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Ageing and the Sustainability of Dutch Public Finances

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Abstract in English

The ageing of the population jeopardises the sustainability of public finances in the Netherlands. The doubling of the ratio between the number of retirees and the number of workers destroys the balance between future public expenditure and tax revenues. Indeed, the increase in expenditure on public pensions and health and long-term care will outweigh the increase in tax revenues. Budgetary reforms are therefore necessary in order to avoid that future generations will have to raise taxes or economize on public expenditure.

Reforms in the field of social security of the last few years are a step in the right direction, but are insufficient. In particular, the decline of interest rates and the reduced wealth of pension funds have worsened the sustainability of public finances. The effects of reforms on the intergenerational balance are important for the question which further reforms are most attractive.

Key words: Ageing, public finances, intergenerational balance

JEL code: H62, J11

Abstract in Dutch

De vergrijzing van de Nederlandse bevolking brengt de houdbaarheid van de openbare financiën in gevaar. De verdubbeling van de verhouding tussen het aantal gepensioneerden en het aantal werkenden verstoort de balans tussen uitgaven en belastingopbrengsten. De stijging van uitgaven aan AOW en gezondheidszorg overtreft immers de stijging van belastingopbrengsten. Budgettaire hervormingen zijn dan ook nodig om te voorkomen dat toekomstige generaties worden genoodzaakt belastingen te verhogen dan wel op publieke uitgaven te bezuinigen.

Hervormingen op het vlak van de sociale zekerheid van de laatste jaren zijn een stap in de goede richting, maar onvoldoende. Met name de daling van de kapitaalmarktrente en het vermogensverlies bij pensioenfondsen hebben de houdbaarheid van de openbare financiën verslechterd. De effecten die hervormingen uitoefenen op de intergenerationele balans zijn van belang voor de vraag welke verdere hervormingen het meest gewenst zijn.

Steekwoorden: Vergrijzing, openbare financiën, intergenerationele balans

Een uitgebreide Nederlandse samenvatting is beschikbaar via www.cpb.nl.

Contents

Preface

The ageing of the Dutch population creates a problem of fiscal sustainability. That is, if current fiscal rules are left unchanged, the public deficit and debt levels will continue to increase and will eventually explode. Policy reforms are thus necessary on the revenue side, on the expenditure side or on both.

In 2000, CPB made a general assessment of the sustainability of Dutch public finances. This study quantified the fiscal sustainability problem on the basis of then-available information. The present study updates the assessment of fiscal sustainability. This is warranted not only since the previous study is more than five years old, but also because a number of fundamentals have changed in the past few years.

The present study also explores several policy options. This underlines the realisation that more than one route can be followed in the pursuit of restoring fiscal sustainability. The study demonstrates that various solutions may be poles apart in terms of their effects upon output and the distribution of income between generations. This extension of the scope of the study has been made possible by the adoption of an applied general equilibrium model, GAMMA. This model is based on the generational accounting framework that was used in the 2000 study, but adds an explicit description of economic behaviour, so that behavioural effects can be integrated and consistency of the calculations is always guaranteed.

A number of people at CPB have collaborated on this study. Nick Draper, Casper van Ewijk, Harry ter Rele and Ed Westerhout (project leader) authored the study, assisted by Jan Donders from the Ministry of Finance. Peter Kooiman provided advice on many issues during the course of the project. Jan Bonenkamp and Martijn van de Ven assisted on pension issues, Daniël van Vuuren on labour market issues, Richard Rosenbrand provided computational assistance, and Jannie Droog, Marja Kolkman and Annemarie Spaans put everything together in readable form. A vast number of CPB colleagues, too many to mention, commented on parts of the study. Furthermore, the study benefited from discussions with Lans Bovenberg (Netspar), Bas Jacobs (UvA and UvT), Lex Meijdam (UvT), Harry Verbon (UvT) and Sweder van Wijnbergen (UvA). Finally, important feedback was obtained from a referee group consisting of delegates from the Dutch Central Bank and the ministries of Economic Affairs, Finance, General Affairs, Health, Welfare and Sports and Social Affairs and Employment.

Casper van Ewijk
Deputy director

Summary

Future generations in the Netherlands face an increasing financial burden due to population ageing. Low fertility and continuous growth in life expectancies imply that the number of retirees in terms of the number of workers almost doubles: the old-age dependency ratio increases from the current level of 23.4% to the level of 43.4% in 2040. If current budgetary arrangements are maintained in the future, total expenditures of the government are projected to grow by 7%-points, from 48% of GDP in 2006 to 55% of GDP in 2040. Although also revenues for the government increase (by 4%-points), mainly through tax revenues on increasing pension income of households, this will be insufficient to compensate for the rise in expenditures. The gap between government expenditures and revenues is projected to increase by more than 3% of GDP between 2006 and 2040. Present budgetary and social security arrangements are therefore not sustainable from a long-term perspective. If policy is not changed, then a growing financial burden will be shifted to future generations. Sooner or later, future generations will be forced to raise taxes or to curb government expenditures.

Sustainability can be restored by anticipating this burden and taking appropriate measures now. Essentially, three directions may be taken to solve the problem. First, it is possible to curb the future cost of ageing by for example, increasing the official retirement age, containing the costs of health care or reducing the favourable tax treatment of the (richer) elderly. These measures do not so much affect the current government budget now, but rather reduce the future cost of ageing. Second, measures can be taken to improve the current budget now, thereby increasing government savings. This will also improve future public finances, as interest payments on government debt will fall. Finally, improvement in the budget can be achieved not only by adjusting expenditures or revenues, but also by *e.g.* increasing labour force participation. In addition, policies that reduce the vulnerability of the economy to macroeconomic shocks (*e.g.* linking the official retirement age to life expectancy) may be useful.

If no specific measures are taken to curb the future cost of ageing, sustainability requires the structural government balance (EMU balance) to improve to a surplus of about 3% by the end of the next cabinet period in 2011. This 3% EMU surplus corresponds to a sustainable primary EMU surplus of roughly 4½% of GDP. The primary EMU balance equals the EMU balance excluding interest payments on public debt.

A target for medium-term budgetary policy

The 3% figure for the sustainable structural EMU surplus provides an indication for the size of the sustainability problem. It should not be interpreted directly as a target for the government budget. It may serve as target only if no new measures are taken to curb the future cost of ageing. Then, sustainability is fully restored by increasing present government savings. Alternatively, if measures are taken to reduce the future cost of ageing, this will relieve the necessity to increase government savings now. That is, if the future costs of ageing are

decreased, this will lower the target for the sustainable budget surplus. An example: if the retirement age is increased to 67 years by 2025, this will reduce the target for a sustainable budget surplus in 2011 from about 3% to about 2½% of GDP. A further reduction of ¾%-points GDP can be expected if the favourable tax treatment of the (richer) pensioners is abolished. Also measures to contain the future cost of health care could have a favourable impact on the budget balance that is required for sustainability.

Uncertainty

It should be emphasised that the results are based on long-term projections of demography, interest rates and economic growth. These contain many uncertainties. Also the method of analysis requires specific assumptions. The results should therefore be interpreted and treated with care. This study by and large follows the common framework adopted in similar exercises currently operated by the EU and the OECD. These projects assess the long-term sustainability of public finances in the wake of population ageing for many different countries.

Comparison with the previous study of 2000

The result on sustainability is worse than in the previous CPB study of 2000 (Van Ewijk *et al.* (2000)). Then, the sustainable structural EMU surplus was found to be 1.2% of GDP in 2010, which was then estimated to require a modest policy adjustment amounting to 0.7% of GDP. The difference is due to a number of factors:

- The shocks to the pension sector had a pervasive impact on the government budget. Not only did pension funds suffer substantial losses on their assets (about 25%) due to the creeping stock market crash, they currently also face lower expected returns on their investments. The long-term interest rate has shown a steady decline; since 2000, the long-term rate of interest rate fell by almost 2%-points from 5½% in 2000 to about 3½% by the end of 2005. In addition, economists are less optimistic nowadays on the return on equities, which also affects the return on pension savings. The lower pension returns directly affect tax revenues for the government through higher (deductible) contribution rates and smaller (taxed) pensions. The fall in the expected rate of return on pension savings is by far the most important factor in the deterioration of the sustainability of the government budget.
- The lower interest rate also affects the assessment of the sustainability of government finances directly, as it gives more weight to the future cost of ageing. This study uses a discount rate of 3% in real terms, which is 1%-point lower than in the previous study. This lower discount rate also contributes to the deterioration in sustainability. The discount rate for the government exceeds the real interest rate on government debt. This is to allow for the economic risk in future revenues and expenditures. For the part of tax revenues that relate to private sector returns on (pension) savings consistent valuation requires that the discount rate equals the expected return. The present study therefore uses one uniform market rate of return equal to the

discount rule throughout the analysis. This methodology is now applied worldwide, but was not adopted in our previous study.

- The current government debt is larger than that projected in 2000. Moreover, the current budgetary situation is masked by the recent increase in revenues from natural gas. These revenues are only temporary, however, as gas revenues will drop in the future when the natural reserves become exhausted.
- Finally, on the positive side, some factors have favourably affected sustainability, in particular the reforms in disability insurance. On the negative side, this study is less optimistic regarding future female participation in the labour force.

Questions & Answers

The results of this study will be explained in more detail through the following questions and answers.

Why should we care about sustainability?

Sustainability is a major concern, as the ageing of the population is expected to lead to an increasing burden for future generations. The falling revenues from natural gas will also cause the budgetary balance to deteriorate in the future. Current policies are called sustainable if they can be maintained without running into problems in the future, when the balance between revenues and expenditures is expected to worsen. This concept of sustainability can be motivated from the point of view of efficiency and of intergenerational equity.

- Efficiency

  Sustainability is related to efficiency, as it prevents the necessity of tax rates having to be raised in the future to finance the increasing burden of ageing. In general, it is better to keep tax rates constant than to increase them over time. Rising tax rates would, on average, increase the distortionary effects of taxes on *e.g.* the labour market. Moreover, the prospect of a high future tax rate is a disincentive for saving and investment.
- Intergenerational equity

  Sustainability also means that future generations will not be burdened by the cost of ageing in a disproportionate manner. A sustainable policy is defined as a policy that can be maintained into an indefinite future so that future generations will be able to benefit from the same social security arrangements, the same spending programmes, and the same tax rates as current generations. Future generations will thus benefit from the government in the same manner as current generations do. In economic terms, along the sustainable time path of government finances, all generations experience the same net benefit from the government. The net benefit of a generation is measured by the amount of government expenditures each generation 'receives' over its full life cycle (from birth to death), minus how much this generation contributes by paying taxes. The concept of sustainability is intimately linked with the 'Musgrave' criterion for the intergenerational distribution: namely, a constant net benefit from the government for all generations relative to their lifetime income.

The present analysis does not explicitly take account of precautionary reasons to care about sustainability. This could be an additional reason not to burden future generations with a 'debt of ageing'. Although economic growth is, on average, expected to raise future incomes, the exact increase in the welfare of future generations is highly uncertain. Moreover, with growing international interdependencies and a relatively shrinking working population, the resilience of the economy could come under pressure. This could also affect the welfare of future

generations and their ability – and willingness – to pay for the ageing costs of the then-old generations.

Why do we need a surplus in the government's financial balance?

Sustainability requires a surplus in the government's budget for two reasons: First, the government must run a positive primary balance so that revenues exceed expenditures (excluding interest payments), in order to redeem debt that is inherited from the past. Second, the government must save for the future burden of ageing. In formal terms, the structural primary surplus along the sustainable time path must satisfy the following:

$$rps = (r-g)\ (D+A)$$

In this equation, *rps* represents the required primary surplus for sustainability. *D* stands for initial public debt and *A* for the 'future' debt that is due to ageing. The annuity term (*r-g*), denoting the difference between the interest rate and the growth rate, is used to translate the stocks *D* and *A* into flow terms. More specifically, the future debt *A* is measured as the present value of the deterioration in the primary budget compared to the initial structural budget as a result of the increasing cost of ageing and other exogenous factors (such as the decrease in revenues from natural gas).

This result can be explained by considering the budget of an average middle-aged household. The primary surplus measures the excess of revenues over expenditures (excluding interest payments on debt). This household needs a surplus to pay for the redemption of debt, on the one hand, and to build up wealth to cover the future cost of pensions and health care, on the other hand. Furthermore, if the household also expects its income to fall (compare declining revenues from natural gas), this is an additional reason to save.

In the case of the Netherlands, the redemption of debt explains only part of the required surplus; most of it (more than three quarters) is related to the future cost of ageing and the drop in revenues from natural gas.

Does the projection for the government budget feature the most plausible development?

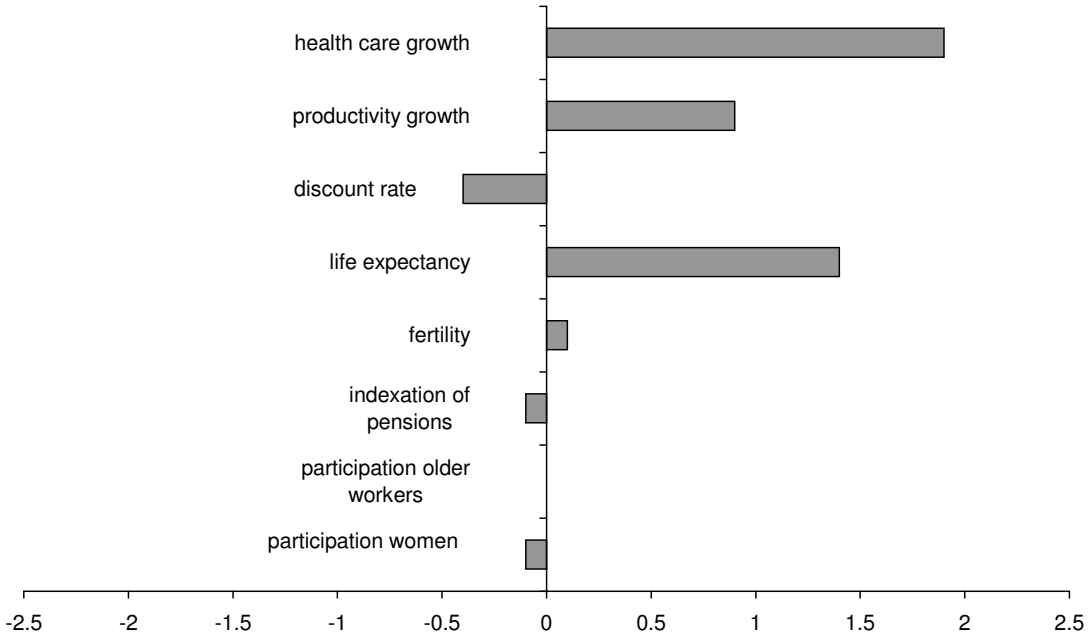
The baseline projection is geared to the specific question that is central in this study: 'Are present policies sustainable?' The projection therefore takes policies as given, and takes no account of expected changes in policies. The baseline projection is meant to serve as a benchmark for sustainable public finances, not as the best prediction of actual policies. The projection thus takes current policies as given, and extends them into an indefinite future. It takes account of the impact of demography and other autonomous factors on the government budget. Tax rates are assumed to be constant, and government expenditures to be indexed to wage growth or GDP growth. Technically, the sustainable time path is found by imposing a once-and-for-all reduction in (non-age-related) government expenditure such that public finances become stable over a long time horizon. The choice of the instrument of government

expenditure is merely for technical reasons. Alternative options for adjusting the budget are also considered in this study.

How robust is the required primary surplus as a target for budgetary policy?

In general, the result for the required structural primary surplus (*rps*) is fairly robust as an indicator of sustainability. The structural surplus is insensitive to cyclical influences. Also, in contrast to the EMU balance, it is independent of short-term fluctuations in actual interest payments on government debt. Figure 1 illustrates the sensitivity of the required primary surplus to a number of underlying factors. The shocks imply a bandwidth around our central estimate of 4.8% of GDP that runs from 4.4 to 6.7% of GDP. The shocks in figure 1 are chosen such that they have more or less the same likelihood of occurring. Most factors appear to have little impact on the sustainable primary balance, as measured in 2011. Also the discount rate that is used for future government revenues and expenditures proves to have a limited impact. The indicator is quite sensitive, however, to life expectancy and the growth of health care expenditures. Also the (exogenous) rate of economic growth has a significant impact on the required primary surplus. Special attention will be devoted to these factors in this study. Also the favourable effect of a higher interest rate or discount rate (easing the target for the budget) deserves some explanation. It should be noticed that the small impact of *e.g.* participation does not mean that this factor is not important; on the contrary, higher participation is an effective way to improve the actual government budget, thereby reducing the gap between the sustainable surplus and the surplus under unchanged policies.

Figure 1 Effect on the sustainable primary balance (% of GDP) for a number of shocks



Why is a low interest rate worrisome from the point of view of sustainability?

The impact of the interest rate or discount rate can be understood as follows. As low interest rates also imply low rates of return for pension finds, contribution rates have to be raised to finance future pensions. Since pension contributions are deductible for taxation this implies a direct loss in tax revenues for the government. Although pension outlays are taxed, the net subsidy on pension savings increases considerably. On average, the implicit subsidy on pension contributions ranges between 40% and 50%.

In addition to this effect, the interest rate has also a direct impact on the government budget. Technically, a low interest rate gives more weight to the future cost of ageing, and thus increases the costs of ageing in present-value terms. In economic terms, the impact of a low interest rate can be understood to imply that more savings are needed to cover the given cost of ageing in the future. It is true that a low interest rate also reduces the cost of servicing initial debt, but this positive effect is outweighed, in the Dutch circumstances, by the negative effect of the increasing cost of ageing. It may be noted that along the sustainable time path the government will build up a positive net position in financial wealth. This is necessary to compensate future generations for the cost of ageing. Given the net creditor position of the government, a low interest rate is detrimental for the government from a long-term point of view. Essentially, this is similar to the reason why pensions become more expensive when the expected return of pension savings falls.

Is growth bad for government finances?

Figure 1 above indicates that higher productivity growth raises the primary surplus required for sustainability. Does this mean that higher productivity growth is bad for government finances? Obviously not. Productivity growth not only increases general welfare, it also bolsters the government budget. Higher productivity growth increases tax revenues in the future, which can be used for extra expenditures or tax cuts. Furthermore, productivity growth can make it easier for the government to carry through necessary economic reforms.

Yet, as figure 1 indicates, higher productivity growth tends to be associated with a higher primary surplus required for sustainability. A ½%-point higher growth on a permanent basis leads to a 1%-point higher target for the sustainable primary balance. This clearly requires some explanation. The crucial factor here is that, in the long run, all expenditures of the government are assumed to be indexed to wages or GDP. Then, higher growth also implies higher future expenditures. On balance, expenditures will increase even more than revenues, as part of the revenues are unrelated to growth (*e.g.* natural gas, taxes related to returns on asset holdings of households and pension funds). The net effect on sustainability, as measured by the required primary surplus, is therefore found to be negative.

In economic terms, the higher required primary surplus can be understood as additional savings that are necessary to cover the – higher – future expenditures on *e.g.* pensions and health care. On balance, higher growth increases the net benefits of current generations. Particularly the current elderly benefit from the higher expenditures, while they pay little in

extra taxes. This positive effect on the required primary surplus is comparable to the impact of higher productivity growth on pension funds; also here, higher growth leads to higher required contributions in the short term, which are necessary to finance the higher future pensions. This does not mean that people are worse off, however. On the contrary, despite the higher pension contribution they will need to pay, individuals will certainly be better off as both their private income and their pension increase through higher productivity growth.

The assumption on the indexation of expenditures is crucial for the result on sustainability. If the time path of expenditures was fixed and not indexed to productivity growth, then higher productivity growth would obviously be beneficial for sustainability. If expenditures would lag behind in growth by ½%-point per year on a permanent basis, this could easily reduce the sustainable budget surplus by 5% of GDP. The question, however, is whether this is a relevant exercise in the context of sustainability. First, it would imply that all government expenditures lag behind in growth relative to income in the private sector. So not only spending on education and culture, but also public pensions and social security payments, will fall relative to private sector income. It should be noted that labour costs are the main costs in the government sector, and that wages follow wages in the market sector. Second, lagging expenditure growth would violate the Musgrave criterion for intergenerational distribution. If expenditures lag behind growth, this will burden future generations too, as their benefit from government expenditures shrinks while they equally have to pay through taxes. Thus, even if such a scenario were possible, it would contribute little to restore intergenerational equity. Instead of an explicit debt, future generations then have to bear a burden through an implicit debt in the form of lower benefits from government expenditures.

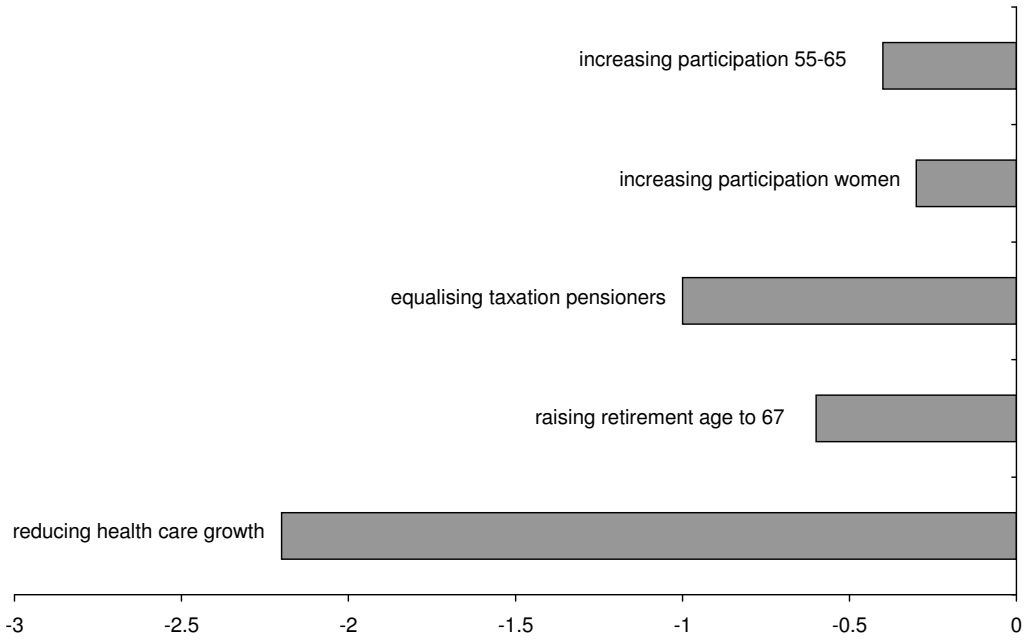
Might higher growth of health care expenditures threaten sustainability?

