based on a top-down approach.

The pre-budget report in December gives both projections calculated on a bottom-up approach and updates on the top-down projections. The bottom-up spending and revenue projections can also be used to derive future

primary balances. With this it is possible to assess the long-term sustainability of public finances. With the top-down projections, the bottom-up projections can be used to identify future fiscal pressures.

United States

With its yearly budget proposal the United States government presents long-term projections going six years into the future. The budget documents also present illustrative 75-year budget projections of public revenues and expenditures at the federal level. The Social Security Administration is mandated to present 75-year projections that assess the adequacy of current payroll contribution rates in financing the scheme.

The Congressional Budget Office also releases special studies on the long-term budget outlook. The latest study was published in December 2005, giving projections until 2050. The CBO also publishes studies on more restricted topics such as “Updated Long-Term Projections for Social Security” (June 2006) and “Global Population Aging in the 21st Century and Its Economic Implications” (December 2005). The CBO has presented several studies on uncertainty in the long-term projections. In 2005 it published “The Uncertainty of Budget Projections: A Discussion of Data and Methods” (February) and “Quantifying Uncertainty in the Analysis of Long-Term Social Security Projections” (November).

Other

Other countries have also carried out analysis on the sustainability of public finances. The German Federal Ministry of Finance published its first report in June 2005 covering the period to 2050. In 2004 Norway presented a White Paper on perspectives for the future showing projections up to 2060.

Note

1. “Baumol effect or ‘cost-disease’: Tendency for relative prices of some services, such as long-term care, to increase vis-à-vis other goods and services in the economy, reflecting a negative productivity differential and the equalisation of wages across sectors” (Oliveira Martins *et al.*, 2006, p. 9).

Bibliography

General information

- Auerbach, A.J., J. Gokhale and L.J. Kotlikoff (1991), *Generational Accounts: A Meaningful Alternative to Deficit Accounting*, NBER Working Paper No. 3589, National Bureau of Economic Research, Cambridge, MA, United States, <http://papers.nber.org/papers/w3589>.
- Banca D'Italia (2000), *Fiscal Sustainability*, Research Department Public Finance Workshop 2000, Perugia, Italy.
- Brixi, Hana Polackova and Allen Schick (2002), *Government at Risk, Contingent Liabilities and Fiscal Risk*, The World Bank, Washington DC.
- Gokhale, Jagadeesh and Kent Smetters (2003), *Fiscal and Generational Imbalances: New Budget Measures for New Budget Priorities*, American Enterprise Institute for Public Policy Research, Washington DC, www.aei.org/docLib/200307161_smetters.pdf.
- Heller, Peter S. (2003), *Who Will Pay? Coping with Aging Societies, Climate Change, and Other Long-Term Fiscal Challenges*, International Monetary Fund, Washington DC.
- Schick, Allen (2005), "Sustainable Budget Policy: Concepts and Approaches", *OECD Journal on Budgeting*, Volume 5, Number 1, OECD, Paris.

OECD

- Burniaux, Jean-Marc, Romain Duval and Florence Jaumotte (2004), "Coping with Ageing: A Dynamic Approach to Quantify the Impact of Alternative Policy Options on Future Labour Supply in OECD Countries", *Economics Department Working Papers No. 371*, June, OECD, Paris.
- OECD (2003), "Labour Force Participation of Groups at the Margin of the Labour Market: Past and Future Trends and Policy Challenges", Working Party No. 1 on Macroeconomic and Structural Policy Analysis, ECO/CPE/WP1(2003)8 and three annexes, 22 September, OECD, Paris.
- OECD (2005a), *Health at a Glance: OECD Indicators – 2005 Edition*, ISBN-92-64-01262-1, OECD, Paris.

- OECD (2005b), *National Accounts of OECD Countries, General Government Accounts Volume IV 1993-2004*, ISBN-92-64-03613-X, OECD, Paris.
- OECD (2005c), *Pensions at a Glance: Public Policies across OECD Countries*, ISBN-92-64-01871-9, OECD, Paris.
- OECD (2006), *Ageing and Employment Policies; Live Longer, Work Longer*, ISBN-92-64-03587-7, OECD, Paris.
- Oliveira Martins, Joaquim, Frederic Gonand, Pablo Antolin, Christine de la Maisonneuve and Kwang-Yeol Yoo (2005), “The Impact of Aging on Demand, Factor Markets and Growth”, *Economics Department Working Papers No. 420*, ECO/WKP(2005)7, OECD, Paris.
- Oliveira Martins, Joaquim, Christine de la Maisonneuve and Simen Bjørnerud (2006), “Projecting OECD Health and Long-term Care Expenditures: What are the Main Drivers?”, *Economics Department Working Papers No. 477*, ECO/WKP(2006)5, OECD, Paris.