Health care expenditure may exhibit strong growth for several reasons. For example, there is substantial evidence that the income elasticity of health care expenditures exceeds one. In addition, medical technological progress may increase expenditure on medical services. The answer to the question depends very much on who pays for the growth, however. In general, if future generations prefer to spend more on health care, this does not have to be a reason to increase government savings now. From an intergenerational point of view, these higher preferred expenditures in the future should be paid by the generations who benefit from them (that is, the generations that are living then). Therefore, if – due to a preference shift – the growth of health care expenditures exceeds general economic growth, this should be financed by increasing tax rates (or decreasing other expenditures) over time. This follows from Musgrave's criterion for intergenerational distribution. However, to the extent that current generations benefit from higher health care expenditures during the rest of their life, this could certainly burden future generations. This would occur if the benefit from the higher expenditures for the current generations exceeds their contribution through the higher tax rate. An unpaid bill is then left behind to future generations. In that case intergenerational equity and sustainability require action now.

How effective are alternative policies to restore sustainability?

Sustainability is restored if the actual structural government budget is brought in line with the required budget surplus. This can be done in many alternative ways. Analysis of all alternatives is beyond the scope of this study. It is useful, however, to point out that besides direct budgetary measures, also fostering participation can be effective in improving the government budget. Figure 2 presents the effects on the sustainability gap (*i.e.* the gap between the required primary surplus and the primary surplus under unchanged policies) of five alternative policies. The two first policies (related to participation) mainly improve the actual budget; the other policies (related to future expenditures) decrease the required budget surplus. This figure should be interpreted with care, as the implementation of the policies may require quite different efforts.

Figure 2 Effects on the sustainability gap (% of GDP) for a number of policies



Are future generations burdened by current generations?

The Musgrave criterion for intergenerational distribution is a relative criterion. It says little about the absolute burden to future generations. In fact, this study finds that future generations will still experience a positive net benefit from the government; they receive more in the form of expenditures (education, pensions, etc.) than they contribute through taxes and social security contributions. In the baseline projection for sustainable policies, future generations can expect a positive net benefit of about 7% of their lifetime wealth. For the generation born in 2006, this amounts to some 56 000 euro in present-value terms per person, corresponding to a yearly 'benefit' of roughly 1 800 euro. Again, this figure should be treated with care although it seems unlikely that the net benefit for future generations will be negative.

To understand why there is a positive net benefit, it is useful to note that although the government has an initial gross debt (54% of GDP in 2006), its total wealth is positive and

amounts to about 60% of GDP. This includes financial assets as well as physical assets (buildings, infrastructure). The benefits of these assets are also attributed to current and future generations. The government thus 'earns' income of almost 4% of GDP in 2006 through these benefits, together with revenues from natural gas to the net benefit of all generations. Sustainability concerns the relative distribution of government wealth over generations. Future generations are well off in the sustainable path, but current generations are also well off even after adjustment of policies to a sustainable level. For current generations, taxes are low in relation to government expenditures, too.

Another way of explaining the finding of a positive net benefit is that current and future generations together have inherited positive government wealth from past generations (*e.g.* stemming from natural gas revenues), which they share by adopting sustainable policies. If current generations do not manage to restore sustainability, they increase their share at the expense of future generations. How the positive initial position has been achieved is not analysed in this study.

This positive net benefit of future generations also explains why increasing fertility is not a solution for the ageing problem, from the point of view of government finances. Over their full life cycle, children cost more to the government through higher expenditures (from education tot old-age pensions) than they contribute through tax payments over their income. For the same reason also immigration (in general) offers little help for the sustainability problem of public finances in the Netherlands.

What are the consequences of a more gradual adjustment towards sustainability?

Sustainability must be distinguished from solvency. Many other possibilities for budgetary policies are feasible, from a financial point of view. For example, any policy that aims at constant public debt (in absolute terms or as a fraction of GDP) or a constant EMU deficit or surplus will satisfy the solvency requirement. The key insight of sustainability, however, is that such strategies are not geared toward efficiency and equity. For example, neither a constant debt target (% GDP) nor a zero-deficit target would prevent the burden of ageing being shifted to future generations and taxes having to rise in the future when the costs of ageing increase. The Musgrave criterion implies that the burden of ageing is shared between generations in proportion to their lifetime incomes.

It should be emphasised that this is not the only possible interpretation of intergenerational equity. The distribution that follows from the projection under the assumption of constant policies, and that happens to match with the Musgrave criterion, serves in the first place as a benchmark for considering intergenerational distribution, and the consequences of alternative policies related to the sustainability of public finances.

To explore alternatives to this benchmark, this study also considers policies where actions to restore sustainability are postponed to 2040. Obviously, postponement benefits current generations, while it increases the burden for future generations. In the baseline projection, postponement implies that up to 2040 the target for the government budget can be relaxed by

2.6% of GDP. From 2040 onwards, it implies a larger sustainability gap of 4.0% of GDP. The impact on the future gap is relatively mild because of two reasons: first, at a low interest rate the financial burden grows relatively slowly; second, the burden is smoothed over all generations living from 2040 onwards until infinity. Thus, the 2.6% of GDP available for extra government expenditures (or tax cuts) up to 2040 must be financed by a permanently larger sustainability gap beyond that year. If, by alternative, generations living in 2040 do not or cannot shift the burden on to future generations, their burden increases not to 4.0% of GDP but even to 7.4% of GDP. This is necessary to return to the original sustainable path in a time span of about one generation, here 34 years.

In the baseline with sustainable policies, current and future generations face a similar adjustment in the budget: namely, 2.6% of GDP. More gradual policies make this burden rise over time. The choice of criterion to be used for the intergenerational distribution and the distribution of the costs of ageing over time that follows from it are normative issues. This study can be helpful, however, in sketching the consequences of alternative solutions of the sustainability problem.

Are there no other instruments to relieve the burden of future generations?

Throughout most of this study the composition of government expenditures is taken as given. Yet, the composition matters for the allocation of the benefit from the government. For example, better education benefits the younger generations, while health care is more important for the elderly. In principle, therefore, the government can relieve the burden for future generations by targeting government expenditures more to younger generations. The scope for such targeting is limited, however, and distributional effects are not always obvious. For example, more expenditure on education benefits younger generations in the first place, but when better education leads to higher productivity and wages, this will also feed into higher pensions of the elderly generations due to the linkage of pensions to wages. These policies are not explicitly considered in this study.

Although not directly an instrument for intergenerational redistribution, it is yet important to take account of policies that affect the value of current asset holdings of households, particularly their housing wealth. A change in house prices can have a large impact on the intergenerational distribution. Generally speaking, a drop in house prices benefits the younger generations (who still have to buy a house), and causes a loss to the older generations, who possess the current stock of houses. The government strongly influences the price of houses through financial regulation, spatial planning and (last but not least) the fiscal system in which interest payments on mortgages are deductible, while interest on other loans is not. A cutback of the favourable tax treatment of mortgage loans would produce, broadly speaking, effects similar to those arising from a reduction of public debt. Such a cutback would lead to lower house prices, thereby entailing a net transfer to future generations and improvement of the government budget on a structural basis. In that way, structural reform in the fiscal treatment of mortgages could lead to a lower target for the budget surplus required for sustainability. Because of the

uneven distribution of home ownership, the drop in house prices will also impact the intra-generational distribution. Analysis of this complex issue is beyond the scope of this study and is deferred to future work. This study also ignores the role of bequests and gifts between generations. Leaving higher bequests could also be a way to compensate future generations for the cost of ageing, but only on a individual basis. As many households do not leave bequests there is certainly also a role for the government in arranging solidarity between generations.

Should the government accommodate for shocks in pension contributions?

The baseline projection takes constant tax rates as a starting point. Constant tax rates can be motivated by tax smoothing and intergenerational equity. For the Netherlands one could argue that account should also be taken of the implicit tax contained in pension contributions. Since occupational pensions (the second pillar of the pension system) are mandatory, these contributions may include an implicit tax when the contribution rate deviates from the actuarially fair premium. This happens, for example, after pension fund assets experience a negative shock, which is recovered by temporarily raising contribution rates. Also, some actuarially unfair early retirement schemes ('VUT') contain an implicit tax. As an alternative to tax smoothing (keeping tax rates constant), smoothing the sum of statutory tax and the implicit 'pension' tax might therefore be considered. A high temporary implicit tax in pensions would then be compensated by a temporarily lower tax by the government.

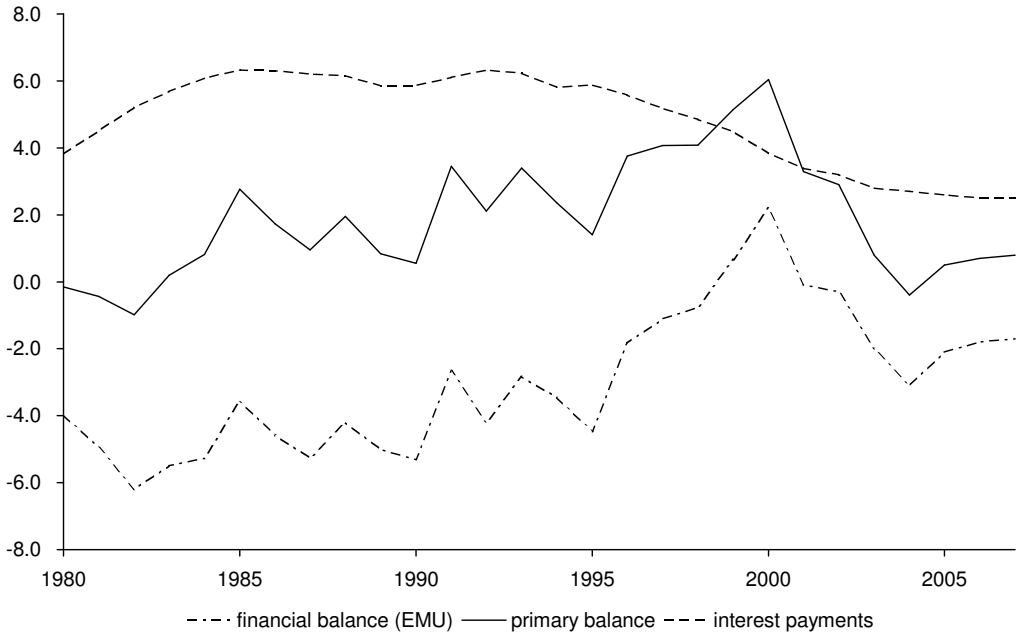
Specifically, since current pension contribution rates temporarily contain an implicit tax, this could provide an argument for the government to be more lenient in its budgetary target in the short run, thereby preventing unnecessary distortion of the labour market. Such a move might also be fair from an intergenerational point of view, as current working generations already have to pay for building up the reserves of pension funds. This alternative of 'tax + premium smoothing' would lower the target for the sustainable primary surplus by ½% of GDP, implying that the sustainable EMU balance in 2011 falls from a little above 3¼% to a little below 3% of GDP. This margin is behind the figure of 3% for sustainable EMU balance in the summary above.

Why is the initial position of the Netherlands not more favourable?

The gap in sustainability arises from the difference between the required level and the actual level of the budget surplus, both measured in structural terms (that is, after correction for cyclical influences). Looking at the actual financial situation, we might conclude that the starting point for the Netherlands is not particularly favourable. Since 2000, the government balance in the Netherlands has shown a marked decline, stronger than in most other European countries. To a large extent, this is due to the cyclical impact of recession (which hit the Netherlands harder than other countries). Another relevant factor, however, is that the available budgetary slack due to the fall in interest payments on public debt was not used for improvement of the budgetary situation. This is illustrated by figure 3. Despite the falling

burden of interest on government debt, both the EMU surplus and the primary surplus have declined since 2000 (the primary balance even more so than the EMU balance).

Figure 3 Balances of the government (% of GDP), The Netherlands, 1980-2006



Doesn't the substantial funded second pension pillar contribute to the sustainability of public finances?

Yes, it certainly does. Since pensions are taxed, the government can expect substantial extra revenues thanks to the pension fund wealth that has been accumulated in the past. Without these pension savings, the required budget surplus for sustainability would have been much higher, and it would have been hard to afford our pensions, which are very high by international standards. This beneficial effect for the government budget concerns the existing stock of wealth of pension funds. The picture is less favourable, however, regarding the flow of new contributions into the pension funds. From an *ex ante* perspective, the pension system is costly to the government through the favourable tax treatment of second-pillar pensions. Although the government gets tax revenues on pension income, it loses more tax revenues through the deductibility of pension premiums at the beginning of a participant's life cycle. The government also loses because pension savings are exempted from capital taxation. The implicit subsidy can be estimated at 40 to 50 cents of every euro saved in the form of pension contributions, in comparison to free savings.

If all countries do the same and start saving for ageing, who is going to absorb the excess of savings?

Ageing is a worldwide phenomenon. If all countries increase their (government) savings, the interest rate will tend to fall. Equilibrium is restored at the point where world investments and savings are again in balance. Also in the Netherlands private savings will fall in reaction to the declining interest rate, thereby reducing the surplus in our current account. What does this imply for government policies? Wouldn't it make a strategy of debt reduction flawed? No: at a lower interest rate, the reduction in debt should be larger rather than smaller. As the return on the provision to the future cost of ageing decreases, the government has to save more if it wants to compensate future generations for the burden of higher expenditures on pensions and health care. Think of the similar problem facing a pension fund: if the return on investments decreases, the pension fund will raise the contribution rates (read: taxes) in order to be able to finance the future cost of pensions.

A low interest rate might be a reason to reconsider other policies, though. The low interest rate should be taken into account in the appraisal of investments, both in the private sector and in the public sector. Investments in education and infrastructure become more attractive, for example, if interest rates are low. Lower interest rates also make pensions more expensive; this could provide a reason to aim at less ambitious pension schemes and to allow for more consumption now. The fall in the interest rate could also be an argument to give more weight to increasing the official retirement age.

1 Introduction

In recent years, the sustainability of public finance has become seriously challenged, threatened by trends such as the ageing of the population. Ageing may particularly diminish the solvency of the public sector if fiscal institutions are left unchanged. To be sure, solvency is manageable: solvency may be easily restored if policymakers are willing to raise taxes or social security contributions, cut back the generosity of social security schemes, or implement reforms that improve the balance between workers and retirees. In practice, however, these conditions appear quite difficult to fulfil. Indeed, while many recognise that sustainability is an issue, comparatively few people are in favour of economic reforms (Boeri *et al.* (2002)).

In 2000, CPB assessed the sustainability of Dutch public finances (Van Ewijk *et al.* (2000)). The EU and OECD carried out similar exercises on an international level (EPC (2001) and Dang *et al.* (2001), respectively). In 2005, it became apparent that the assessment for the Netherlands needed updating. Not only had substantial reforms been introduced, also the international economic environment had changed dramatically. Also the EU and OECD plan to update their earlier studies in due time.

Nature of the ageing problem

The most important reason why ageing jeopardises the sustainability of public finances is that many social security institutions are financed on a PAYG basis. This applies not only to the majority of pension schemes in industrialised countries, but also to health insurance schemes. Although this financing mode is a good thing when it comes to organising solidarity between different generations, it is vulnerable to a significant increase in the number of retirees relative to the number of workers. And this is exactly what occurs with an ageing population.

This problem does not apply only to the Netherlands. All industrialised countries face the same challenge (although to a different extent), since the factors behind the ageing of the population, low fertility rates and an ongoing increase in life expectancies, are international. The PAYG financing mode is international as well, although in this respect, too, there are important differences between countries. Indeed, the relatively modest demographic change expected for the Netherlands and the sizeable amount of pensions that are funded imply that fiscal sustainability is less problematic in the Netherlands than it is in some other EU countries.

Sustainability, economic efficiency and intergenerational equity

An assessment of the sustainability of public finances is actually an exercise in discounting. If government wealth is negative (public assets have lower value than public debt), and current and future primary balances are expected to be negative, then the government obviously has a financial problem. If primary balances are initially positive, however, and are expected to turn negative only after some years, then question whether there is a financial problem ultimately depends on the discount rate that is chosen to weigh future balances against current balances.

Choosing an appropriate discount rate is easier said than done. Future uncertainties are large, there are as many interest rates as financial assets, and risk characteristics differ between assets and time periods. This study chooses one uniform time-invariant discount rate equal to the average market rate of return. This is in line with current international conventions. In addition, this approach avoids the bias in outcomes that occurs when risk premiums are included and not properly accounted for in discount rates.

It is one thing to indicate the size of the financial problem of the public sector; it is quite another to solve the problem. The solution to the problem of achieving fiscal sustainability is far from unique, and a number of approaches will serve to get fiscal policies back into balance. Some measures, for example, generate more revenues (taxes and social security contributions), and some economise on expenditures and focus on more structural economic reforms. Each of these policy changes can be implemented right away or somewhere in the future, in one step or more gradually. This study adopts two criteria to evaluate the different options: tax smoothing (economic efficiency) and Musgrave's criterion (intergenerational equity). Both criteria imply under certain conditions an immediate and permanent policy adjustment. Under less stringent conditions, more gradual policy solutions are also allowed.

A general-equilibrium approach

The previous study on the sustainability of Dutch public finances adopted a generational accounting (GA) approach. This approach allows one to attribute the whole of benefits and costs of the public sector to different cohorts. This study adopts a general-equilibrium model, GAMMA, to address the sustainability question. GAMMA is based on the GA model and can do the same things as the GA model can. The important difference between the two approaches is in the recognition of economic behaviour.

Unlike the GA model, GAMMA recognises that private savings and labour supply are endogenous by deriving the private saving decision and the labour supply decision in an optimizing framework. This is important as now the consistency of consumption and savings can be guaranteed. Accounting for the endogeneity of private savings and labour supply is also important in variants in which changes occur in the interest rate, the wage rate or the tax rate on labour supply. In these variants, the inclusion of economic behaviour may change economic effects, budgetary effects and intergenerational income effects as well. In addition, GAMMA is better able than the GA model to account for changes that may develop only gradually in the future, as for example the expected increase of longevity.

The GAMMA approach brings the sustainability calculations more in line with other (CPB and non-CPB) models in which economic behaviour has long been recognised. Obviously, it may deviate from the GA approach, in particular in those cases in which important changes in economic behaviour may be expected. Here, the GAMMA calculations can be helpful in assessing whether the errors made in using the GA model are really substantial.

Basic assumptions

Any analysis of the future of our economy is compelled to make a great number of assumptions. This is unfortunate, as some assumptions may essentially drive the results, thereby hindering a meaningful assessment of their plausibility. The best course of action seems to be constructing a careful baseline projection, being fully transparent about the assumptions that are made and indicating the robustness of the findings by undertaking a detailed sensitivity analysis.

One major assumption in our assessment of fiscal sustainability concerns the future course of economic policies. Our approach is to base calculations on current policies. The reforms of the disability scheme and the health insurance scheme that have been implemented at the start of 2006 are thus included in the calculations. Policy reforms on which a final decision has not yet been reached are not included. This approach ensures that the assessment of fiscal sustainability will not be based on promises that may appear difficult to realise at a later stage.

Furthermore, public expenditures and revenues are assumed to be fully wage-indexed. Hence, labour productivity growth (and thus wage growth) cannot increase the average tax rate by tax creeping. We make this assumption because we consider tax creeping to be politically unsustainable in the long run. Another type of indexation refers to social security benefits. Again, we assume full indexation, as the alternative of partial indexation, if pursued for a long time, would eventually wipe out social security altogether and would therefore not be politically viable.

Although the logic of our reasoning is clear, it is also vulnerable to easy criticism. This underlines the importance of the sensitivity and policy analysis. It also underscores the importance of a proper interpretation of our calculations. Our calculations are not projections in their usual definition (as, *e.g.,* in Huizinga and Smid (2004)). Rather, our calculations assess the sustainability of present policies in the wage of changing demographics and other exogenous developments that affect the government budget. Although policy neutrality may not be the most realistic assumption, it is probably the best assumption one can make in constructing a benchmark projection with which other projections can be compared.

Basic findings

Compared with the 2000 CPB study ‘Ageing in the Netherlands’, our assessment reports a substantial worsening of fiscal sustainability. This may come as a surprise, since the Dutch government enacted policy reforms in the field of disability pensions and pre-pensions precisely to combat the budgetary effects of an ageing population. The explanation can be found in the huge changes in the international economic environment, which have had a particularly tremendous impact on the open Dutch economy. Indeed, since 2000 stock prices have collapsed worldwide and interest rates have continued to decline. The large equity positions of Dutch pension funds aggravated the impact of the decline in share prices.

On the basis of current information and current policies, our study finds the implicit debt to be large. Total debt, the sum of the net debt (official debt minus financial assets of the government) and this implicit debt, is about twice as large as GDP. This is the size of the gap, in

present value terms, that has to be closed by discretionary measures. The sustainability gap, which is the annuity of the latter figure, equals 2½% of GDP, which is sizeably larger than the 0.7% of GDP in 'Ageing in the Netherlands'. This sustainability gap is a tentative estimate, based on an output gap of 2½% in GDP in 2006. This figure is very uncertain, however. A more robust measure for fiscal sustainability is the primary surplus of the public sector finances in 2011, the last year of the coming government period (2007-2011) that corresponds with sustainable public finances. This 'required primary surplus' amounts to 4.8% of GDP, corresponding to a surplus in the EMU balance of 3.3% in 2011. In case the government accommodates for the implicit tax in second-pillar pension contributions, the sustainable primary surplus decreases to 4.4%, corresponding to a required EMU surplus of 2.9%. Again, it should be noticed that these indicators for sustainability assume that no measures are taken to curb future age-related expenditures.

The economics of ageing

The main source of this sustainability problem is the ageing of the population. The combination of low fertility, ongoing growth in life expectancy and the retirement of the baby-boom generations will lead to a doubling of the ratio of retirees to people of working age. The ageing of the population drives up the expenditure on first-pillar pensions and on health care (both cure and long-term care services) and reduces the base from which this expenditure needs to be financed (the income generated by labour market participation).

This is not the whole story, however. Indeed, not only does public expenditure increase relative to GDP, also the ratio of tax- and social security revenues to GDP increases over time. This reflects, first, that national consumption grows relative to national output, and that consumption is a major part of the base for indirect taxation. Second, it relates to the consumption principle that is used in the Netherlands to tax second-pillar pensions: tax pension benefits, but not pension premiums. The ageing of the population, reflected in a steep increase of pension benefits, thus also boosts the revenues from income taxation.

The increase of revenues from taxes and social security contributions cancels against the increase of expenditure on public pensions; both amount 4%-points of GDP in the 2006-2040 period. Health care expenditure increases also with about 4%-points of GDP, however. Hence, given that current budgetary policies are left unchanged, primary deficits will arise, increasing debt and deficit levels to higher and higher levels. In other words, solvency of the public sector is a real problem under current budgetary policies.

One should not draw the conclusion from this analysis that ageing is a problem solely for the public sector, without macroeconomic repercussions. Indeed, we could say that ageing is a macroeconomic problem, reflected in fiscal balances. Ageing reduces the rate of growth of national output per capita, for it reduces the population fraction that participates on the labour market. The set-up of unchanged fiscal policies implies that these macroeconomic developments are reflected in the fiscal balances, not in the balances of the private sector. It is a real possibility that a public sector that is permanently facing budgetary problems goes hand-in-

hand with quite prosperous future economic development. Indeed, this discord characterises our baseline projection and most of our sensitivity variants. Obviously, this puts our findings into perspective. To restore fiscal sustainability, society has to relinquish some of its consumption possibilities. Indeed, the average rate of growth of consumption per capita drops from 1.8 to 1.6 percent a year in the period 2006-2040 on account of the financing of the sustainability gap. Consumption per capita will thus keep growing, albeit somewhat more slowly than in a world with a stable population structure.

Comparison with the previous study

What is the reason for the fact that we now assess ageing much more to be a sustainability problem than we did six years ago? Indeed, our assessment of the size of the sustainability problem worsened from a required primary surplus of 2.9% of GDP to 4.8% of GDP, an increase of no less than 1.9%-points. Actually, there is not one reason, there are several. The most important ones are the interest rate assumed for the future and the adoption of a new methodology to cope with risk premiums.

Due to the falling interest rates also the expected return on private savings and pension fund savings has decreased substantially. The long-term interest rate has shown a steady decline, falling from about 5½% in 2000 to about 3½% in the beginning of 2006. In addition economists are less optimistic nowadays on the return on equities, which also affects the return of pension funds. Therefore, whereas the previous study assumed a rate of return of 5¾% for pension funds the present study assumes the return to be 3% in real terms. The 3% return can be motivated by a real (long-term) interest rate of 1½%, an equity premium of 3% on top of the long-term interest rate and a 50-50 mix of bonds and equities. Measured relative to the short-term interest rate rather than the long-term rate this corresponds to an equity premium of 4 to 5%. Due to the enormous size of the second pension pillar in the Netherlands this fall in return has a large impact on the government budget. Lower returns imply that pension contribution rates have to be raised, which worsens sustainability of government finances directly as pension contributions are deductible for taxation. In addition, higher contribution rates burdens the government budget through the implicit subsidy on second pillar pensions, which amounts some 40% to 50% of each euro paid on pension contributions.

The decline in interest rates also leads to a lower discount rate for the government. This study uses a discount rate of 3% in real terms, which is one percentage-point lower than previous study which used as discount rate 4%. This is a fairly modest adjustment which is due to the fact that the discount rate for the government is now assumed to be equal to the average market rate of return. This is appropriate because the size of future revenues and expenditures is uncertain and related to aggregate economic risk. Moreover, by using a return equal to discount rate one avoids that risk premiums are treated in an asymmetric manner. In this respect the present study improves upon the previous study which used a low discount rate for the government relative to the return in the private sector, including pension funds. This methodology of using a uniform discount rate equal to the rate of return is now adopted

worldwide, but not in our previous study.[1] Together the net effect of the lower in rate of return and discount rate account for an increase of the sustainability problem of 3.3% of GDP. That is more than the total change of 1.9%. Obviously, other factors must have had a net beneficial effect on sustainability.

Three other factors make up for the difference between this figure of 3.3% of GDP and the total change of 1.9% of GDP. The first is the reforms of disability schemes that occurred during the last few years. They imply both lower expenditure and higher labour market participation, thereby reducing the sustainability problem with 3.0% of GDP. Secondly, the introduction of a new basic health insurance scheme has increased the sustainability problem with about 0.5% of GDP. The rise in health care expenditure that is due to ageing now applies to all insured. Partly, one could call this a labelling effect as the health care expenditure of the formerly privately insured who were 65 and older were included in private sector schemes before and in public sector schemes after the reform of health insurance. For another part, the inclusion of the formerly privately insured into the new health insurance scheme implies a genuine increase in solidarity, which is reflected in a more severe sustainability problem.

Thirdly, labour market participation of females is now expected to develop less favourably than six years ago. This worsens the sustainability problem with 1.2% of GDP. One reason is that recent research has shown that part of the steep increase in female labour participation has been cyclical rather than permanent. Another reason is that we no longer expect female participation to climb to Scandinavian levels if no further policies are implemented that foster female labour participation.

Uncertainties

As usual, we should stress that these figures are surrounded with sizeable uncertainty. This applies particularly in this case, in which the task is to assess developments that will unfold in a period of several decades. We have therefore undertaken a detailed sensitivity analysis that assesses the robustness of our findings from different angles. Specifically, we have explored the robustness of our findings for changes in the international macroeconomic environment (rates of return and labour productivity growth), demographic developments (life expectancy and fertility), labour market trends (labour market participation of persons aged 55-64 and women), policies of pension funds (unconditional indexation of pensions) and trends on health care markets (demand for medical services). Taken separately, the analysis of changes in any of these variables indicates their impact upon fiscal sustainability. Combined, these calculations form a bandwidth around the figure of 2.6% of GDP, which indicates the robustness of this figure.

The bandwidth for the sustainability gap reflects that the future is very uncertain. A negative deviation of 1.7%-points is a real possibility; on the upward side, even a deviation of 2.5%-

[1] If we would have applied this methodology in our previous study, we should have chosen a higher discount rate for the government, equal to the market rate of return of 5¾%. This would have implied a slightly more optimistic assessment of sustainability.

points is plausible. This results in a bandwidth of (0.9, 5.1) for the sustainability gap. The corresponding bandwidth for the primary surplus is also large albeit somewhat smaller than that for the sustainability gap: 4.4% to 6.7%. In terms of the EMU balance this corresponds to a range of 2% to 5% of GDP.

Policy variants

An important part of our analysis consists of an overview of approaches that can be followed to restore solvency. One approach is to put into effect an immediate and permanent adjustment of the primary surplus-to-GDP ratio. There are a number of alternative policy options that may deviate from intergenerational equity or tax smoothing but do achieve fiscal sustainability. Consider measures that generate more revenues (taxes and social security contributions); measures that economise on expenditures and more structural economic reforms (*e.g.* increasing the retirement age); those that are implemented right away or somewhere in the future, in one step or more gradually. The differences are economic and generational. Measures that restore sustainability and reinforce the economy may be considered more attractive than policy measures that restore sustainability at the cost of a weaker economic structure. Similarly, measures that distribute the burden of restoring fiscal solvency equally over different generations are often seen as fair. In this sense, they may be considered more attractive than measures that concentrate the burden of adjustment on only a small group of generations.

Taxation has adverse effects on economic activity. If consumption or labour income taxes are used to restore fiscal sustainability, then employment and output drop to lower levels. This effect is absent if the government economises on public consumption. Indeed, raising indirect taxes reduces employment and output, both by 0.8 percent. If the labour income tax is raised, the reduction even amounts to 1.3%. This reflects the fact that labour income taxes are fully targeted at the workforce and thus lead to stronger employment effects than the increase of indirect taxes.

An alternative to policy adjustments that are adopted immediately are policies that retard fiscal adjustment by delaying the once-and-for-all adjustment. The costs of policy reforms will not diminish by delay. Rather, they will increase because delay means that a period in which reforms could have been induced, is left unused. Indeed, a reform of 2.6% of GDP does not suffice if political action is delayed. Should policymakers delay policy adjustment to 2040, the drop in material public consumption increases to a level of 4.0% of GDP. Correspondingly, delaying measures redistributes between generations: current generations are spared and future generations pay more. For example, delaying the implementation of a cut in public expenditure until 2040 reduces lifetime welfare of generations born in 2040 by about 20 000 euros. Obviously, current generations benefit from such a delay. Whether this is also unfair is a political assessment that depends strongly on how one weighs the fact that future generations will be richer than current generations.

Policies of increasing the official retirement age have both economic and intergenerational effects. They increase labour market participation and partially correct for the effects of ageing.

They allow for an increase of public consumption, as tax revenues will increase more favourably. Generations close to retirement lose from the postponement of public pensions. Young and future generations stand to gain from the increase of public consumption.

Structure of the study

This study is structured as follows. Chapter 2 sketches the nature of the ageing problem. It stresses the international nature of increasing longevity and low fertility, and explores the fiscal problems brought about by these demographic trends. It describes some of the policy solutions that countries have chosen to cope with the sustainability problem. It also shows the gradual fall of interest rates that has had a huge impact upon the assessment of sustainability. Chapter 3 develops a conceptual framework. This chapter discusses the concepts of sustainability, tax smoothing and intergenerational equity. It pays due attention to the methodology of a uniform and low discount rate. Chapter 4 sets out the model used for the calculations and the assumptions on important exogenous variables. The model is a bit overqualified when it comes to making future projections, but proves to be extremely useful in the exercises that analyse different policy options. The section on exogenous variables discusses not only the output gap and gas revenues, but also demographic variables, labour market participation developments and policy reforms. Chapter 5 presents the baseline scenario. It shows how the assessment of sustainability of this study relates to the future development of the economy and the budget of the public sector. It also compares the results of this study with those of 'Ageing in the Netherlands', the earlier assessment. Chapter 6 provides a sensitivity analysis that underlines the uncertainties that surround the baseline scenario, thereby considerably qualifying this scenario. It also shows the great importance of the assumptions that are made with respect to longevity and the increase of health care consumption, when compared to other variables. Finally, chapter 7 presents some policy variants. This overview demonstrates that different policy variants may vary considerably in terms of output and employment effects, in the development of medium-term primary balances and in redistribution between generations.

2 Nature of the ageing problem

The Netherlands is not unique in combining low fertility rates with ongoing growth in life expectancy. Indeed, ageing populations can be observed in many countries. Similarly, ageing creates a problem of fiscal sustainability in many other countries as well. It is hardly surprising, therefore, that policy reforms are being discussed or have already been implemented in a number of countries that anticipate the ageing of their populations.

2.1 Introduction

Population ageing is occurring not only in the Netherlands, but also in many other countries around the world. Section 2.2 compares the demographic changes in the Netherlands with those abroad. Section 2.3 highlights the fiscal problems that result from these demographic trends. Finally, section 2.4 discusses policy reforms that are either under discussion or have been implemented already.

2.2 Demographic changes in an international perspective

An often-used indicator for ageing is the elderly dependency ratio: the ratio of the number of people aged 65 and older to the working-age population. This ratio was just shy of 21% in the Netherlands in 2004 (if the working-age population is set at the number of people aged 15-64[2], as is customary in international statistics). This ratio will increase in the coming decades and peak just before 2040, when it is expected to be around 43%. While this key indicator will subsequently decline somewhat (owing to the death of the post-war baby boom generation), the decrease will be limited. The reason is that ageing is mainly due to the lower number of children per female and higher life expectancy; these twin causes of ageing will continue to apply beyond 2040. The elderly dependency ratio will therefore probably still amount to as much as almost 41% in 2050, and subsequently will hover around that level.

Population ageing is currently substantially less pronounced in the Netherlands than it is in many other countries. By way of illustration, the elderly dependency ratio here is distinctly lower than in each of the large European countries in figure 2.1 (Spain, France, Italy, Germany and the UK). Of these four countries, Italy has to contend with the most advanced ageing of the population. The elderly dependency ratio in Italy is some 8.5%-points higher than in the Netherlands. The elderly dependency ratio in the UK is the lowest of the four countries, but still almost 4%-points higher than in the Netherlands. The ratio in the Netherlands is significantly (4%-points) lower than the EU-15 average. Comparison with the EU-25 widens the gap a little

[2] To allow for the average age at which people in the Netherlands commence their working lives, we have chosen the 20-64 year-old age group as the best indicator of the working-age population for the Netherlands. Calculating the elderly dependency ratio by reference to this age group produces a figure of 23% for 2004.

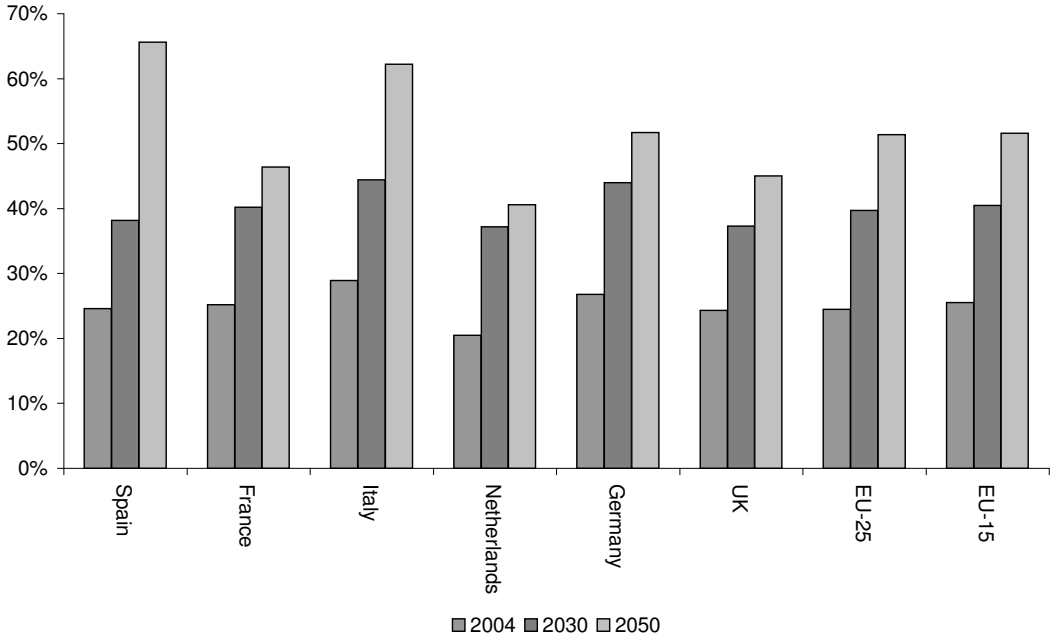
further (5%-points), as ageing of the population in the ten new member states of the European Union is currently slightly more advanced than for the original 15 member states.

The elderly dependency ratio will rise sharply everywhere in Europe in the coming decades. The expected jump for the Netherlands is comparatively limited. As a consequence, this ratio will continue to be substantially lower in the Netherlands than in almost all other European countries in the next few decades. Some countries, including Spain and Italy, will even see the elderly dependency ratio rising beyond 60% in 2050. The ratio in the Netherlands is likely to end up lower than both the EU-15 and the EU-25 figures by some 11%-points in 2050.

The elderly dependency ratio is mainly a function of the average number of children per female and life expectancy at birth. Figures 2.2 and 2.3 reflect the levels of these two determinants for the countries whose elderly dependency ratios are depicted in figure 2.1. They show that the relatively low elderly dependency ratio currently applying for the Netherlands is due to fertility that (within a European perspective) is fairly high and life expectancy that is somewhat depressed. The high fertility rates compared with other countries can be attributed to the relatively high birth rates for immigrant women. One quarter of all children born now have immigrant parents, whereas the share of immigrants in the total population is only 10%. The figures also show why the Dutch elderly dependency ratio is expected to increase to a relatively limited extent in the coming decades. This can be explained by the relatively modest increase in life expectancy at birth that is projected for both males and females in the Netherlands.

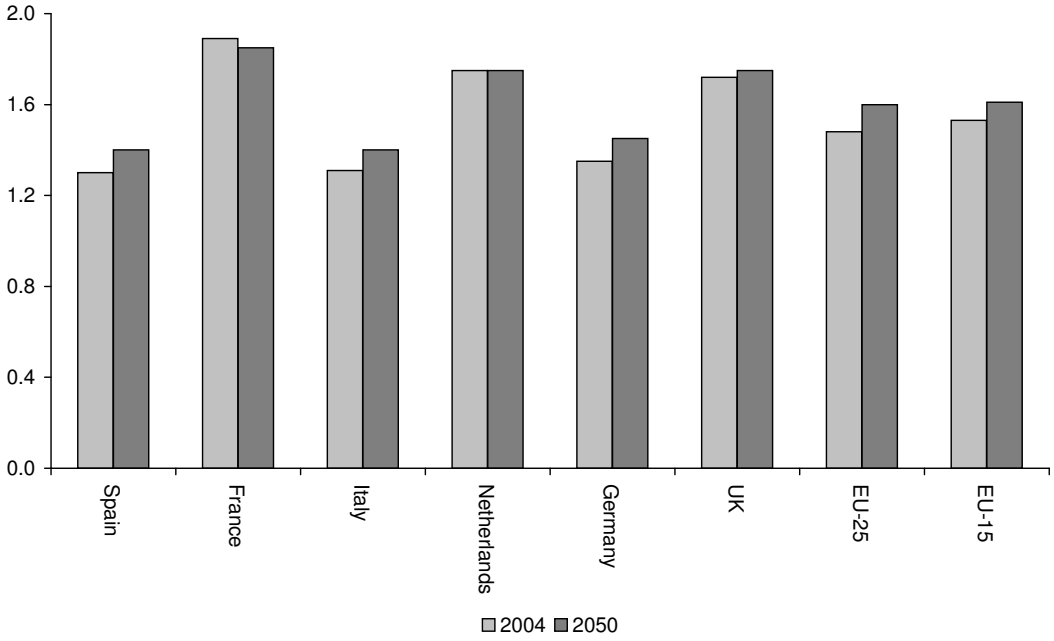
Note that the figures in this section are based on the demographic projections produced by Eurostat, which are used by the Working Group on Ageing Populations in its recent report on the impact of ageing on public finances in the EU countries. The baseline projection of this study is founded on the demographic projection of Statistics Netherlands, which assumes a smaller increase in life expectancy at birth for the Netherlands in the coming decades. According to this baseline projection, the elderly dependency ratio will rise less than the figure projected by Eurostat. The differences are quite large. While Eurostat projects that life expectancy at birth for males and females will increase during the next 45 years by 4.8 and 4.3 years, respectively, Statistics Netherlands projects an increase by only 2.9 and 1.4 years, respectively.

Figure 2.1 Elderly dependency ratio (number of people aged 65 and over as a percentage of the 15-64 year-old group)



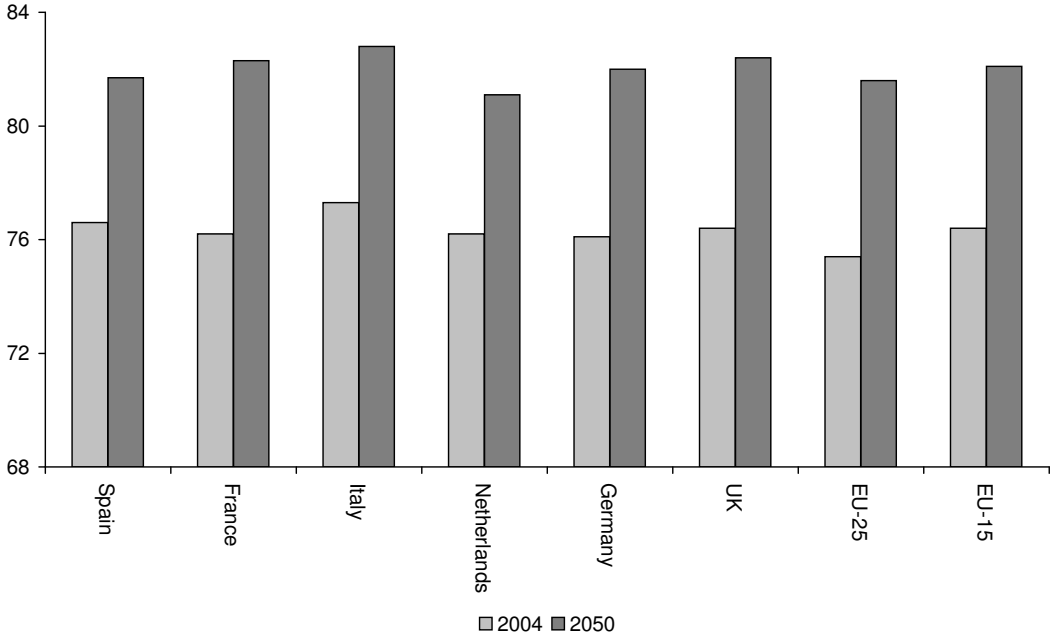
Source: EPC (2006)

Figure 2.2 Number of children per female



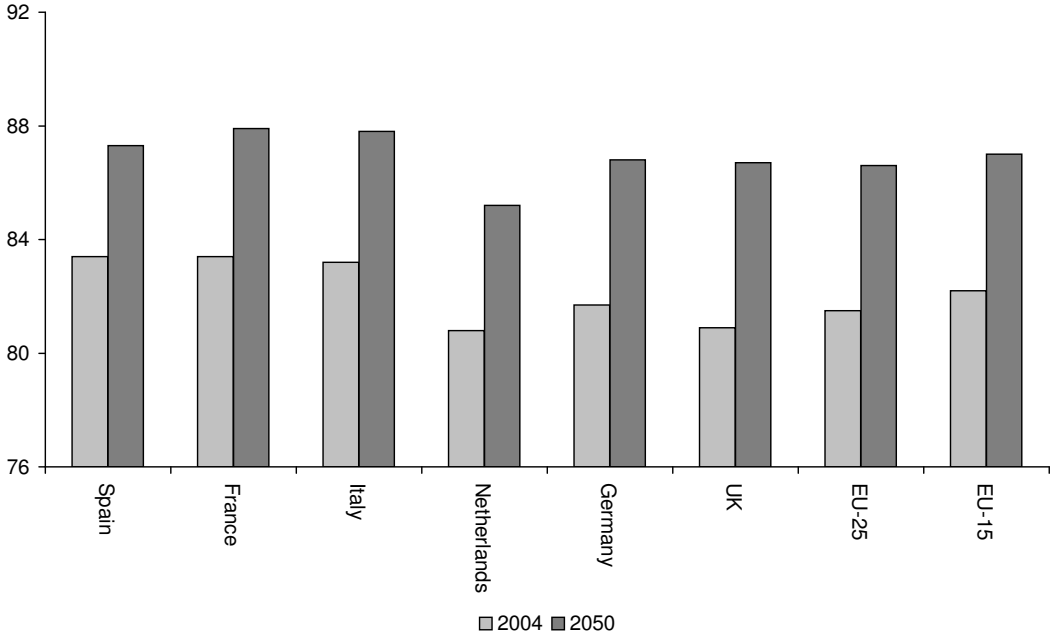
Source: EPC (2006)

Figure 2.3 **Life expectancy at birth for males**



Source: EPC (2006)

Figure 2.4 **Life expectancy at birth for females**



Source: EPC (2006)

2.3 Fiscal sustainability in an international context

The most important reason why population ageing jeopardises the sustainability of public finances is that many social security institutions are financed on a PAYG basis. This applies not only to the majority of pension schemes in industrialised countries, but also to health insurance schemes. Although this financing mode is a good thing when it comes to organising solidarity between different generations, it is vulnerable to a significant increase in the number of retirees relative to the number of workers which is exactly what occurs with an ageing population.