European Union

- Carone, Giuseppe, Declan Costello, Nuria Diez Guardia, Gilles Mourre, Bartosz Przywara and Aino Salomaki (2005), *The economic impact of aging populations in the EU 25 Member States*, European Commission Economic Papers No. 236, Brussels.
- Economic Policy Committee and European Commission (2005a), *The 2005 EPC projections of age-related expenditure (2004-2050) for the EU 25 Member States: Underlying assumptions and projection methodologies*, European Economy Special Report No. 4/2005, ECFIN/CEFCPE(2005)REP/55087, European Commission, Brussels, http://ec.europa.eu/economy_finance/epc/epc_sustainability_ageing_en.htm.
- Economic Policy Committee and European Commission (2005b), *The 2005 EPC projection of age-related expenditure: Agreed underlying assumptions and projection methodologies*, European Economy Occasional Paper No. 19, ECFIN/CEFCPE(2005)REP/54772, European Commission, Brussels, http://ec.europa.eu/economy_finance/publications/occasional_papers/2005/ocp19en.pdf.
- Economic Policy Committee and European Commission (2006), *The impact of ageing on public expenditure: projections for the EU 25 Member States on pensions, health care, long-term care, education and unemployment transfers (2004-2050)*, European Economy Special

Report No. 1/2006 including annex, European Commission, Brussels, http://ec.europa.eu/economy_finance/epc/epc_sustainability_ageing_en.htm.

European Commission (2005), *Public Finances in EMU 2005*, Directorate-General for Economic and Financial Affairs, European Economy No. 3/2005, European Commission, Brussels, http://ec.europa.eu/economy_finance/publications/european_economy/2005/ee305en.pdf.

International Monetary Fund (IMF)

IMF (2002), *Assessing Sustainability*, prepared by the Policy Development and Review Department, 28 May, IMF, Washington DC.

IMF (2003a), *Debt Sustainability in Low-Income Countries: Towards a Forward-Looking Strategy*, prepared by the Staff of the Policy Development and Review Department, 23 May, IMF, Washington DC.

IMF (2003b), *Sustainability Assessments: Review of Application and Methodological Refinements*, prepared by the Policy Development and Review Department in collaboration with the Monetary and Financial Systems Department and in consultation with other departments, 10 June, IMF, Washington DC.

IMF (2004a), *Debt Sustainability in the Low-Income Countries: Proposal for an Operational Framework and Policy Implications*, prepared by the Staffs of the IMF and the World Bank, 3 February, IMF, Washington DC.

IMF (2004b), *Debt Sustainability in Low-Income Countries: Further Considerations on an Operational Framework and Policy Implications*, prepared by the Staffs of the IMF and World Bank, 10 September, IMF, Washington DC.

IMF (2005), *Operational Framework for Debt Sustainability Assessments in Low-Income Countries: Further Considerations*, prepared by the Staffs of the IMF and World Bank, 28 March, IMF, Washington DC.

Australia

Australian Treasury (2002), *Intergenerational Report 2002-03*, Budget Paper No. 5, ISBN-0642-74142-5, Canberra.

Gruen, David and Matthew Garbutt (2004), *The Long Term Fiscal Implications of Raising Australian Labour Force Participation or*

Productivity Growth, Treasury Working Paper 2004-01, April, Canberra, www.treasury.gov.au/documents/820/PDF/Gruen_Garbutt.pdf.

Productivity Commission (2005), *Economic Implications of an Ageing Australia*, Research Report, ISBN-1-74037-173-9, April, Canberra, www.pc.gov.au/study/ageing/finalreport/index.html.

Canada

Department of Finance (2005), *A Plan for Growth and Prosperity*, November, Ottawa, www.fin.gc.ca/ec2005/agenda/agc2005e.pdf.

Denmark

Danish Cabinet (2001), *En holdbar fremtid – Danmark 2010 (A sustainable future – Denmark 2010)*, ISBN-87-7856-403-4, Copenhagen.