This problem does not apply only to the Netherlands. All industrialised countries face the same challenge (although to a different extent), since the factors behind the ageing of the population, low fertility rates and an ongoing increase in life expectancies, are international. The PAYG financing mode is international as well, although also in this respect there are important differences between countries.

It is therefore that a few years ago, the Economic Policy Committee established the Ageing Working Group (AWG) to examine the consequences of ageing for public finances in the member states of the EU. This working group published age-related expenditure projections in 2001 and 2003. On the basis of this work, an assessment of the long-term sustainability of public finances was integrated into the surveillance of EU member states' budgetary positions. The assessment takes place annually on the basis of Stability and Convergence Programmes.

The reports of the working group and the role they play in European policymaking are an example of the *open method of co-ordination*. This method is an experimental approach to EU governance based on benchmarking national progress towards common European objectives and organised mutual learning. The open method of co-ordination has been applied across a growing range of policy areas, including employment, social inclusion/combating poverty, and pension reform.

In 2001, the AWG published projections of age-related public expenditure projections for the fifteen EU member states. Like the 2000 CPB study, the AWG study focuses primarily on the effects on public finances. The projections covered pensions, health care, long-term care, education and unemployment transfers for the period up to 2050. The analysis demonstrated that ageing is an international trend that may be expected to cause fiscal problems in many countries. In the same period, the OECD published an internationally comparable study (Dang *et al*. (2001)) with similar results.

In 2005, the AWG published a sustainability assessment which provides comparable results across countries (Economic Policy Committee (2005a)). This assessment (not presented here), which uses a number of indicators, shows that the Dutch sustainability position is generally below the average of that of the EU countries. This position seems to be at odds with the relatively favourable demographic development discussed above and the fact that the Dutch pension system features a large privately funded component which will generate huge tax revenues in the future.

There are two causes for this disparity. The first is that the EPC assessment assumes constant tax revenues relative to GDP for all countries and therefore does not include the increase in tax revenues that may be expected from rising pension incomes. As we will see in chapter 5, this factor plays a major role in restricting the costs of ageing for public finances in the Netherlands. The second cause lies in the fact that, in spite of the relatively favourable demographic development, age-related public expenditure shows a far stronger future rise than in other countries. The latter, in turn, is for two reasons.

First, in contrast to many other countries, the Dutch public pension system is not reformed and, moreover, features a linkage of benefit levels to wages in the private sector. Therefore the future rise in the share of public pension expenditure relative to GDP fully reflects the rise of the number of elderly. This is not the case in, for instance, Germany, Italy, France and the United Kingdom. In these countries, of which two (Germany and Italy) even feature a far more severe ageing of the population, the rise of public expenditure on pensions is more modest than in the Netherlands due to reforms that curb the rise of benefit levels (Italy, Germany and France) and the fact that pension benefits are, by arrangement, not linked to private sector wage levels (United Kingdom).

Secondly, the Netherlands spends relatively large amounts on care for the elderly. In other countries, care for the elderly relates more to the private domain. Consequently, ageing of the population leads to a relatively high increase of expenditure in the Dutch case.

Recently, the AWG published updated projections of age-related public expenditure projections for all 25 EU member states (EPC (2006)). The projections cover pensions, health care, long-term care, education and unemployment transfers for the period 2005 to 2050. Basically, this report confirms that ageing requires fiscal policy reforms. Although projections on public expenditure improved for some countries, this does not at all imply that these countries can expect ageing to turn into a demographic trend without budgetary repercussions. The European Commission is expected to prepare a detailed report on the sustainability of public finances later this year.

The OECD is also investigating the sustainability issue again. OECD (2006) focuses on projections for health care and long-term care. Later, the OECD will publish sustainability calculations as well.

2.4 Policy reforms

Perhaps the most direct way for governments to anticipate the financial burden of ageing is to reduce the public debt by cutting down public expenditure or raising taxes. A smaller government debt in the future will create, through lower interest payments, budgetary scope for the higher demographically sensitive public expenditure. Lower interest payments will make it possible for governments to absorb the higher expenditure within the budget without the need to increase the tax burden or trim back collective arrangements. By taking budgetary measures now, the government may prevent the need for such measures in the future. An argument in

favour of such a policy is that future generations will not be burdened by the cost of ageing in a disproportionate manner. If the government anticipates the financial burden of ageing by a budget surplus, this surplus contributes to national savings. These savings result in more scope for consumption in the future, just like savings for funded pension systems.

Governments can also mitigate the consequences of ageing for public finances by modifying collective arrangements in order to achieve greater control of public expenditure. This can be done, for instance, by a reform of the public pension and health care systems. The recent reform of the health care system in the Netherlands is thus targeted not only at a better quality of care provided, but also at better curtailment of the growth in collectively financed expenditures on health care.

Alternatively, governments can consider measures that increase the labour market participation of those younger than 65 years. In this respect, Europe seems to offer policymakers ample scope. In particular, the labour market participation rate of people aged 60-64 years is very low in many countries, since the majority of workers retire at a (much) younger age than the statutory retirement age. In most countries, also the participation rates of women and immigrants are relatively low. A rise in these rates may thus contribute to a higher labour market participation rate of people younger than 65 years. Finally, in several European countries a reduction in the number of social security benefit recipients may also boost the employment rate.

Another way to tackle the ageing problem is to introduce more substantial policy reforms. The consequences of ageing for public finances can partly be attributed to increased longevity in an institutional setting with a given statutory retirement age. When people live longer and the statutory retirement age does not change, fewer workers are available to carry the financial burden of one retired worker. The most straightforward response to this would be an increase in the statutory retirement age. Some countries, among them the US, have already taken steps in this direction (in the US, the financial burden of longevity is shared between younger and older generations). Since the number of healthy years has risen and is expected to increase further, sharing the risk is neither impossible nor unreasonable. It may be imposed gradually, *e.g.* by linking the statutory retirement age to life expectancy. In several European countries, the rise in life expectancy has unleashed a debate on this issue. For example, a committee in the UK chaired by Lord Adair Turner proposed gradually raising the statutory retirement age from 65 to 68 or even 69 between 2020 and 2050. In Germany, the new government has announced its intention to increase the statutory retirement age from 65 to 67 (beginning in 2010 until 2035).

Life expectancy has risen significantly in all European countries in the past decades, and this increase is set to continue in the coming decades. Between now and 2050, life expectancy in the EU-15 member states is anticipated to be extended by an average of six years for males and five years for females. This increase in life expectancy raises the cost of pension systems. Some European countries are attempting to mitigate this effect by linking the level of pension income to life expectancy.

Sweden and Italy introduced 'notional' defined-contribution pension schemes. Under these schemes, pension contributions amount to a fixed percentage of the pension-related salary. Contributions paid during the working life are converted into a fictitious pension capital. This capital is not actually saved, which explains the adjective 'notional'. The level of the annual income from the pension is calculated on the basis of the average remaining life expectancy of the retiree, when he or she retires. Under this system, therefore, an increase in life expectancy automatically reduces the annual pension income.

France intends to link the number of working years that are necessary to receive a full pension to life expectancy from 2008. The official retirement age will not change. People have to work longer, however, to obtain the same pension, or they will have to be content with a lower pension income. Under this approach, a higher life expectancy results in higher contributions and a smaller number of benefit years (if the insured person works longer) or in a lower annual benefit (in the other case).

In Germany, people have to work during 45 years for a full pension. A few years ago, a ceiling was established for the level of contributions as a percentage of wage income (20% until 2020 and 22% for 2020-2030). Once contributions at the maximum contribution rate prove insufficient to finance pensions, the government will take additional measures, which may include a reduction of pension benefits or an increase in the retirement age. The latest German pension reform foresees a significant reduction of future replacement rates (at a given age). From 2005 on, the introduction of the so-called sustainability factor in the pension adjustment formula will automatically slow down annual pension adjustments, including those for new pensioners, due to changes in the ratio of pensioners and contribution payers.

In several EU countries that had a low statutory retirement age in the past, the government raised this age to 65. A few member states are considering the possibility of increasing the statutory retirement age beyond 65 years. Several EU countries have introduced flexible retirement, whereby people retiring at a later age receive higher pension benefits. This financial incentive may result in a higher effective retirement age.

3 Sustainability, economic efficiency and intergenerational equity

Sustainability requires that present policies can be maintained without incurring financial problems in the (distant) future. Sustainability relates to the criterion of tax smoothing for economic efficiency, and the Musgrave criterion for intergenerational equity. For practical budgetary purposes, sustainability can be translated into a target for the structural primary surplus in the medium term. Important parameters are the discount rates that are used to express future revenues and expenditures in present values. In order to account properly for the riskiness of assets and liabilities, this study adopts a uniform discount rate for all actors in the economy. This discount rate is considerably lower than in our 2000 study, which has an important negative effect on sustainability.

3.1 Introduction

This chapter defines the concept of sustainability and discusses how it is measured using long-term projections of the government budget. These projections feature constant tax rates and constant expenditures relative to wages or GDP. Full account is taken of the impact of demographic change. Giving these features the concept of sustainability is closely related to the 'tax smoothing' criterion for economic efficiency and to 'Musgrave's criterion' for intergenerational equity. Attention is given to both aspects.

The chapter also discusses how future government deficits must be weighed against current budgetary deficits. The crucial variable here is the discount rate for future expenditures and revenues. The chapter discusses the choice for a uniform discount rate and the choice for a discount rate that is low, when compared to the 2000 study.

3.2 Long-range projections for the government budget

The projection of the government budget in the future is crucial for the results on the long-term sustainability of government finances. Current policies are considered to be sustainable if they can be maintained in the future without incurring financial problems. The concept of 'constant policies' in the definition of sustainability is rather ambiguous. Does it mean constant tax brackets or constant average tax rates? Does it imply continuation of present indexation rules in social security, or does it assume that all transfers grow in proportion to wages? Should one take account of inflationary biases in fiscal rules?

It is obvious that these questions have different answers, depending on the time horizon of the analysis. In a short-run analysis, it is natural to follow 'formal' fiscal rules. This makes little sense, however, for a long-term analysis. The time horizon of current fiscal policies is far too short to take them as a basis for long-term projections. For example, extending current tax brackets into the long-term future implies that almost all workers would end up in the highest tax bracket purely as a result of income growth. We therefore define, as the most neutral way to

extrapolate current policies, a 'steady growth' scenario of future policies where all relevant age-specific categories of government expenditure grow in proportion to productivity in the private sector. This applies to both transfers and social security benefits, which is a natural assumption, as transfers are linked to wages, and wages grow at the same rate as productivity. On the revenue side we assume a constant (average) tax rate for each distinct tax base.

Long-term budget projections and CPB scenarios

The long-term budget projections in this study are conceptually different from scenarios that can be found in other CPB studies, *e.g.* in 'Four Futures of Europe' (De Mooij and Tang (2003)) and 'Vier vergezichten op Nederland' (Huizinga and Smid (2004)). Scenarios sketch possible alternative 'worlds' featuring consistent sets of exogenous variables and plausible policy reactions, developed for policymakers to provide a background for alternative strategic policy options under uncertainty.

The focus of this study is different, however, as it analyses the stance of current policies, and their consequences for future generations. The projections are therefore 'neutral', in the sense that they ignore possible changes in future preferences. For example, if future generations desire to spend more on culture or health care, and to pay for this by higher future tax rates, this is not regarded as a problem of current budgetary policies. Also, from an intergenerational distribution perspective, there is no reason why current generations should pay for a stronger preference for collectively financed goods by future generations. For this reason, the baseline projection in this study ignores the empirical evidence that the income elasticity of health care consumption exceeds one, for example; in a scenario study on the future of the health care sector in the Netherlands, one would like to include such an effect.

This framework is consistent with a constant relative distribution of income across agents living at a certain point in time. This will be worked out more precisely below, where we will also explain how ageing affects future government expenditure. The projection ignores possible changes in future preferences for, *e.g.* health care services (see the text box 'Long-term budget projections and CPB scenarios').

Age profile of government expenditures and revenues

In order to establish the impact of demographic change on the government budget, this study makes a detailed allocation of all budget items to age groups. This allocation can be summarised in the age profile of net benefits (*i.e.* public expenditures minus taxes paid by each age group). Figure 4.3 shows the age profile of the net benefit from the government budget for the base year 2006. On average, the young and the elderly benefit from the government, while the middle-aged are net contributors. In the original form of generational accounting, as developed by Auerbach *et al.* (1991), this age profile is assumed to remain constant over time, apart from indexation to productivity. The method of generational accounting was extended for the Netherlands (Ter Rele (1998), Bovenberg and Ter Rele (2000)) by taking account of projected changes in the age profiles. These extensions were also used in Van Ewijk *et al.* (2000). The present study involves a further improvement, as the analysis builds on a comprehensive general equilibrium model for the Dutch economy (see section 4.2), which also describes the evolution of tax bases in a consistent manner.

The age profiles are combined with projections for the aggregates of each spending category and tax component in order to determine the fiscal benefits and burden for each age cohort. The generational accounting approach in this study assumes that all government expenditures are assigned to generations although a significant part of expenditures are general, and not age-related. The non age-related expenditures (*e.g.* military expenditures, infrastructure) are distributed evenly over all individuals. Their growth is linked to GDP growth.

3.3 How to measure sustainability?

From a long-term perspective, the primary balance offers a useful parameter for the stance of budgetary policy. The primary surplus measures the excess of tax revenues[3] over primary, *i.e.* non-interest, government expenditures. It differs from the EMU surplus, which equals the primary EMU surplus minus interest paid on public debt.[4] The primary surplus can be interpreted as the net contribution of the private sector to government finances. A positive surplus implies that the private sector pays more in the form of taxes than it 'receives' in the form of expenditures.

Figure 3.1 Primary surplus (% of GDP), baseline projection 2006-2100 without policy adjustment

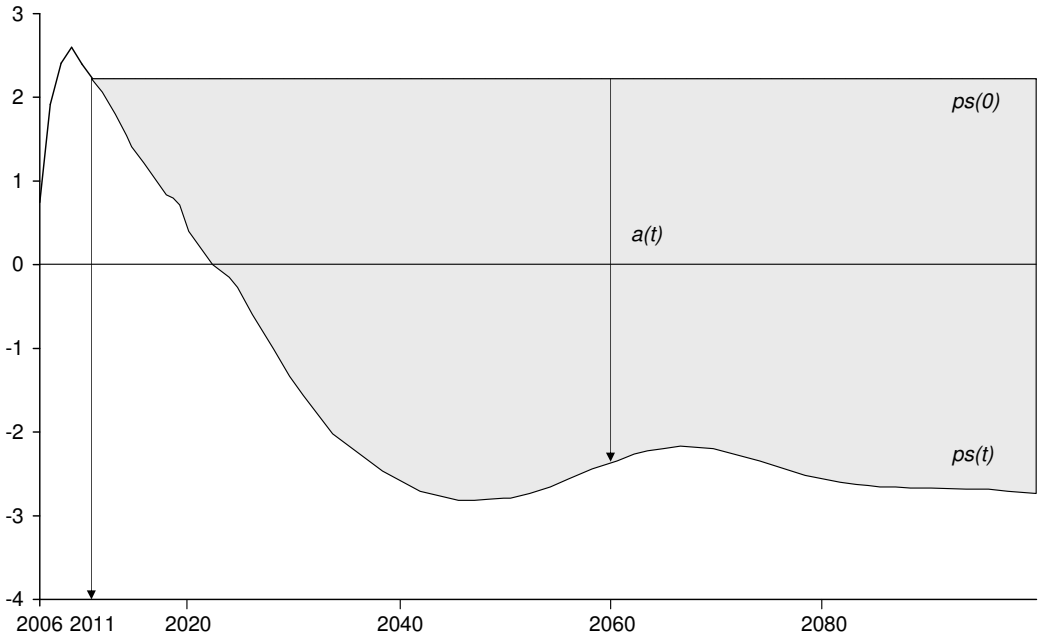


Figure 3.1 presents the evolution of the primary surplus (% GDP) from 2006 to 2100. This figure is based on the time path for the unsustainable case (to be discussed in chapter 5). In this case, no policy measures are taken to close the sustainability gap. The primary surplus is expected to be positive in the near future, when the economy recovers from the recent

[3] In this study, tax revenues and social security contributions are simply referred to as *tax revenues*.

[4] In this study, the term primary balance or surplus is often used rather than primary EMU balance or surplus just for the sake of brevity.

recession, but tends to become negative as ageing erodes the balance between revenues and expenditures. It stabilises at a level of around minus 3% of GDP.

This raises the question of whether or not such a development is sustainable: that is, do the surpluses in the near future outweigh the deficits in the more distant future and the initial public debt *D*? Future surpluses are measured in absolute amounts (euros). This gives the following solvency condition for public finances:

$$V(0) \geq D(0)$$

where *V(0)* denotes the present value of all future primary surpluses (in euros), starting in year t=0. Both $D(0)$ and $V(0)$ are expressed as a ratio to GDP in year t=0. Similarly, we can define the sustainability gap in present-value terms as $D(0) - V(0)$. This is also sometimes called the total debt, reflecting that it is the sum of the official debt of the government and the implicit debt that is due to future deficits. The approach to measure the sustainability gap in present-value terms has been taken by Raffelhueschen (1999a and 1999b) and Gokhale and Raffelhueschen (1999), among others. This study does not use this 'stock' measure of sustainability, however. Rather, the measure is translated into its more intuitive 'flow' counterpart. This done by expressing it in its equivalent perpetual annuity, the sustainability gap *sg*:

$$sg\ (0) = (r - g)\ [D(0) - V(0)], \qquad (3.1)$$

where r is the real discount rate and g the average structural real rate of economic growth. Note that the annuity factor is not r, but $(r - g)$. This is due to the fact that the annuity is defined as a constant fraction of GDP (for details, see the appendix to this chapter). Expressed this way, the gap can be interpreted as the permanent adjustment of the budget (as a constant percentage of GDP) that is required to reach sustainability. In terms of figure 3.1, it amounts to a parallel upward shift of the time path of the primary surplus, such that the solvency condition is met. Clearly, this is not the only way to restore the sustainability condition. Infinitely many changes of the time path of surplus would do, in fact, provided the same change in present-value terms results. The gap merely indicates the size of the sustainability problem, therefore, and does not present a policy prescription.

How to calculate the sustainability gap in practice

From a practical point of view, we determine the sustainability gap by establishing the change of expenditure on material public consumption as a constant percentage of GDP that renders policies sustainable. Material public consumption is defined as public consumption on goods and services provided by the private sector. Consumption of publicly provided goods is excluded from this definition. The required primary budget corresponds to the actual structural

primary budget along the sustainable path. The instrument of government consumption serves purely a technical purpose. Our choice to use this instrument should not be perceived as a recommendation for the direction of policy adjustment. Rather it is based on the consideration that, in our model, a change in the size of this consumption does not lead to behavioural responses (on labour supply or private saving, for example). Chapter 7 explores other policy options that do involve such behavioural feedbacks.

3.4 Towards an indicator for sustainable budgetary policies

A useful alternative measure of the sustainability problem is the required primary surplus *rps*:

$$rps(t) = ps(t) + sg(0) \tag{3.2}$$

where *ps* stands for the structural primary surplus if current fiscal policies are left unadjusted. This merely restates that obtaining sustainability amounts to a parallel upward shift of the time path of the primary surplus in figure 3.1 with size equal to $sg(0)$. In the appendix to this chapter it is derived that *rps* satisfies the following equation, now focusing on the initial year t=0:

$$rps(0) = (r\text{-}g)[D(0)+ A(0)], \tag{3.3}$$

where $A(0)$ measures the present value of $a(t)$, the gap between the primary surplus and the initial (structural) primary surplus in year *t,* which is $a(t) = ps(0) – ps(t)$, $t \geq 0$. Since ageing is the main reason why the primary surplus deteriorates in the future, we will refer to $A(0)$ as the 'burden of ageing'. Graphically, $A(0)$, coincides with the (discounted) surface between the projected surplus $ps(t)$ and a straight horizontal line at the initial level $ps(0)$ in figure 3.1. This is illustrated in figure 3.1, where the year 2011 (when the economy is in its structural equilibrium) is taken as the starting year (t=0).[5]

The year 2011 is taken as a starting point, as the economy is not on a structural path right from the start. In 2006, the Dutch economy has just started to recover from the recession. The actual primary surplus thus falls below the structural surplus. The deviation between the two relates to the *output gap*, which measures the difference between actual GDP and structural GDP. In our baseline scenario we have tentatively assumed an output gap of 2.5%. In closing this gap, the primary surplus will increase by 1.4% (*i.e.* the structural surplus is 1.4% larger than the actual primary surplus, which is estimated to be equal to 0.7% (estimate by September 2005)). Consequently, the implied estimate of the structural primary surplus $ps(0)$ equals 2.2% of GDP. We assume that this gap is closed in four years; in figure 3.1 this is reflected in the increasing surplus in the first few years.

[5] The figure scales the primary surplus to GDP for expositional reasons. When taking the present value of the burden of ageing, one should take account of the growth of GDP.

Output gap and required primary surplus

The size of the output gap, and thereby the actual size of the structural primary surplus, is unfortunately highly uncertain. This uncertainty largely carries over to the sustainability gap *sg*. However, the alternative measure *rps* has the advantage that it is robust to the uncertainty in the output gap. This robustness can be understood from equation (3.3.). The ageing burden reflects the extra burden due to the ageing of the population. Recall that in figure 3.1 this is measured by the area between the *ps*(*t*) curve and the horizontal line at *ps*(0). A change in *ps*(0) shifts both lines up or down, thereby leaving the area between them unaffected. Equation (3.2) shows that the sustainability gap *sg(*0) must depend on *ps*(0) since *rps*(0) does not. This is the main reason why in this study we prefer to present our results in terms of the required structural primary surplus, and not in terms of the sustainability gap (see the Box 'Primary EMU balance and EMU balance'). An even more robust measure would be to define the sustainable structural primary surplus by also excluding revenues from property, like gas revenues, dividends and interest received (see the Box 'An even more robust target for the government balance'). To align with customary policy targets, we also report the 'required EMU surplus' corresponding to the required primary surplus. The required EMU surplus equals the *rps* minus interest payments on public debt. Confronting the target with a more precise projection of the likely development of the government budget until 2011, assuming unchanged policies, leads to the necessary budgetary adjustment for the new cabinet period.[6]

To conclude this section we have to add a drawback of using the required primary surplus as a measure of the sustainability problem, as compared to the sustainability gap. The logic behind the gap *sg* is to calculate the size of the total government debt, both current and future, implicit in current public arrangements. This total debt is largely independent of the way it is distributed over current and future generations. Essentially, this allows for a two-stage approach: we first assess the size of the problem, and then we discuss how the problem can be solved. This is no longer the case with the required primary surplus in a benchmark year (such as 2011) as a measure of the sustainability problem. Indeed, this measure presupposes a given 'neutral' policy with respect to how the sustainability gap is restored.

Indicator for sustainable budgetary policies

The structural required primary surplus provides insight into the sustainability problem upon the condition that sustainability is restored by a once-and-for-all adjustment in the budget. If, alternatively, part of the reform becomes effective only in the future, this will mitigate the required adjustment in the short run. The required primary surplus as determined above should therefore not be directly interpreted as a target for sustainable budgetary policy in the short run. One should also take account of policy measures that curb the future cost of ageing. Denoting

[6] In fact, the measured size of the sustainability gap applies only if it is closed immediately. A delay of the adjustment will increase its size. However, this increase may be considered small if the delay does not extend beyond the duration of a cabinet period (say, four years). This difference is therefore ignored in this subsection, which focuses on medium-term fiscal targets.

the present value of changes in primary deficits that are due to reforms by F, we can modify the sustainable primary surplus as follows:

$$rps(0) = (r\text{-}g)\,[D(0) + A(0) - F(0)] \tag{3.4}$$

Here, F is measured by the present value of the impact of policy reforms on the future time path of the primary surplus relative to the original time path. In terms of figure 3.1, such a reform would be represented by a smaller deterioration in the primary balance relative to the initial primary balance. As such a reform would help to curb the future costs of ageing, it would allow for a smaller required primary surplus in the short term. This will receive further elaboration in chapter 7 of this study, which discusses a number of policy options that reduce the future cost of ageing.

Primary EMU balance or EMU balance?

From a long-term perspective, the primary EMU balance has the advantage over the EMU balance that it is not affected by (short-term) fluctuations in the interest payments on government debt. Moreover, taking the EMU balance as a starting point for budgetary policy would imply that interest payments are treated on equal footing with other government expenditures. This is not warranted, as changes in interest payments have a different impact on sustainability than changes in primary expenditures. In general, a decline in interest payments should be given less weight (from the point of view of sustainability) than a decline in primary expenditures. This follows from the definition of the EMU surplus as the primary surplus (*ps*) minus nominal interest payments (*iD*).

EMU surplus = $ps - iD$

where i is the nominal interest rate. At a given target for the EMU surplus, a fall in debt by one euro would suggest that there is additional budgetary room equal to interest saved on this one euro, which is equal to I (in this study, 3.5 eurocents). However, as can be seen from the result for the sustainable primary surplus (3.3) above, a one-point decrease in debt allows for a reduction in the primary surplus only by the annuity (r-g), which equals 1.3% in the baseline of this study. The rest of the savings on interest payments should be used for improvement of the EMU surplus. So, only 1.3 out of 3.5 eurocents (37%) of the savings on interest payments is available for budgetary expansion if sustainability is to be maintained. The rest (63%) should be kept to improve the EMU surplus.
If interest payments decrease due to a fall in the interest rate, the result is even more dramatic. As will be set out below, a fall in the interest rate – in the Dutch case – tends to worsen the sustainability of public finances from a long-term perspective, while under a target for the EMU balance it may – falsely – be interpreted as an improvement in government finances.

An even more robust target for the government balance

The target for sustainability can even be made more robust than the sustainable structural primary surplus by also excluding the property income received by the Dutch government, *i.e.* the revenues from natural gas and dividends and interest received . This target is more robust for monitoring the sustainability of Dutch government finance, because the actual and expected size of these revenues may show substantial fluctuations which hardly affect the structural position of government finances. This does not only apply to short run fluctuations, *e.g.* in oil prices or interest rates. It also applies to longer run fluctuations in oil prices, because the exhaustion of the natural gas reserves drastically reduces the long run impact of oil prices on Dutch public finances. Furthermore, changes in government revenues which are due to *e.g.* general fluctuations in the rates of return, selling or buying equity and redemption of loans will by their nature be compensated by changes in interest payments. Revenues from natural gas and dividends and interest received for 2011 are projected at 1.3% and 1.2% of GDP respectively. This means that the target figure for a sustainable balance in 2011, defined in this way, is 2.5% of GDP lower than that of the sustainable structural primary surplus (4.8% of GDP) and equals 2.4% of GDP. Note however that using a concept for the government balance that is defined as such entails a departure from common international practice and may therefore lead to some confusion.
Excluding natural gas revenues may seem strange in view of the present Dutch budgetary practice to reserve 40% of the natural gas revenues for funding investments on infrastructure of national importance. This practice suggests that 40% of the fluctuation in natural gas revenues will be compensated by fluctuations in investments in infrastructure. However, provided these investments are mainly decided upon by their social rate of return, the impact of changes in gas revenues on these investments will be small.

3.5 Tax smoothing

On the revenue side, sustainability is measured under the condition of constant tax rates. This assumption corresponds to the principle of 'tax smoothing', which is a well-known criterion for economic efficiency (Barro (1979)). Tax smoothing is efficient, as it minimises the distortionary impact of taxation on economic decisions over time. In formal terms, tax smoothing follows from the convexity of welfare losses associated with the distortionary effect of taxation. If the burden of ageing is shifted to the future, this must be financed by raising tax rates in the future. This leads to higher welfare losses in the future, which are not fully compensated by welfare gains now. Moreover, high future tax rates fail to capture the interest of households and firms that must decide on savings and investment now. Moreover, investments in human capital are discouraged if agents expect tax rates to rise in the future.

In an uncertain world, this constancy of tax rates holds for the expected values. Tax smoothing applies *ex ante*, but not necessarily *ex post*. Whenever new information becomes available, the government should adjust its policy, and revise its tax rates instantaneously to the new, constant, level. As a result, although tax rates are aimed to be constant *ex ante*, they will in general not be constant, and follow a random walk, *ex post*.

As shown by Lucas and Stokey (1983) and Bohn (1990), the variability of tax rates across states of nature could be avoided if the government would hold a portfolio of assets and liabilities that provides a hedge against shocks in the government balance (*e.g.* by issuing indexed bonds). Price-indexed bonds are issued in a number of countries, but not in the Netherlands. In this study we take the choice of debt instruments as given.

Some qualifications are in order with respect to the optimality of tax smoothing. The principle of tax smoothing, while efficient, is not necessarily desirable from a social point of view. The government may be concerned with both efficiency and equity, both within and between generations. The distributional concerns may be a reason to deviate from tax smoothing.

Furthermore, tax smoothing assumes that the marginal distortionary costs of taxation are constant over time. This need not be true in reality. For instance, increasing international mobility of the tax base may lead to rising marginal costs. This may be a reason for a declining path of tax rates. Uncertainty about future tax revenues could also be a reason for tax smoothing no longer to hold in a strict sense, and could provide an argument for extra precaution.

The size of the benefits of tax smoothing is uncertain. Earlier analysis suggests that these benefits of tax smoothing may be limited (Cutler *et al.* (1990)). However, Flodén (2002) finds substantial welfare gains for European countries. This may be due to the fact that the population of European countries ages more rapidly than that of the US, and to the fact that the public sector in European countries is larger on average than its US counterpart.

Tax + premium smoothing

Finally, it could be argued that the smoothing principle should be applied to taxes plus the implied tax rate in pension contributions. The implicit tax measures the difference between the pension contribution and value of the pension rights acquired. This is relevant, as the Netherlands features a sizeable mandatory second-pillar pension system that now faces serious underfunding (in terms of real liabilities). Also, current early retirement schemes ('VUT') still contain some actuarially unfair elements. The alternative of smoothing taxes including the 'pension tax' can also be motivated from the point of view of intergenerational equity. Recovery of pension funds' losses due to the stock market crash entails an extra burden to current generations, either in the form of cuts in (the indexation of) pensions, or in the form of temporarily higher contribution rates. This additional burden could be a reason for temporarily easing the ambition in the government budget. This extension of tax smoothing is analysed as one of the policy options in chapter 7.

3.6 Intergenerational distribution of income

The baseline projection in this study features constant tax rates and constant government expenditures relative to wages or GDP, and allows for the impact of demographic change on the government budget. This baseline can be regarded as 'neutral' with respect to the intergenerational distribution. Since all generations pay the same tax rates, and also have the same benefit from government expenditures relative to their lifetime income,[7] it can be said that the net benefit from the government (relative to their lifetime incomes) is constant for all

[7] The benefit is not exactly constant, due to changes in life expectancy, disability insurance and health care expenditure, as well as some other minor changes.

generations starting from now. This is usually referred to as Musgrave's criterion for intergenerational equity (Musgrave (1986)).

A comprehensive set of generational accounts keeps track of all revenues and expenditures for each generation (by year of birth) during the full life cycle, from birth to death. Generational accounts include contributions to and income received from the second-pillar pension system, as well as the revenues from and payments to the government sector. All government expenditures are allocated to individuals by age group (see section 4.3). By taking the present values over the life cycle, this study determines the net benefit that each generation receives from the government, and from the mandatory pension system. Generational accounts thus provide insight into the distributional effects of government policies.

The analysis takes the initial position of government finances and the pension sector as given. It does not look into the past. How the initial position for the government and the pension sector has been achieved, and which generations contributed to this, fall outside the bounds of this study. This forward-looking character corresponds to the principle of tax smoothing, which also takes the initial position as given.

Sustainability and intergenerational risk sharing

The benchmark for sustainable policies (as implied by the Musgrave criterion for intergenerational equity) is forward looking. It determines a time path for budgetary policy taking the initial situation as given. Shocks in the budget position are thus smoothed over all generations starting from now. For example, if the actual path of government finances deviates from the projected sustainable time path, any new assessment of sustainability will start from the new position. This is relevant when comparing the results of this study with those of our previous study (Van Ewijk *et al.* (2000)). Due to the recession, public debt is now larger than that projected in our previous study. Rather than reverting to the 'old' time path for sustainable government finances, this new budget position is taken as given, and used as the starting point for the new projection. This is in accordance with economic efficiency (see section 3.2), and also contributes to risk sharing between current and future generations. In effect, the negative shock that caused the budget to deteriorate is smoothed over all generations, including future generations.

Musgrave: a relative criterion

It should be noted that Musgrave's criterion is a relative measure. It says nothing about the absolute level of this benefit: it can be positive or negative. A sustainable time path only ensures that, relative to lifetime income, the burden of future generations equals the burden of the youngest living generation. Whether this is positive or negative depends on the financial position of the government and the net contribution of the current (older) generations to the budget during their remaining lifetime. To be more concrete, this study does not conclude that future generations will inherit a net financial burden from current generations. On the contrary, we find that future generations, despite the expected burden of ageing, still will experience a positive net benefit from the government. Their benefit from government expenditure will be greater than their payments through taxes and social security contributions. The exact calculation of the net benefit requires some arbitrary decisions on how to attribute government

expenditures to individuals. But even under alternative assumptions, the result of a positive net benefit seems quite robust.

Another way of explaining this result of a positive net benefit in the baseline is that current and future generations together have inherited positive government wealth (*e.g.* stemming from natural gas revenues) from past generations, which they share in proportion to their lifetime income. How this positive position has been achieved is not analysed in this study.

Two qualifications

According to Musgrave's criterion, all generations share the same net benefit from the government relative to their income. The projections under 'constant fiscal arrangements' in this study satisfy this criterion, but with some qualifications.

First, the net benefit of generations is not exactly constant, as future generations are expected to live longer, and therefore benefit longer from health care and public pensions. On the other hand, general government expenditures that cannot be individualised grow with GDP and therefore stay behind on a per capita basis as the old-age dependency ratio increases. This reduces the net benefit of future generations.

Second, the projections ignore possible changes in the relative price of public goods. If, for example, health care becomes more expensive because of low productivity growth in this sector (Baumol's law), this might affect the welfare of future generations negatively. Also, the increasing mobility of production factors negatively affects the welfare of future generations through increasing the welfare costs of taxation. However, these factors deserve careful analysis before valid conclusions can be drawn. For example, it is not evident that Baumol's law applies, in particular, to the government sector. Also the private sector (in which services are by far the most important sector) may be subject to low productivity growth. Similarly, the consequences of increasing factor mobility are not obvious beforehand, as it might also contribute positively to the welfare of future generations by creating better opportunities for trade and travel. These factors are difficult to assess in the current framework. In order to see the implications of alternative assumptions, the sensitivity analysis in chapter 6 includes a variant on public expenditure growth.

Other criteria for intergenerational equity

Musgrave's criterion of equal relative net benefit from the government is not the only possible interpretation of intergenerational equity. An alternative could be the criterion of not leaving a net burden to future generations (Auerbach (2003)). If this is translated into not leaving a negative net benefit to future generations, this criterion turns out to be more lenient in the case of the Netherlands than Musgrave's criterion, as future generations are expected to get a positive net benefit from the government. It leaves open, however, the question why current generations would fully 'own' the positive inheritance of the past and yet do not share this with future generations.

There is a large literature on intergenerational social welfare functions that offers more advanced schemes for the distribution of income of current and future generations (Arrow (1995)). An important parameter here is the social discount rate by which the utility of future generations is weighed against the utility of current generations. If future generations are richer, this could be an argument for redistribution in favour of current generations. Note that this is not that obvious, since welfare seems to depend more on relative income than on absolute income (Layard (2005)). This study does not attempt to apply more advanced social welfare functions. In the first place, the weight attached to utility of future generations is a matter of political preferences. Second, although the income of future generations is expected to be higher, it is also more uncertain which should be taken into account (see the text box 'Are future generations richer?').

Are future generations richer?

The baseline projection features structural growth of income by 1.7% per year. Future generations are thus expected to be richer than current generations. This growth is uncertain, however. This uncertainty must be given a price when comparing the income of future generations and current generations. Given the observed risk aversion with regard to *e.g.* future dividends, this price could be quite high. A rough indication: this study uses a risk premium for future income of about 1½ to 2% on top of the risk-free interest rate. With this size, the risk premium just happens to compensate for the expected growth of income, which amounts to 1.7%. That is, using this risk premium implies that individuals are more or less indifferent between a set income with no growth, and a growing but uncertain income. The expected growth relative to current income in that case just compensates for the uncertainty. Expressed in certainty equivalents, future income may then not be significantly higher than current income. This risk premium is uncertain, however. Yet, if one chooses a lower risk premium for future income, one should also lower the discount rate for government expenditures and revenues, as they share the same source of risk, namely uncertainty about future income. Thus, arguing that future generations are richer in terms of certainty equivalents indeed implies that also the discount rate for the government budget should be reduced, thereby increasing the sustainability gap and raising the required primary surplus.

3.7 Intergenerational redistribution effects from alternative policies

Different types of policies have different effects on the intergenerational distribution of income.[8] We discuss four examples here:

- Rising health care expenditures
  To the extent that current generations benefit from a higher-than-projected growth in health care expenditures, this will increase their net benefit and enhance the burden for future generations. This effect has to be distinguished from the effect of higher health care expenditures for future generations themselves (for which they can be expected to pay themselves). From the perspective of intergenerational distribution (Musgrave's criterion), a persistent additional

[8] In general, policies that restore fiscal sustainability change the time path of public debt. In theory, if the government has sufficient age-related instruments (taxes, transfers, expenditures), the government could restore sustainability without changing the time path of public debt (Calvo and Obstfeld (1988)). In practice this is not the case, however, so that policies that change the time path of public debt are indispensable for intergenerational redistribution.

growth in health care expenditures requires a steady rise in tax rates over time. To the extent that current generations benefit more from the rising expenditures than they contribute through the rising tax rates, this could be an argument for a more ambitious primary surplus as a starting point. This case will be analysed in chapter 6.

- Cutting pension costs

  The opposite holds for measures to reduce the burden of public pensions (*e.g.* by raising the retirement age), or to increase taxes on second-pillar pensions. Both kinds of measures reduce the net benefit of current generations, and therefore relieve the burden for future generations. To some extent, these measures provide an alternative to debt reduction. This will be worked out in chapter 7.

- Government investment

  Since government investment (*e.g.* in infrastructure) yields revenues over a longer time horizon, it has a different impact on the intergenerational distribution than government consumption. The generational accounts in this study allow for this difference in time profile of revenues between government investment and consumption. From an intergenerational point of view, the long horizon of government investment is an argument for also spreading the financial burden over time, so that not all costs are paid by current generations. To some extent, this corresponds to the idea of the '*golden rule of finance*', according to which government investment can be financed by issuing debt, while government consumption should be financed by taxes. The golden rule of finance, however, is partial in the sense that it only takes account of the benefits and burdens that stem from government investments. It fully neglects the role that debt financing can have in smoothing across generations the effects of shocks that result from other factors, such as ageing. Therefore it is inferior to the framework developed in the context of sustainability.

- Education

  Expenditures on education are targeted to the younger generations. A shift in the budget that increases expenditures on education therefore increases the net benefit of younger (and future) generations at the expense of current older generations. From an intergenerational point of view, this could help to relieve the burden for future generations. This study takes account of only the direct benefits of education. It does not consider the impact on future human capital and productivity. To the extent that the benefits of education consist of higher future wages, it is no longer certain that all benefits can be appropriated by the younger generations. In contrast, since pensions and social security benefits are linked to average wages, also the older generations will – indirectly – benefit from higher education expenditures. The redistributive effect in favour of future generations is therefore smaller than might appear at first sight.

3.8 The discount rate

In order to assess the sustainability of government finances, one must compare government expenditures and revenues at different points in time. This is done by expressing all future flows of revenues and outlays in terms of their 'present value', *i.e.* the discounted value in terms of present money.[9] In this study we use a discount rate of 3% in real terms in the baseline projection, corresponding to a nominal discount rate of 5%. This discount rate of 3% is similar to the rate used by the Ageing Working Group (AWG) of the European Union (EPC (2005b)). The 3% discount rate is higher than the current real rate of interest on government debt, which is between 1% and 2% at the moment of writing this study. The bond yield does not provide the appropriate discount rate for the government, however. The nominal interest rate pertains to cash flows that are nominal and certain. This is generally not the case with future government expenditures and revenues. Note that in this study both expenditures and revenues of the government are related to productivity or GDP. Over a long time horizon, therefore, future budgetary flows are 'risky' (their absolute size depends on the realisation of economic growth). This risk should be accounted for when determining the present value of these flows.

In general, the appropriate discount rate can be interpreted as the sum of the risk-free rate plus a risk premium that is specific to the risk of that income or expenditure flow (see also Van Ewijk and Tang (2004)). This study uses one uniform discount rate that is equal to the rate of return of the average market portfolio. This rate of return applies to both the financial assets of households and the investment portfolio of pension funds. In fact, this uniform rate of return of 3% pertains to all investments in the economy. This 'market rate of return' can be motivated in terms of a risk-free rate of about 1½%, an equity premium of 3%, and a portfolio mix of fifty-fifty in equity and bonds, although other decompositions of the market return would have been possible as well. The text box 'Underpinning the 3% discount rate' provides some background to these figures.

The following highly relevant example may illustrate the importance of choosing the appropriate discount rate for the government budget. As second-pillar pensions are taxed, while pension contributions are exempted, from taxation, the Dutch government has a large implicit tax claim on future pensions. Simply put, some 30 to 50% (the average tax rate on pensions, including indirect taxes) of the returns on assets of Dutch pension funds will, in fact, flow to the government in the form of future taxes. As total wealth of pension funds amounts to almost 140% of GDP, this involves an implicit tax claim in the same order of magnitude as gross public debt, which is 54% of GDP in 2006. Obviously, the value of this tax claim is determined by the tax rate and the current value of pension assets. We should not make the mistake of projecting tax revenues on pensions using a high risky expected return on pension assets, and then calculating the present value of these taxes by discounting the tax revenues at a low 'government' rate (*e.g.* equal to the real interest rate on government bonds). We would then be

[9] In principle, each budget item should be discounted by its own relevant discount rate. This study adopts a uniform discount rate, so that it is allowed to aggregate revenues and expenditures into a single measure as the primary surplus.

neglecting the fact that the higher expected return on pension assets reflects a compensation for the greater riskiness of these returns. The discount rate to be applied to this flow of tax revenues should therefore be identical to the expected return on pension assets. This is also one of the important guidelines that AWG has adopted for the assessment of sustainability.[10]

Underpinning the 3% discount rate

If future government expenditures were certain and fixed in nominal terms, their present value could easily be determined using the current term structure of interest rates. This is in accordance with the principle of 'fair value' or market value. In reality, expenditures are not fixed in nominal terms, and depend on the – uncertain – time path of future economic growth. The same is true for the government revenues. The valuation of these future flows of expenditures and revenues is a complex issue. There is no market where government liabilities and assets are properly priced. It is also difficult to find comparable assets (*e.g.* GDP-indexed bonds) that might provide guidance with regard to their value. One therefore has to rely on theoretical insights on the valuation of assets and liabilities. According to the standard Capital Asset Pricing Model (CAPM), the required rate of return (= discount rate) can be considered as the sum of the risk-free rate and the appropriate risk premium:

discount rate = risk-free rate + risk premium

Usually, the equity premium is measured by the difference between the— ex ante— return on equity and the risk-free interest rate, measured by the real interest rate on short-term government paper. In Europe, the real interest rate has shown a clear downward tendency in the past 15 years. The present nominal short-term rate of just above 2% is sometimes seen as low from the perspective of the past two decades. Such a low rate, however, is less exceptional from a longer-term perspective; most studies find historical averages of between 0 and 2% for the real short-term rate. Recent studies on the natural rate of interest suggest that the interest rate in Europe has come down from about 4% in the 1980s to slightly below 2% in 2004. Studies on the impact of ageing suggest that worldwide abundance of savings relative to labour supply may put world interest rates further under pressure (Turner *et al.* (1998)).