Germany

Federal Ministry of Finance (2005), *Bericht zur Tragfähigkeit der öffentlichen Finanzen (Report on the Sustainability of Public Finances)*, Berlin, German text only, www.bundesfinanzministerium.de.

New Zealand

Janssen, John (2002), *Long-term Fiscal Projections and their Relationship with the Intertemporal Budget Constraint: An Application to New Zealand*, New Zealand Treasury Working Paper 02/04, Wellington, www.treasury.govt.nz/workingpapers/2002/02-4.asp.

Rodway, Paul and Peter Wilson (2006), *Modelling New Zealand's Long-term Fiscal Position*, New Zealand Treasury Policy Perspectives Paper 06/01, February, Wellington, www.treasury.govt.nz/workingpapers/2006/tpp06-01.pdf.

The Treasury (2005), *A Guide to the Public Finance Act*, August, Wellington, www.treasury.govt.nz/pfa/.

The Treasury (2006), *New Zealand's Long-Term Fiscal Position*, Wellington, www.treasury.govt.nz/longtermfiscalposition/2006/.

Norway

Ministry of Finance (2004), *Perspektivmeldingen 2004: utfordringer og valgmuligheter for norsk økonomi*, St. meld nr. 8 (2004-2005), Oslo.

United Kingdom

HM Treasury (2005a), *Long-term global economic challenges and opportunities for Europe*, March, ISBN-1-84532-083-2, Crown Copyright, London, www.hm-treasury.gov.uk/documents/international_issues/int_global_index.cfm.

HM Treasury (2005b), *Delivering the benefits of accruals accounting for the whole public sector*, December, ISBN-1-84532-116-2, Crown Copyright, London, www.hm-treasury.gov.uk/media/F59/87/pbr05_accounting_281.pdf.

HM Treasury (2005c), *Long-term public finance report: an analysis of fiscal sustainability*, December, ISBN-1-84532-123-5, Crown Copyright, London, www.hm-treasury.gov.uk/media/F59/32/pbr05_longterm_513.pdf.

HM Treasury (2006), *Budget 2006. A strong and strengthening economy: Investing in Britain's future. Annex A: Illustrative long-term fiscal projections*, London, www.hm-treasury.gov.uk/budget/budget_06/bud_bud06_index.cfm.

United States

Congressional Budget Office (2001), *Uncertainty in Social Security's Long-Term Finances: A Stochastic Analysis*, December, Washington DC, www.cbo.gov/showdoc.cfm?index=3235&sequence=0.

Congressional Budget Office (2005a), *The Uncertainty of Budget Projections: A Discussion of Data and Methods*, February, Washington DC, www.cbo.gov/showdoc.cfm?index=6119&sequence=0.

Congressional Budget Office (2005b), *Quantifying Uncertainty in the Analysis of Long-Term Social Security Projections*, Background Paper, November, Washington DC, www.cbo.gov/ftpdocs/68xx/doc6873/11-16-MonteCarlo.pdf.

Congressional Budget Office (2005c), *The Long-Term Budget Outlook*, December, Washington DC, www.cbo.gov/ftpdocs/69xx/doc6982/12-15-LongTermOutlook.pdf.

- Congressional Budget Office (2005d), *Global Population Aging in the 21st Century and Its Economic Implications*, December, Washington DC, www.cbo.gov/ftpdocs/69xx/doc6952/12-12-Global.pdf.
- Congressional Budget Office (2006), *Updated Long-Term Projections for Social Security*, June, Washington DC, www.cbo.gov/ftpdocs/72xx/doc7289/06-14-LongTermProjections.pdf.
- Crippen, Dan (2003), “Countering Uncertainty in Budget Forecasts”, *OECD Journal on Budgeting*, Volume 3, Number 2, OECD, Paris.
- Department of the Treasury (2005), *Financial Report of the United States Government 2005*, Washington DC.
- Executive Office of the President, Office of Management and Budget (2006), *Fiscal Year 2007, Analytical Perspectives, Budget of the United States Government*, Washington DC.
- Sabelhaus, John and Julie Topoleski (2006), *Uncertain Policy for an Uncertain World: The Case of Social Security*, Working Paper Series, March, Congressional Budget Office, Washington DC, www.cbo.gov/ftpdocs/70xx/doc7090/2006-05.pdf.

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