Even larger uncertainty is attached to the second component of the discount rate, *i.e.* the risk premium. There is a large literature on the equity premium, with different results depending on the method used and the time period considered. Recent evidence tends to point to a fairly modest equity premium of around 3% (Jagannathan *et al.* (2001)).

Finally, in order to find the average market rate of return (which is relevant to the cost of capital), one must take account of the average financing mix between equity and bonds of companies. Using a fifty-fifty mix, a real interest rate of 1½%, and an equity premium of 3% may provide an underpinning for the 3% discount rate used in this study. But other combinations of interest rate and equity premium may be possible as well (*e.g.* an interest rate of 1% and an equity premium of 4%). Some may feel that the real rate of return of 3% is on the prudent side for private asset holdings and pension fund investments. Others may argue that this rate is high for discounting future government expenditures and revenues. For the sustainability measure, which is the key issue in this study, the 3% discount rate does not seem to be on the pessimistic (*i.e.* low) side. However, it cannot be sufficiently emphasised that both the size and the valuation of future government liabilities is very uncertain.

[10] See EPC (2005). More specifically, the AWG study argues that the return on pension study assets should not be higher than the discount rate prescribed for the government. In contrast to the present study, the AWG study determines the discount rate without – explicit – reference to the risk premium included in the market return. Rather, it is based on a historical average of the interest rate on government bonds. This difference in motivation for the interest rate has no consequences for the sustainability measure: the assumption on the discount rate is the same. See the Appendix 'Comparison with the AWG study' to chapter 5 for a detailed description of the differences and similarities between this study's framework and that of the AWG.

The assumption of one uniform discount rate and market rate of return throughout this study is helpful in the present analysis, as it avoids difficulties arising from heterogeneity in riskiness of assets that are practically impossible to solve in a generational accounting framework. Allowing for more types of assets would require not only full modelling of the portfolio behaviour of private households, but also the valuation of risk transfers implied in the complex Dutch system of supplementary pensions. The restriction to a uniform rate of return is acceptable, considering the goal of this study (focussing on the long-term sustainability of government finance). From a theoretical perspective, this uniform rate can be motivated from the idea that, in the long run, uncertainty in growth is the fundamental source of the risk for all the key macroeconomic variables relevant to long-range analysis.

Interest on public debt

The fact that we assume a discount rate equal to the average market rate of return does not imply that we also assume that the government actually finances its debt at a rate of 3%. This discount rate is relevant only for the determination of the sustainability gap. For the calculation of the time paths of public debt, interest payments and the budget deficit we use a real interest rate of 1.5%, roughly based on the actual mix of short- and long-term debt issued by the government. In the model underlying these calculations (GAMMA), this way of treating government finance is innocuous, as private sector behaviour does not depend on the actual choice of financial instruments by the government. Moreover, as debt tends to become small relative to GDP in the future, the exact choice of the interest rate on government debt has little impact on the time path of the EMU balance and public debt along the sustainable baseline projection.

Dynamic efficiency

This study uses an interest rate on nominal government debt that is below the structural growth rate of GDP. This might suggest that the condition for dynamic efficiency is violated. In a case of dynamic inefficiency, savings are too high from a welfare point of view, and additional debt finance by the government may lead to a Pareto improvement for all generations. Unfortunately, this is not the case. As argued by Abel *et al.* (1989), it is not the interest rate on government debt but the average market rate of return that is relevant for the condition for dynamic efficiency. What matters is the difference in growth and interest rate after proper adjustment for risk involved. Comparing a risk-free interest rate with an uncertain growth rate is clearly wrong. Taking the appropriate market rate of return, Abel *et al.* find that the condition for dynamic efficiency has always been fulfilled in more than 150 years of US history. Also in this study the market rate of return (3%) exceeds the growth rate ($\cong$ 1,7%), thereby ensuring that the condition for dynamic efficiency is satisfied.

It is true that when making a deterministic projection public debt does not explode, and becomes stable as a percentage of GDP in the very long run if the actual interest rate on government debt is lower than the growth rate. This does not imply, however, that debt can be increased freely without any cost. What matters for sustainability is not the amount of debt as a percentage of GDP, but the value of this future debt in welfare terms (that is, the burden of debt to future generations). It is important to note that nominal debt is costly in welfare terms for

future generations, as it increases the variance in their consumption. If income is uncertain, and a substantial fixed amount has to be paid for debt service, then the residual that is available for consumption becomes highly volatile. As agents are risk-averse, this leads to a loss in welfare. The value of this welfare loss should be taken into account in the value of government debt.

Consequences of low interest rates

Compared to the previous study on the sustainability of public finances (Van Ewijk *et al.* (2000)), this study treats the discount rate differently in two respects. These changes together explain why the results on sustainability are more pessimistic now than in 2000.
First, the discount rate for the government budget is one percentage point lower than in 2000 (namely 3% instead of 4%). This reflects the general fall in interest rates between 2000 and present. The nominal long-term rate of interest came down from 5½% in 2000 to a rate of just above 3½% by the end of 2005.

Second, this study adopts a uniform rate of return across the economy. Thus, also for private households and pension funds the relevant rate of return and discount rate equal 3%. This is much lower than in the previous study, which assumed a return of 5¾% for pension funds and a comparable return for private savings. The prospects on the return of pension funds had to be adjusted after the stock market crash of 2001-2002. Not only have the interest rates come down, but also the estimates on the equity premium are more modest now. The 3% real discount rate can be motivated by a 1 to 1½% real interest rate, a 3% to 4% equity premium and a 50-50 mix of equity and bonds. By using the same discount rate for the government and the private sector, this study complies with the principles as set out by the European Union for the assessment of sustainability.

The crucial role of the discount rate should be kept in mind when interpreting the results of this study. This study follows the international accounting principles as set out by the European Union, which will also be followed by the OECD in a similar worldwide exercise on ageing and sustainability. Consistency in method across countries is of great value, as it contributes to a common accounting framework that can serve as a basis for international comparison and surveillance. Moreover, as described above, the choice of a uniform rate of return and discount rate of 3% fits in well with the analytical framework developed in this chapter.

A common accounting framework does not take away the problem that sustainability can change over time due to changes in interest rates. Changes in interest rates should be seriously accounted for when considering the cost of ageing. The government here essentially faces the same problem as pension funds: how to react to changes in the market value of their assets and liabilities? Also for pension funds these effects can be substantial. Yet, more and more people are convinced that assets and liabilities should be valued using actual market prices, according to the principle of ‘fair value’. Following this same principle of fair value for the government requires that also government assets and liabilities are valued at market prices.

This does not mean that the government should react instantaneously to changes in the value of its assets and liabilities, and the consequential assessment of sustainability. Adjusting the

budget at every instant to new information on sustainability – although prescribed by principle of tax smoothing – may be costly, at least from a political point of view. The problem can be compared to the problem of the captain of a sailing boat upon the moment that the wind turns. Should he immediately change direction and adjust the sails, or should he wait and see if the wind will turn again in its original direction? As it is more costly to redirect the ship one will be more reluctant to react to each change in wind. Returning to the sustainability problem: there are good reasons to reassess the long-run stance of the government's budgetary policy only at low frequency, *e.g.* once every four years parallel to the election cycle. The choice of the appropriate discount rate based on market prices should be an important element in this periodical assessment.

Appendix: Burden of ageing and the primary surplus

This appendix derives equations (3.2) and (3.4) of section 3.3 and discusses the effect of changes in the discount rate and the rate of productivity growth upon the required primary surplus and the sustainability gap. We assume a structural growth path with initial debt $D(0)$ and a projected time path for the structural primary surplus $ps(t)$, for $t \geq 0$. Both $D(0)$ and $ps(.)$ are expressed as a fraction of GDP (denoted by Y). Figure 3.1 in section 3.3 illustrates the time path for $ps(t)$. The rate of GDP growth, g, is assumed here to be constant through time. Figure 5.6 in chapter 5 illustrates the time path of economic growth.

Given a (constant) discount rate r, the present value of future primary surpluses measured in absolute terms in year $t = 0$ equals

$$V(0)Y(0) = \sum_{t=0}^{\infty} (1+r)^{-t}\, ps(t)Y(t)\,, \tag{A.1}$$

where $V(0)$ expresses the same amount as a fraction of $Y(0)$.

Together with initial debt $D(0)$, we obtain the total debt $D(0)$-$V(0)$, which coincides with the 'stock' measure of the 'sustainability gap' as a fraction of GDP. This can be expressed in 'flow' terms by determining the perpetual annuity z again as a (constant) fraction of GDP that yields a present value equal to the total debt. Thus,

$$\sum_{t=0}^{\infty} (1+r)^{-t}\, zY(t) = [D(0) - V(0)]Y(0)\,. \tag{A.2}$$

Note that z represents the sustainability gap in flow terms.

Given our assumption that GDP grows at a constant rate, the left-hand side in (A.2) reduces to

$$\sum_{t=0}^{\infty} (1+r)^{-t}\, zY(t) = zY(0)\sum_{t=0}^{\infty}\left(\frac{1+r}{1+g}\right)^{-t} \approx (r-g)^{-1}\, zY(0)\,,$$

so that we obtain

$$z \approx (r-g)[D(0) - V(0)]\,, \tag{A.3}$$

which is equation (3.2) in section 3.3. In a more general representation with time-varying growth, g can be interpreted as the average rate of growth of GDP.

Turning to the derivation of equation (3.4), we replace $ps(t)$ with $ps(0)$ - $a(t)$, with $a(0) = 0$, and use (A.1) to obtain

$$V(0)Y(0) = \sum_{t=0}^{\infty} (1+r)^{-t}\,[ps(0) - a(t)]Y(t)\,. \tag{A.4}$$

We also define, similarly to (A.1), the present value of future ageing costs $a(t)$ in absolute terms:

$$A(0)Y(0) = \sum_{t=0}^{\infty} (1+r)^{-t} a(t)Y(t) ,$$

where $A(0)$ measures the same amount as a fraction of $Y(0)$. For a constant growth rate g, it reduces to

$$A(0) = \sum_{t=0}^{\infty} \left(\frac{1+r}{1+g} \right)^{-t} a(t) \approx \sum_{t=0}^{\infty} (1+r-g)^{-t} a(t) . \qquad (A.5)$$

Similarly, (A.4) reduces to

$$V(0) \approx (r-g)^{-1} ps(0) - A(0) ,$$

which can be re-written into

$$ps(0) \approx (r-g)[V(0) + A(0)] . \qquad (A.6)$$

Finally, defining the required primary surplus by the sum of the initial surplus and the sustainability gap

$$rps(0) = ps(0) + z ,$$

and substituting for z and $ps(0)$ using (A.3) and (A.5) we obtain equation (3.4) of section (3.3):

$$rps(0) \approx (r-g)[D(0) + A(0)] . \qquad (A.7)$$

Both the sustainability gap z and the required primary surplus $rps(0)$ depend on the annuity term $(r-g)$. Both a lower interest rate and a higher growth rate directly imply a smaller sustainability gap and a lower required primary surplus. There is also an indirect effect, however, which yields opposite effects. A low interest rate (high growth rate) increases the weight of future deficits, leading to a smaller $V(0)$ and a larger $A(0)$, thereby raising the sustainability gap and the required primary surplus. Formally, the effect of the (constant) annuity term $(r-g)$ on the required primary surplus follows from the derivative of (A.7) with respect to $(r-g)$, using (A.5):

$$\frac{d}{d(r-g)} rps(0) \approx D(0) + \sum_{t=0}^{\infty} (1+r-g)^{-t} a(t) - \frac{r-g}{1+r-g} \sum_{t=0}^{\infty} (1+r-g)^{-t} ta(t) . \qquad (A.8)$$

The sign of the derivative depends on the magnitude of $D(0)$ and the time pattern of the ageing costs $a(t)$. For *e.g.*, constant $a(t) = a$; $t \geq 1$, with $a(0) = 0$, equation (A.7) reduces to $rps(0) = a + (r - g)[D(0) - a]$, so that the derivative is simply $D(0) - a$. Then, the sign of the derivative depends on the relative size of $D(0)$ and a. In terms of (A.8), this entails that the last two right-hand-side terms are jointly equal to $-a$. When, instead of being constant, ageing costs increase over time, the second of these two terms increases relative to the first, so that the contribution of the ageing costs to the derivative starts to become more negative. This negative contribution will eventually dominate the effect of a positive $D(0)$, and the derivative turns negative.

Note that this derivative analysis is partial only as it takes as given the time path of primary surpluses. Indeed, primary surpluses are not independent of the size of the annuity term $(r - g)$. For a complete derivative analysis it would be handier to take the shocks in the interest rate and the rate of productivity growth in the sensitivity analysis in chapter 6.

The impact of the discount rate and the rate of productivity growth can also be illustrated by using figure 3.1. First, consider a decrease of the rate of discount *r.* This increases the weight of future periods relative to those nearby. The negative future primary surpluses get more weight, which worsens the sustainability problem. Alternatively, this result can be understood as follows. At a lower interest rate more savings are required to obtain the same provision for future ageing costs. The reasoning is exactly the same as that explaining why a fall of the interest rate deteriorates the financial stance of funded pensions. The case of an increase in the rate of labour productivity growth is similar. A higher rate of labour productivity growth makes both government revenues and government expenditure grow faster. Hence, future primary deficits (in absolute terms) will also grow faster. This worsens the sustainability problem. Indeed, more resources will have to be set apart now in order to meet larger future deficits. As stated above, there is also an opposite effect: for a given debt D (0) and burden of ageing A (0), a higher $(r - g)$ increases the required primary surplus *rps.* In the Netherlands, this opposite effect is much too small too neutralize the effect discussed above.

4 Model and basic assumptions

Our numerical analysis draws on the model that is used, as well as a host of assumptions. The general equilibrium model GAMMA distinguishes different generations and accounts for important aspects of economic behaviour. It ensures consistency from a long-term point of view, and makes it possible to analyse the economic effects and intergenerational consequences of alternative policy options. As GAMMA is based on the generational accounting framework, it also allows for a full generational accounting analysis. Crucial for the outcomes are the assumptions on the future behaviour of the discount rate and the interest rate, trends in demographics, labour market participation and government expenditures. Equally important is the behaviour of pension funds, which has changed recently for a number of reasons. The same holds true, finally, for policy reforms that have been implemented quite recently and that will have effects mainly in the coming years.

4.1 Introduction

The chapter starts with a discussion of the general equilibrium model underlying the analysis, which improves on several aspects the generational accounting model that is usually adopted to assess the sustainability of public finances. Next, it describes the major assumptions underlying the projections of the long-term development of public finances. It incorporates the information that was available in September 2005 and takes account of the future consequences of policy measures that had been decided upon before that date. The calculations exclude measures that are not yet decided on, even if their implementation may be likely in the future. This is necessary if we want to have an assessment of the sustainability of current budgetary policies. The base year for the projection is 2006, the last year for which a short-term forecast is available.

The chapter first discusses GAMMA and second the generational accounting structure of GAMMA. Then, it reviews the assumptions on the age structure of the population and the labour market behaviour of men and women. Finally, it discusses recent reforms of pension fund policies and government policies in the field of disability, early retirement and health care.

4.2 A general equilibrium approach

This study uses an applied general equilibrium model with overlapping generations of households, GAMMA. The model is constructed for analysing long-term issues such as ageing, pension issues and structural policy reforms. The model describes in detail the government sector and the pension sector, and comprises a comprehensive set of generational accounts for all current and future generations. GAMMA goes beyond the traditional generational accounting framework, however, by incorporating economic behaviour of households, firms and pension funds. Households decide on labour supply and private saving, firms decide on demand for labour and capital, and pension funds decide on pension contributions and benefit

levels. Economic behaviour is founded in both the theoretical and the empirical literature, and indeed included in many models (both at CPB and outside). Agents are rational and forward looking, and optimise in a consistent microeconomic framework. GAMMA thus allows for welfare analysis of policy reforms. Furthermore, GAMMA assumes perfect labour and capital markets. GAMMA is therefore not equipped to describe short- and medium-term dynamics.

GAMMA attaches the following features to the Dutch economy. First, the Dutch economy is small relative to the outside world. Domestic policies do not affect the interest rate, which is determined on world capital markets. Second, the goods produced at home are perfect substitutes to those produced abroad: prices are given and terms-of-trade effects are absent. This fits in with the long-term horizon of the model. Third, the model is deterministic. Lifetime uncertainty is recognised, but perfect capital markets enable households to insure against longevity risk.

GAMMA is used throughout this study. Also the baseline projection of chapter 5 is produced by GAMMA, but in a special way: the age profiles and developments through time of labour supply and consumption are based on recent empirical research, and are used to calibrate GAMMA. Using GAMMA for the baseline ensures that the income, consumption and wealth of households are consistent. The behavioural underpinnings in GAMMA are especially relevant to the sensitivity analysis presented in chapter 6 and the policy analysis in chapter 7.

Households

According to life-cycle theory, households rationally choose levels of current and future consumption and labour supply (leisure) on the basis of total wealth. The latter is defined as the sum of financial wealth and human wealth (the discounted value of potential[11] future labour and pension income). The adopted utility function implies that labour supply and its complement, leisure, depend on the marginal reward of labour (the price of leisure) only; leisure does not depend on total wealth. Leisure will be fixed unless its price changes. According to the life-cycle model, households smooth utility of consumption and leisure over their life cycle. Hence, as long as there is no change in the price of leisure, households will smooth consumption of goods. Every household is represented by a finitely lived adult. Longevity risk is assumed to be diversified; each household receives an annuity from a life insurance company in return for bequeathing the company its remaining assets upon decease (Yaari (1965)). The tilt of the consumption path thus depends only on the difference between the interest rate and the rate of time preference.

GAMMA accounts for the fact that consumption profiles over the life cycle are hump-shaped. This can be explained by household composition and age-related preferences. For instance, households with children tend to consume more. Taking account of these types of age effects, the life-cycle model in GAMMA is made consistent with the data (De Ree and Alessie (2006)).

[11] Potential labour income is defined as income with labour time equal to the total available time.

GAMMA distinguishes three important channels through which the government influences household behaviour: the labour income tax, the consumption tax and the capital tax on household savings. As labour supply depends on net wages, taxes on labour income and consumption reduce labour supply. Households also take account of the implicit subsidy or tax in mandatory contributions to supplementary pension schemes. On average, participation in second-pillar pension schemes increases the labour supply. This effect, which is not frequently recognised, is due to the implicit government subsidies in pensions: pensions are taxed at a lower rate than labour income, and pension savings are exempted from the capital tax.[12] As participation in pension funds is mandatory, this pension subsidy acts as a subsidy on labour supply, rather than on pension savings. Third, the capital tax affects savings. Savings outside the mandatory pensions are non-deductible, and subject to a capital tax. The real rate of return declines in case this tax rate increases, which makes saving less attractive. The labour income tax and consumption tax also influence savings, as follows from the life-cycle model.

Firms

Firms are assumed to operate in competitive markets where prices equal world market prices. The cost of capital is given by world market prices and the tax regime. As a corollary, the incidence of taxes is fully shifted to labour. In a small open economy, the wage rate has to accommodate changes in both the cost of capital and the tax rate.

Production takes place with labour and capital according to a CES production function. The productivity of labour is assumed to depend on age. In particular, different age cohorts have dissimilar productivity levels. Apart from their productivity, labour supplied by households of different ages is homogeneous. Labour productivity grows at a given rate in time. Capital adjusts without any delay. Wage accommodation thus takes place without any delay.

Pension funds

The private pension sector (second pillar) has a large influence on the government budget. Pension contributions are deductible, while pensions are taxed. The difference between the tax rate on labour income and pensions implies an implicit subsidy, which stimulates labour market participation. The pension contribution rate can be decomposed into two components: the actuarial contribution rate and a catching-up rate. The actuarial contribution rate finances the accrual of pension rights, while the catching-up premium is used to accommodate shocks in the asset position of a pension fund. Pensions are a certain percentage of average wages earned over the working period; they are indexed to prices and partly to wages, reflecting the situation for the average Dutch pension fund.

[12] See Westerhout *et al.* (2004) for a more comprehensive treatment of this issue.

Parameter values

The most important parameters of GAMMA are summarised in table 4.1. The values of the parameters are based on the evidence produced by national and international research. One of the crucial parameters is the substitution elasticity between leisure and consumption. This has a value of 0.25 and implies that on average the uncompensated wage elasticity of labour supply equals 0.14. Quite recently, CPB completed a meta-analysis on this parameter that was used to update the MIMIC model (Evers *et al*. (2005)). Our value of 0.14 is a little smaller than the corresponding value in the MIMIC model, but corresponds fairly well with the results from the meta-analysis.

GAMMA does not include a wealth effect in its labour supply equation, unlike some other models in the field (Altig *et al.* (2001), Bovenberg and Knaap (2005)). Our approach is supported by international evidence that finds zero or small wealth effects (Lumsdaine and Mitchell (1999)). Sometimes, research reports significant effects for certain income groups. It should be stressed, however, that GAMMA models the labour supply decision on a macro level, for which this evidence is less relevant.

GAMMA's elasticity of intertemporal substitution equals 0.5. Estimates of this elasticity typically vary widely in the range between zero and one. Research by Epstein and Zin (1991), which properly distinguishes between the aversion to risk and the aversion to intertemporal substitution, confirms this result. Our value of 0.5 is well within their range of estimated values.

The rate of time preference takes a value of 1.3%. This is somewhat higher than in Altig *et al.* (2001), and somewhat lower than in Bovenberg and Knaap (2005). Unlike the other parameters discussed above, the rate of time preference cannot be chosen independently, but follows from the requirement that the consumption-wealth ratio (as produced by GAMMA) coincides with national statistics. Finally, an important parameter of the firm model is the elasticity of substitution between labour and capital. Here, GAMMA adopts a value of 0.5, which falls within the range estimated in Broer *et al.* (2000).

Table 4.1 Parameters GAMMA

Rate of labour-augmenting technological progress (%)	1.7
Substitution elasticity labour and capital	0.5
Rate of time preference (%)	1.3
Intertemporal substitution elasticity	0.5
Rate of inflation (%)	2.0
Nominal rate of return on government bonds (%)	3.5
Real discount rate	3.0
Substitution elasticity leisure and consumption	0.25

The model assumes that the value of leisure increases through time. We make this assumption to avoid that continuous labour productivity growth would imply a continuous increase in labour market participation, something that is clearly not observed in the real world. We admit that this assumption is somewhat *ad hoc*; until now, the literature does not seem to have offered better alternatives, however (King *et al.* (1988)).

Finally, the model assumes that agents are rational and forward-looking. They take into account the future consequences of their decisions. In the context of the long-term analysis, this is the only way to ensure consistency in behaviour, from a microeconomic and macroeconomic point of view. It is a prerequisite for meaningful welfare analysis, and yields plausible predictions for behaviour on a macroeconomic level. It should be noted that this framework of rational forward-looking behaviour does not require agents to make long-term decisions every hour of the day. Rather, it assumes that society somehow features correcting mechanisms and guiding institutions that prevent agents from behaving irrationally and non-optimally in a persistent manner.

4.3 Projecting public finances into the future

Expenditures

We distinguish two types of primary government expenditures. The first consists of age-related expenditures, *i.e.* expenditures of which the benefits can be attributed to individual beneficiaries. This category consists of expenditures on social security, health care and education, and totals about 26% of GDP. The second type of expenditure consists of non-age-related expenditures, *i.e.* expenditures that cannot be that easily attributed to individual beneficiaries. This category, which includes expenditure on defence, general government, transfers abroad and subsidies, amounts to around 19% of GDP.

Age-related expenditures

For this category, future expenditures are constructed by assuming that – apart from indexation to productivity in the private sector – age-specific benefits per person from these expenditures remain unchanged. Average public expenditures related to a person of a certain age (*e.g.* a 30- or 70-year old) will thus increase each year at a rate that corresponds to the increase of productivity in the private sector.

There are three exceptions to this. The first concerns disability benefits. To derive the future numbers of beneficiaries, we include the effects of a number of recent measures that aim to curb the inflow into these schemes. Section 4.6 discusses these measures.

The second exception relates to unemployment benefits. In this case we take account of the impact of the business cycle in the first years of the projection (see below).

The third exception concerns health care expenditure. Here, we also follow an extended procedure. In order to account for death-related costs, we decompose the population into a population of survivors and a population of decedents, defined as persons who die within a

year. The age profile of per capita health care expenditure is decomposed into two age profiles: one for per capita health care expenditure of survivors, and another for per capita health care expenditure of decedents (see the box 'Death-related costs in health care expenditure'). Combining demographic projections with these two age profiles yields projections for the development of health care expenditure of survivors and that of decedents through time. Upon aggregation, we obtain the development of health care expenditure through time. Note that this approach is quite similar to the standard approach. It just decomposes an age profile into two other age profiles, and assumes that the latter, rather than the former, are constant.

The baseline projection in this study ignores other influences on health care expenditure. Several publications point out that health care is a luxury good and might therefore have an income elasticity that exceeds unity. Other studies stress the significance of technological progress in health care. We have chosen to treat health care expenditure like other public expenditure items, *i.e.* combine a unitary income elasticity with the ageing effect. Our sensitivity analysis in chapter 6 will explain the effect of an alternative assumption.

Non-age-related expenditures

The second type of expenditure consists of the expenditures that cannot be that easily attributed to individual beneficiaries. For these expenditure items we assume a 'flat' age profile, entailing an equal benefit for each individual. This is obviously an arbitrary assumption, but better alternatives seem to be lacking. The aggregate growth rates of these items are assumed to correspond to the aggregate growth rate of GDP.[13] Per capita benefits then adjust such that aggregate expenditure is proportional with GDP. The rationale for this proportionality on the macro level may be that expenditure on these items is closely linked to the size of production in the economy.[14] Again, this assumption is somewhat arbitrary.

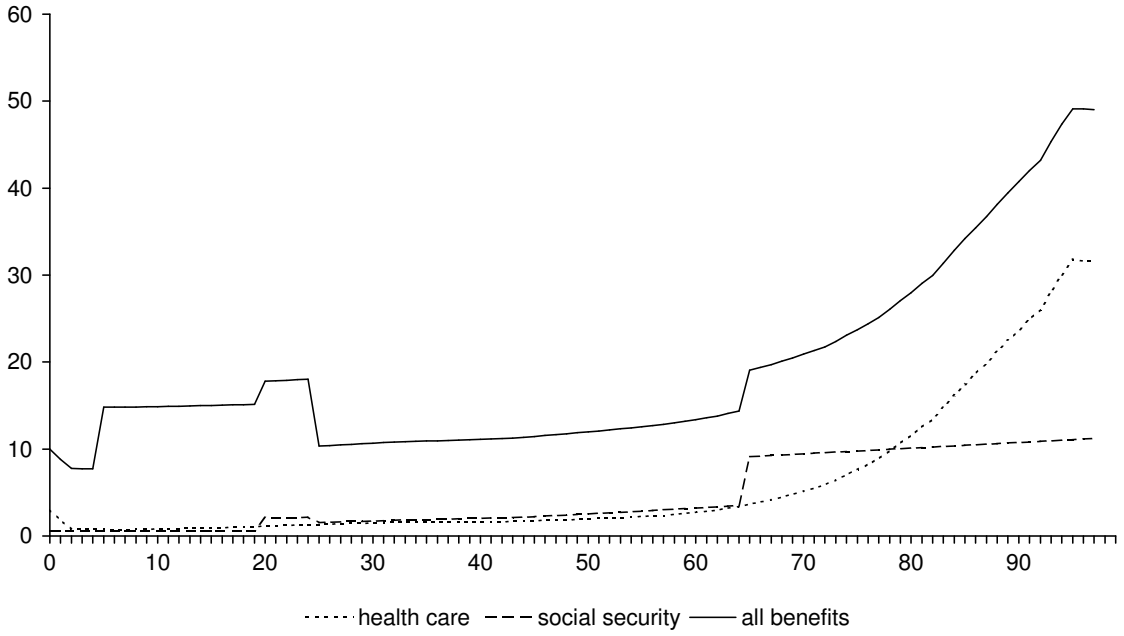
Age profile of benefits

Combining the age profiles of different expenditure types, we achieve the age profile of the aggregate of public sector benefits. Figure 4.1 reveals this age profile of benefits as in 2006. It shows that benefits generally rise with age. The two main components of this rise are social security and health care. Benefits from social security rise with age mainly due to public pensions (AOW), which are paid to citizens over the age of 65, and disability benefits, which increase with age for those younger than 65 years. Health care costs rise with age because of growing costs of illness and of provisions for the elderly. The other benefits include those on education, among others. These are not shown separately.

[13] This assumption is corroborated by a recent study on the historical development of public expenditure in the Netherlands (see Bos (2006)). In the last three or four decades, the total size of these expenditure items turns out to have been roughly constant as a share of GDP.

[14] We use GDP at base prices, rather than GDP at market prices. The reason is that the latter includes the revenues from indirect taxation, which cannot be considered as output.

Figure 4.1 Age profile of benefits (1 000 euro), 2006



Death-related costs in health care expenditure

Important for the decomposition of the age profile of health care expenditure into the age profile for survivors and the age profile for decedents is the age profile for decedents (*i.e.* the age profile of death-related costs). Earlier publications (Van Ewijk *et al.* (2000), Westerhout and Pellikaan (2005)) did not have access to microeconomic data and were forced to make a guess about the appropriate age profile for decedents. Microeconomic data on costs in the last year of life is now available, however, for the Netherlands (Polder and Achterberg (2004)). These data pertain to the year 1999, which is quite recent for the purpose at hand. When the data are disaggregated to cure and long-term care, the cure component is found to decrease with age and the long-term care component to increase with age. This pattern corresponds to what others have found for different countries.

We do not want to use the data in their raw form, however, since they measure costs in only the last year of life. Substantial evidence indicates that death-related costs occur in a time period that is much longer than a year. Therefore, we inflate these figures by a blow-up factor. Note that this implicitly suggests that the ratio between costs in the last year of life and total death-related costs is the same for people of different ages. To get a blow-up factor, we have analysed four papers that presented data on death-related costs: WRR (1997), Seshamani and Gray (2004), Roos *et al.* (1987) and Jones (2002). The values for the blow-up factor that we have calculated are 2.6, 2.2, 2.3 and 2.7, respectively. We take the average of these numbers: 2.45.

Given the age profile of death-related costs, the age profile of survivors follows from calibrating the age profile of total health expenditure (the weighted average of the age profiles of survivors and decedents).

Revenues

Government revenues consist of direct taxes, social security contributions, indirect and other taxes, corporate taxes and revenues from government assets (including natural gas). The model distinguishes direct taxes from various sources (*e.g.* taxes levied on labour income, pension income and private asset holdings). This makes it possible to account for the impact of

underlying economic trends such as the rise of labour market participation and the maturing of the pension system. Apart from the impact of specific trends (see below), the growth of direct taxes and social security contributions[15] is based on the evolution of income and savings during the life cycle of households. Indirect and other taxes[16] are split up into a part related to consumer spending and another part levied on investments. The development of indirect and other taxes is based on the development of household consumption and investment by firms. Similarly, corporate tax revenues relate to the development of corporate profits.

Figure 4.2 Age profile of taxes (1 000 euro), 2006

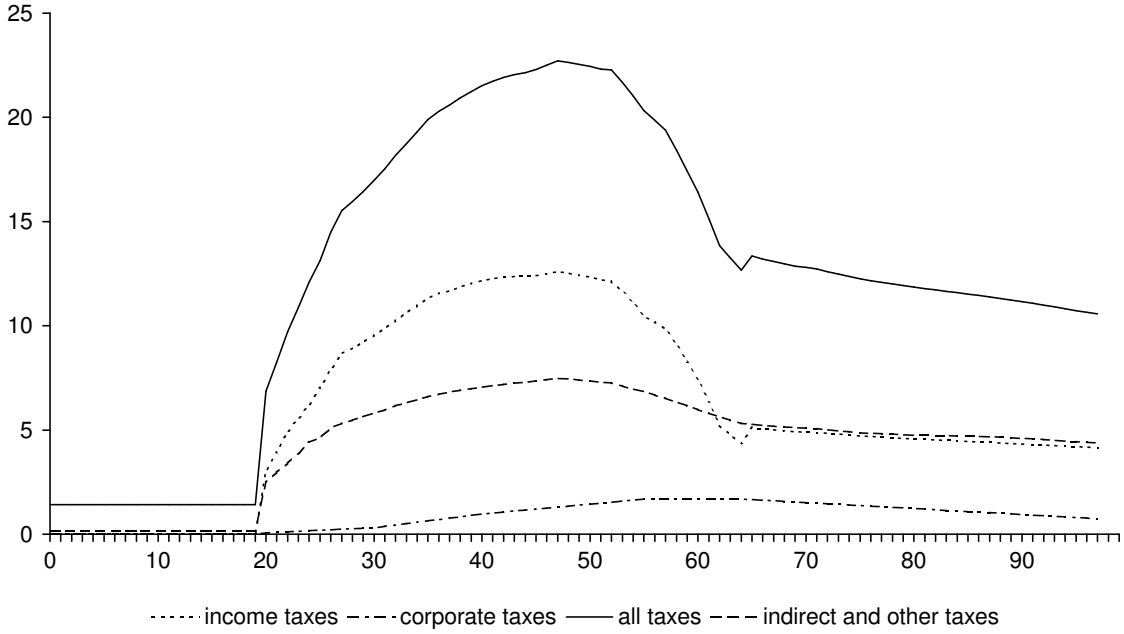


Figure 4.2 shows how the taxes paid vary with age. Until the age of about 50, labour incomes rise with age, explaining the upward slope in the tax profile. Beyond the age of 50, tax payments fall, due to the decreasing participation of the labour force. The declining labour incomes are not fully offset by various forms of pension incomes. Accordingly, income taxes fall with age.

Revenues of the government also include earnings on assets. The holdings of financial assets are assumed to be constant in real terms. This entails that their share in GDP will fall through time. For the part of government assets that yields a nominal return (such as bank deposits and bonds), this implies a need for the purchase of these assets, since its real value would otherwise decline. As the EMU definition of the budget balance does not include expenditure on financial

[15] In the rest of the text, both the employees' and employers' parts of social security contributions are included in the income tax.

[16] Indirect and other taxes consist of the value-added tax, excises, environmental levies, taxes on the purchase and on the ownership of cars, taxes on the transfer of the ownership of houses, taxes on the ownership and occupation of houses, inheritance taxes and a number of taxes yielding small revenues.

asset purchases, this implies that the growth of government debt in nominal terms is slightly larger than is indicated by the deficit according to the EMU definition, or that debt redemption by the government is smaller than the EMU surplus.

Figure 4.3 Age profile of net benefits (1 000 euro), 2006

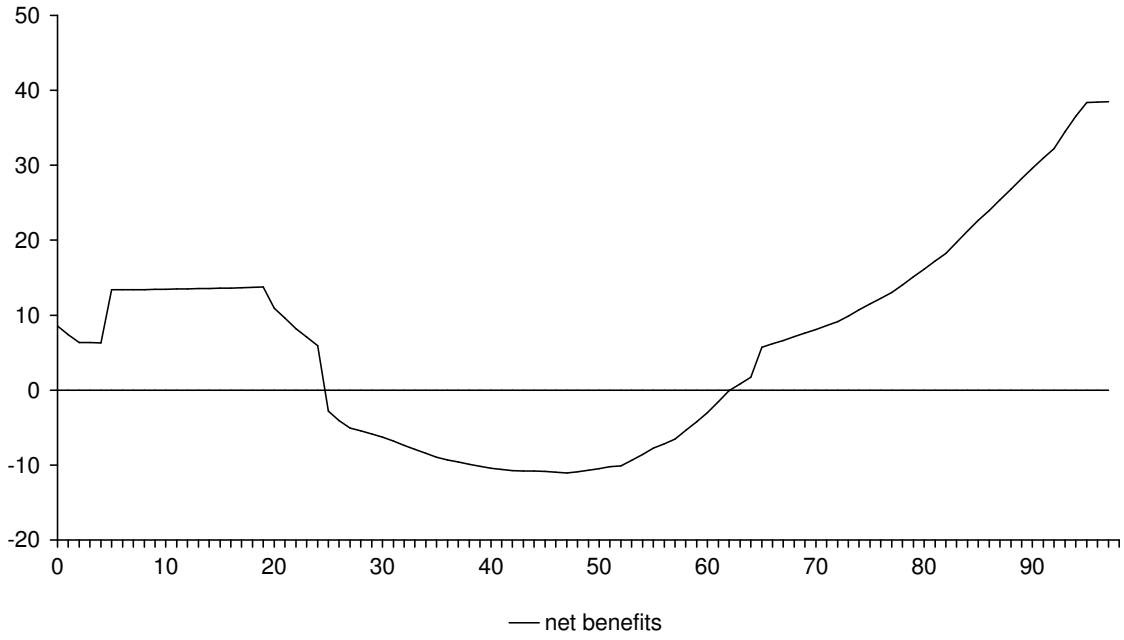


Figure 4.3 combines the expenditure and revenue sides of the budget and shows the age profile of the net benefit from the government, which is defined as benefits minus taxes. It turns out that the young and the elderly are net beneficiaries of the government, whereas the middle-aged are net contributors.

4.4 Demography, labour supply and other inputs

Demography

The baseline demographic projection employs the most recent baseline projection of Statistics Netherlands.[17] This incorporates insights into the development of fertility, mortality rates and immigration patterns. This demographic scenario assumes that the fertility rate is about 1.75 over the whole period, and that net immigration increases from its current negative value of around 2 000 annually to a structural level of 30 000. Mortality rates continue to decrease in the future, especially at older ages. As a result, life expectancy will also increase. Life expectancy at birth will increase from its present level of 76.7 years to 79.6 years for males in the period 2005-2050. Similarly, life expectancy at birth for females will increase from its present level of 81.2 years to 82.6 years in 2050. In the space of 45 years, average life expectancy will thus

[17] For the purpose of this study, Statistics Netherlands extended the time horizon of the baseline projection up to 2100.

increase by a good two years. The gain is concentrated at higher ages: life expectancy at the age of 65 will increase with about 1.5 years.

Table 4.2 provides an overview of the change in the age composition of the population that is brought about by these developments. The elderly dependency ratio, defined as the number of 65+ as a percentage of the 20 to 64-year olds, is projected to rise from 23.4% in 2006 to 43.4% in 2040. After 2040, it stabilises at a more-or-less constant level of around 39%. The total population will grow to just over 17 million in 2040, and after a dip around 2060, will rise further to 17.5 million in 2100.

Table 4.2 Population and its composition in 2006-2100[a]

	2006	2020	2040	2060	2100
	thousands				
Age group					
0-19	3976	3752	3831	3824	3940
20-64	10036	9828	9188	9513	9694
65+	2345	3244	3983	3557	3841
Total	16358	16825	17003	16895	17462
Elderly dependency ratio	23.4%	33.0%	43.4%	37.4%	39.6%

[a] The data apply to the end of the year

Labour market participation

In the last two decades, labour force participation has increased markedly. This trend is expected to continue in years to come, although at a somewhat lower rate. Participation is projected to rise by about 3 to 4%-points. Measured in full-time equivalents, the rise will be less mainly due to a higher incidence of part-time work.[18]

As appears from table 4.3, the principal determinants of future labour force participation are demographic changes and the continuing rise in the participation rate of women. In the third place, policy measures introduced earlier will have an effect on the development of future labour force participation. For the period 2020-2050, only a modest decline is foreseen in the aggregate labour participation rate, of 0.6%-point; behind this decline is a rising share of non-western immigrants, with relatively low participation rates.

The most important demographic change is obviously the ageing of the population. Hence, the rather low participation rate of the elderly will put relatively more weight in the composition of the aggregate participation rate. As can be read from table 4.3, this effect results in a lower participation rate of 1 to 2%-points.

[18] For more background information on the projection for labour force participation, see Euwals and Van Vuuren (2005).

Table 4.3 Decomposition of the change in labour participation (as % of population aged 20 to 64 years)

	2005	2005-2020	2005-2050
Level (in ultimate year)	72.1	75.6	74.9
Demography		– 1.7	– 1.2
Participation men 20-54 years of age		0.7	0.5
Participation men 55-64 years of age		0.5	0.3
Participation women 20-54 years of age		1.5	1.1
Participation women 55-64 years of age		2.5	2.1
Total change (in years)		3.5	2.8

Female participation rates will continue to increase, most notably in the higher age groups. The principal underlying this development is that older cohorts of women with a relatively low participation rate will be replaced by younger cohorts with higher participation rates. Aside from this so-called 'cohort effect', trends of emancipation and individualisation will lead to an increase in female labour force participation. The current projection assumes that female participation rates in the Netherlands will move towards those of Swedish women, such that by 2020 about half of the difference between both countries will have disappeared. The rationale for this partial convergence is that additional policy measures would be needed for further convergence and such policy measures are assumed to be absent in this projection.

It should be noted that the current projection is more conservative with respect to the development of female participation rates than Van Ewijk *et al*. (2000). According to current insights, female participation rates included an important cyclical component during the late 1990s. This so-called 'encouraged worker effect' led to relatively high growth rates in that period. In contrast with the former projection, our study now takes into account this temporary 'encouraged worker effect', so that the projected participation rates are lower and more in accordance with 'structural levels'.[19]

The rising participation rates of men result from earlier reforms in the Disability Insurance (DI) and early retirement schemes. Although these reforms also affect the participation rates of women, this effect is relatively small. The increase in labour market participation rates are also the result of the reforms that aimed to prevent the rise of disability claimants, which was foreseen in earlier projections. Overall, the difference in projected disability claimants as of 2020, between this study and the former study, amounts to 500 000 persons. The DI reforms are assumed to raise the aggregate participation rate by about 4%-points in 2020.[20] Without the reform, the aggregate participation rate would remain stable at 72% until 2020. Therefore, in case the DI reform would not have taken place, the increasing participation rate of women would be offset by the negative demographic effect and the further rise of the number of disability claimants.

[19] A more elaborate discussion is provided in Euwals and Van Vuuren (2005).

[20] Note that the number of 500 000 persons does not directly correspond with the effect on the participation rate of 4%-points, as not every person who would have enrolled into disability insurance will remain in the labour force.

Labour productivity

The annual rate of labour-augmenting technological change (and thus the rate of age-specific labour productivity growth) equals 1.7%. The corresponding rate of aggregate labour productivity growth may deviate from this rate due to demographic factors. Indeed, because productivity is age-dependent (an employee's productivity increases during her years of service until she reaches the age of 53), an increase of the average age of the working population implies that aggregate productivity growth may deviate from the age-specific rate of productivity growth. This effect is in our calculations very modest, however. The productivity growth assumption of 1.7% per year corresponds to the growth rate adopted by the AWG, and falls in the range that is defined implicitly by the four scenarios in Huizinga and Smid (2004).

Finally, growth in macroeconomic labour productivity is affected by the decline in natural gas revenues. This will have a slight negative effect in the coming decades.

Revenues from natural resources

Government revenues from natural gas resources are assumed to decline gradually from their current (2006) level of 8.0 billion euros (1.6% of GDP), based on an oil price of $50 a barrel and an exchange rate of $1.20 per euro, to zero in 2050. The decline results from the depletion of gas reserves. After a small increase in the years up to 2011, the volume of gas production is projected to dwindle. Real oil prices are projected to decline by 46% in dollar terms in a decade ahead, corresponding to a decline of 49% in euros. Afterwards, they are assumed to rise by around 25% in both dollar- and euro terms in the period up to 2050. This directly affects the price of gas.

Interest rate and equity premium

As discussed in the previous chapter, the market rate of return is 3% in real terms. This rate of return, which applies to both households and pension funds, also determines the discount rate for government revenues and expenditures. This rate of return projection is very much in line with Huizinga and Smid (2004). The actual rate on government debt is 1.5% in real terms, however. Finally, the assumed rate of inflation is 2%.

Cyclical impact

Our calculations take 2006 as the base year. This year is not cyclically neutral. In particular, the actual values of GDP and tax revenues are below their structural values and that of unemployment is higher than its structural value. The magnitude of the cyclical component in GDP is very uncertain and not specifically analysed in this study. The calculations assume that the output gap equals – 2.5% of GDP. Then, using a coefficient of 0.55 for the relation between the output gap and its impact on the budget balance, the cyclical impact on the budget balance is estimated at – 1.4% of GDP.[21] A gradual return to structural levels is imputed on both the

[21] Note that CPB uses a weighted average of the output gap in the current and previous year to calculate the cyclical impact. As the output gap is assumed to be – 2.5% in both 2005 and 2006 we arrive at an impact of – 1.4%.

expenditure side (unemployment benefits) and the revenue side (tax revenues) of the budget. The return is assumed to take a period of four years. Hence, a neutral position will be achieved in 2010. Additionally, in order to be in line with present trend-based fiscal policies, we assume that the development of government primary expenditure (other than unemployment benefits) will not be influenced by this cyclical factor.

4.5 Assumptions regarding occupational pensions

Recent developments in the field of pensions

Over the past few years, pension funds incurred a strong deterioration in their coverage ratio. This has led to huge increases in pension contribution rates and ample discussion about the attractiveness of reforming pension schemes. Two developments are particularly relevant when it comes to modelling second-pillar pension schemes in GAMMA: the use of the indexation instrument and the conversion from final pay to average pay.

For most funds, indexation in the past had been only conditional. Because that provision had been rarely invoked, and the conditional nature of the indexation was usually only to be found in the fine print of pension schemes, the pension-fund supervisory authority did not rule out the possibility that pension scheme participants could successfully object in court to a limitation of indexation. The supervisory authority therefore demanded that the conditional nature of indexation should be more clearly communicated to participants. Many funds have meanwhile opted for clearly informing participants of the conditional nature of indexation. This, in combination with undercoverage in the base year of our calculations, makes it likely that the future will feature more indexation cuts.

A few years ago, pension schemes for most participants were final-pay schemes. Nowadays, pension schemes for most participants are average-pay schemes, in which gross pension is linked to average pay over a participant's entire career. A major consequence of moving to the average-pay system is that limiting indexation results not only in lower pensions for retirees but also in lower accrued benefit entitlements for active participants. Pension funds that have adopted an average-pay system can therefore save much more on their benefit obligation by limiting indexation.

The GAMMA pension fund

The occupational pension system in the Netherlands consists of a wide variety of pension funds and pension systems. Our modelling of the system involves some necessary simplification. To project the development of contribution rates, pension payments, assets of pension funds and so forth, we represent the entire system using a model of a single average pension fund. This 'average' pension fund uses the average-pay scheme and aims at a replacement rate of 88% of

average pay after 40 years of service (this includes the surviving relatives' pension).[22] The existence of the flat-rate public pension, the AOW, is taken into account by the pension fund through a franchise. Only workers with a wage above this franchise build up an occupational pension. The recent decline in the franchise in response to the disappearance of early retirement schemes in taken into account.

On the aggregate level, pension contributions are actuarially cost effective. Because building up pension rights is linear, namely 2.2% of the pension wage per year worked, pension contributions are not cost-effective on an individual level. Younger workers pay more than the actuarial value of the additional pension right they receive; older workers pay less.

Most pension funds in the Netherlands aim at wage- or price indexation. This is not guaranteed, however, but is conditional on the financial position of the fund (coverage ratio). Many pension funds have recently introduced more explicit indexation rules, providing *e.g.* no indexation at all if the funding ratio is below a certain lower bound, full indexation if the funding ratio is above an upper bound, and a linear cut in indexation for ratios in-between. Our average pension fund aims at a mixture of wage- (70%) and price indexation (30%), and gives full indexation at a funding ratio of 135% of the nominal liabilities (equivalent to about 95% of the indexed liabilities) or more. No indexation is given if the funding ratio is below 100% of nominal liabilities (70% of indexed liabilities).

In the baseline projection, the pension fund limits indexation up to around 2025. For our average pension fund, the funding ratio (in terms of nominal liabilities) required by the Dutch Central Bank (DNB), which is the supervisory authority, is 130%. Since the funding ratio is currently below the level required by DNB, contribution rates are temporarily above the cost-effective contribution rates. Moreover, indexation to wages or prices is temporarily below full indexation. In the long term, the GAMMA pension fund aims at full funding of the indexed liabilities. Given the interest rate, inflation rate and real wage growth, this implies a funding ratio of about 145% of nominal liabilities.

[22] This is more than the figure of 70% that many people envisage as the replacement rate of their pension schemes. Indeed, when most pension schemes were still final pay schemes, 70% of final pay could be regarded as the norm in those days. The switch from final pay to average pay and, subsequently, the abolishment of early retirement schemes, induced most pension funds to increase annual accrual rates of pension entitlements.

4.6 Social security and health care reforms

The year 2006 features three major reforms. This section briefly describes these reforms and discusses how they affect the projections in this study.

Disability schemes

Important measures have been taken in 2004 and 2006 to reform disability insurance schemes by curbing the inflow into these schemes. The 2004 measures were threefold. The first is the extension from one- to two years of the duration of the period in which employers have to continue to pay the wages of sick employees, although at a reduced rate of 70% of the previous level. The second 2004 measure involves an eligibility restriction, with more rigorous requirements to qualify for these schemes. Not only the new claimants are submitted to the new, sharpened, criteria; the measure also applies to the existing stock of beneficiaries, who must undergo a one-off screening (for those under the age of 50) on the basis of the revised criteria. The third measure taken in 2004 was the abolition of the (separate) public scheme for the self-employed. These people must now resort to private insurers. The 2006 measures distinguish between degrees of disability. For those who are partially and temporarily disabled, incentives have been strengthened to return to the labour market.

Overall, these measures are expected to lead to a substantial reduction in the inflow into disability insurance. Benefit levels are only slightly affected. In the period 2003-2006 and over the next decades, the number of persons that benefit from the schemes is expected to decline by around 300,000 (that is, roughly one-third). Expenditure will reduce correspondingly. As is discussed in section 4.2, the reduced inflow boosts the average labour market participation rate by around 4%-points.

Abolition of early retirement arrangements and the introduction of a life-course arrangement

As from 2006, the favourable tax treatment of the existing early retirement arrangements is abolished. Apart from a provision that those born before 1950 are not affected, and a transitional measure until 2011, both the funded (‘prepensioenregelingen’) and the PAYG part of these arrangements (VUT) have been reformed. In the case of the funded part, the reform implies that savings in this form will in the future be treated in the same way as non-institutionalised private savings. In the case of the PAYG part, contributions are no longer tax deductible. It will still be possible, however, to save in a tax-favoured way for early (before the age of 65) retirement as long as the pension rights are transformed in an actuarially neutral way. A new life-course arrangement has also been introduced. The labour market effects of the two policy measures are considered negligible. Hence, the two reforms thus have little relevance for our calculations.

Health care

The reform in health care involves the introduction of one system of insurance for the entire population. This replaces the previous system of publicly provided insurance for relatively low incomes (up to roughly the average wage level) and private insurance for higher incomes. The new system is fully operated by private insurers. It is, however, included in the classification of the public sector because of its compulsory character. It is mandatory for all inhabitants in the Netherlands, and private insurers are obliged to accept every applicant on terms that do not discriminate between individuals.

Part of the reform is the introduction of an income-dependent subsidy ('zorgtoeslag'). Included in our calculations is the assumption that this subsidy will grow proportionally with GDP.

The introduction of the new system has a substantial effect on the size of publicly provided health care mainly because it will now include the part that was formerly provided privately. These effects are absorbed in the government budget for 2006, the base year for our projection. The higher level in the base year also affects the increase of expenditure after 2006. This results from the projection methodology followed in this study, which uses the base-year age profile of costs to project future developments. Partly, we overestimate the effect from the reform of health insurance. That is due to the fact that our previous study did not recognise the WTZ and MOOZ institutions. Apart from this, the reform implies a genuine increase in solidarity, which has the price of increasing the costs of ageing.

5 A baseline projection

In the baseline projection, current primary surpluses are expected to turn into primary deficits. The major reasons are the ageing of the population and the 'decumulation' of natural gas reserves. Hence, the government faces a debt which dwarfs the official debt. If sustainability is restored by implementing a permanent cut in the ratio of material public consumption to GDP, the primary surplus reaches a value of 4.8% of GDP in 2011. Despite the size of the cut in material public consumption, national consumption per capita continues to increase in the coming decades.

5.1 Introduction

This chapter outlines the baseline scenario of the study. It explicitly demonstrates that the baseline scenario is unsustainable. It also shows how an immediate adjustment of public consumption restores fiscal sustainability. Section 5.2 discusses the sustainability of public finances in general; section 5.3 does the same in more detail. Section 5.4 describes the development of economic aggregates, section 5.5 that of supplementary pensions and section 5.6 the corresponding effects upon generations. Finally, section 5.7 compares the outcomes of our baseline scenario with the outcomes of the previous CPB study on fiscal sustainability.

5.2 The unsustainability of public finances in the baseline projection

Given the inputs that were discussed in the previous chapter, this chapter quantifies how future public deficits will develop if current fiscal rules are left unchanged. We find public finances to be unsustainable. On account of ageing, expenditure on public pensions and health care will increase strongly. Tax revenues will increase as well but not in the same amount. Hence, primary government balances, which are currently in surplus, will gradually reduce and eventually turn into deficits.

Figure 5.2 shows the development of both the EMU balance and the primary EMU balance if current fiscal institutions are left unchanged. Primary EMU balances will turn negative after 2020, EMU balances already before 2015. As the figure demonstrates, EMU balances will not stabilise in terms of GDP. This reflects that in case of unchanged policies, the EMU deficit, public debt and interest payments will increase in interaction.

We estimate the debt of the public sector at 2 times GDP. The annuity value of this amounts to 2.6% of GDP. The corresponding value for the primary surplus in 2011 depends on the measures that are taken to restore sustainability. If material public consumption expenditure is cut in 2006 on a permanent basis, this primary surplus will reach a value of 4.8% of GDP. The corresponding EMU surplus in 2011 will then reach a value of 3.3% of GDP. If taxes are increased more gradually to compensate the high pension contributions in the first few years, the primary surplus reaches a value of only 4.3% of GDP. Chapter 7 presents the effects of some more alternatives to the benchmark of an immediate downsizing of public expenditure.

Figure 5.4 shows the development of primary EMU balances and EMU balances if the cut in material public consumption is used to achieve fiscal sustainability. Both variables are now more positive during the whole period considered. In addition, the explosive nature of the development of the EMU balance is absent now. Indeed, under sustainable policies, both the primary EMU balance and the EMU balance eventually stabilize in terms of GDP.

Corresponding to this scenario of sustainable policies is a time path for public debt. Public debt is reduced to zero in 2020 and continues to reduce beyond that year. In 2040, it reaches a negative value of about 20% of GDP. It may come as a surprise that in order to achieve fiscal sustainability, the public sector should actually aim at accumulating a positive amount of wealth. The reason is that the assumption of unchanged fiscal institutions is made for the whole future. Hence, also in 2040 the government will face primary deficits. These primary deficits will require an increase of tax rates in 2040, thereby deviating from the concepts of tax smoothing and intergenerational equity, unless a sufficient amount of public wealth is accumulated. The interest revenues from this public wealth can then be used to avoid the increase in tax rates in the future.

5.3 Public finances

How will public finances develop if current fiscal policies are maintained? Table 5.1 shows the development of public finances in the baseline projection. The EMU deficit is currently expected to reach 1.7% of GDP in 2006. In subsequent years, the budget deficit will initially decrease without budgetary measures. This decrease is in part due to the fact that the EMU deficit in 2006 is distorted by cyclical factors. The cyclical element in the budget deficit in 2006 is estimated at 1.4% of GDP. This element gradually dwindles to zero in the baseline projection after 2006, as the economy recovers to a situation in 2010 that is neutral in cyclical terms. The EMU deficit also improves in the coming years in the baseline projection because interest payments – as a percentage of GDP – decline at the assumed nominal interest rate of 3.5% on public debt. The government will realise a reduction in interest payments upon refinancing of the repaid government debt.

Table 5.1 Public finances without budgetary measures in the baseline projection

	2006	2011	2020	2040	2060	2100
	% of GDP					
Expenditure						
Social security	12.0	12.4	13.5	15.5	14.5	14.9
Public pensions	4.7	5.3	6.6	8.8	7.8	8.2
Disability benefits	2.0	2.1	1.9	1.6	1.6	1.6
Unemployment benefits	1.2	1.0	1.0	1.0	1.0	1.0
Other benefits	4.1	4.0	4.0	4.1	4.1	4.1
Health care	8.8	9.3	10.3	13.1	12.5	12.6
Education	5.4	5.5	5.4	5.8	5.7	5.8
Other expenditure, excluding interest payments	19.2	18.5	18.4	18.2	18.3	18.3
Primary expenditure	45.3	45.7	47.8	52.5	51.0	51.5
Interest payments	2.5	2.0	1.5	2.5	4.2	7.2
Total	47.8	47.7	49.3	55.0	55.2	58.7
Revenues						
Income tax and social security contributions	21.8	23.1	23.7	25.3	24.9	25.2
of which on pension income	1.8	1.9	2.5	3.6	3.4	3.6
Indirect and other taxation	14.9	15.6	15.9	17.3	16.7	16,8
of which on consumption by population aged 65 and older	1.9	2.2	2.9	4.2	3.6	3.7
Corporate income tax	2.6	2.6	2.5	2.4	2.3	2.3
Natural gas revenues	1.6	1.2	0.8	0.1	0.0	0.0
Other income	5.2	5.3	5.2	4.9	4.7	4.4
Total	46.1	47.9	48.1	50.0	48.6	48.8
EMU balance	– 1.7	0.2	– 1.1	– 5.1	– 6.6	– 9.9
Primary EMU balance	0.7	2.2	0.4	– 2.6	– 2.4	– 2.7
EMU debt[a]	54.4	47.7	41.0	74.5	126.4	213.3
Government total wealth[a]	60.3	64.2	61.0	17.6	– 37.0	– 125.0

[a] Value at the end of the year

The improvement of the EMU deficit puts an end, in the baseline projection, to the increase in the government debt ratio seen in the past few years. The initial accelerated growth of nominal GDP also contributes to this, as the denominator of the government debt ratio increases more swiftly as a result. These favourable developments in terms of government debt and the debt ratio will not last very long in the absence of budgetary measures. Owing to the influence of ageing, the primary EMU balance slowly but surely deteriorates in the baseline projection after 2010. The reason is twofold: the increase in public pensions (AOW) and health care expenditure in the next few decades will outstrip GDP growth, and natural gas revenues will gradually decline. While revenues from tax and social security contributions also increase more strongly than GDP as a result of ageing, this favourable development is not sufficient to offset the comparatively strong increase of demographically sensitive public expenditure and the gradual decline in natural gas revenues.

The period 2006-2040

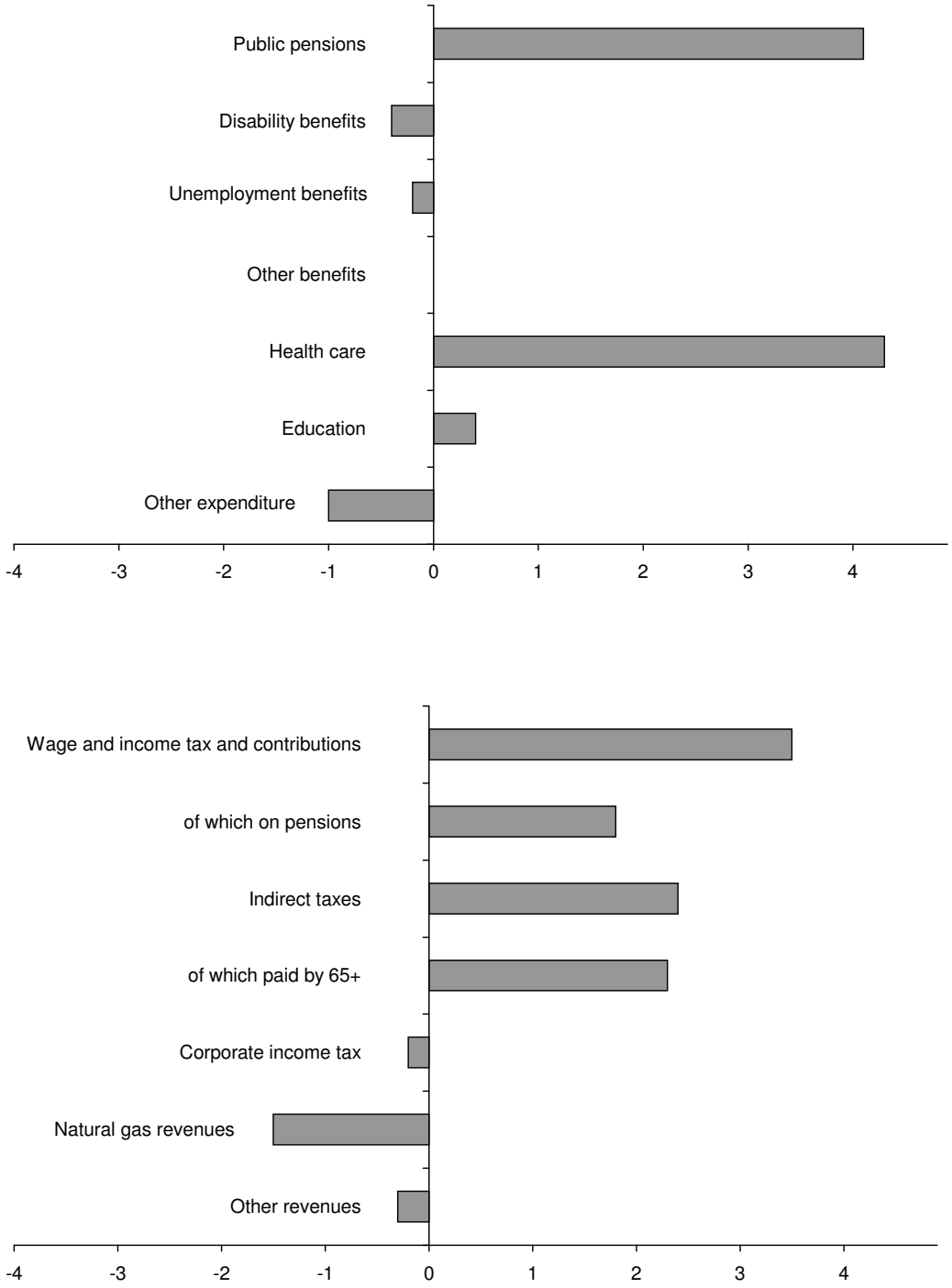
The old-age dependency ratio (*i.e.* the ratio of the number of people aged 65 and older to the working-age population) will peak just before 2040. It is therefore interesting to explore in greater detail how public finances will develop in the period 2006-2040. Figure 5.1 shows the change in public expenditure (excluding interest payments) and public revenues (as a percentage of GDP) for that period.

In the wake of the gradual build-up of the old-age dependency ratio, expenditure on public pensions rises by 4.1%-points. This means that real expenditure on public pensions increases by 3.3% per year on average, outpacing average GDP growth by 1.9%-points. Of the increase in real expenditure on public pensions, 1.6%-points can be accounted for by the increase in the number of persons entitled to public pensions. The remaining portion of the rise in expenditure (1.7%) is equal to the increase in the real public pension benefits. Also health care expenditure rises in the period under consideration, by 4.3%-points. This means that real health care expenditure increases by 2.6% on average per year in this period. Of this, 0.9%-points can be accounted for by demographical developments. The demographical element in the growth of health care expenditure is therefore lower than it is for the increase in public pension expenditure. This can be attributed to the fact that a substantial portion (currently around half) of health care expenditure occurs for persons younger than 65 years. In addition, the projection takes account of the fact that part of health care expenditure is incurred in the period leading up to death. This cushions the effect of ageing on growth of health care expenditure, as costs of health care in the final phase of life do not rise owing to ageing but are only incurred for people who are on average older than was the case in the past. The remaining portion of growth in real health care expenditure is connected to the real wage increase, as it is assumed that real health care expenditure for all age categories will rise in step with this wage increase.

The movements in the shares of the other categories of public expenditure in GDP are, compared with those of public pensions and health care expenditure, modest. The share of expenditure relating to disability benefits in GDP will decline in the period 2006-2040 as a result of the recent modifications of the schemes concerned. Growth in unemployment benefits on the basis of the projected decrease in unemployment also lags behind growth in GDP.

Unemployment in 2006 is higher than equilibrium unemployment, but subsequently declines as the economy recovers, and is equal to equilibrium unemployment as from 2010. The share of the other benefits in GDP remains unchanged. Increases in spending on education, in contrast, will outpace GDP in the next few years. In the baseline projection, the increase in the share of spending on education in GDP occurs after 2020. That increase is connected with an increase in the ratio between the population that would normally be expected to receive education and the working-age population.

Figure 5.1 Primary expenditure and revenues of the public sector (in % of GDP) for the period 2006-2040 without budgetary measures in the baseline projection



The other public expenditure (excluding interest payments) declines by 1.0% of GDP in the period 2006-2040 in the baseline projection. The decline is caused partly by the cyclical recovery that is a feature of the first few years in this projection. Additionally, there are statistics-based reasons for the decline of this share.[23]

Ageing results not only in strong growth in public expenditure but also in a comparatively strong increase in government revenues. The reason is that taxes are paid from pensions, which increase substantially on account of ageing. In the first place, an increase in revenues from income taxes and social security contributions (in % of GDP) can be expected. That is because public pension benefits and supplementary pensions form part of the base for those taxes and some social security contributions. The contribution of the supplementary pensions to the tax base results from the consumption principle. Taxpayers can deduct contributions for supplementary pensions and owe no investment yield tax on the pension capital accrued. The subsequent supplementary pension is taxed, however. Further reasons for this rise in the ratio of revenues from income taxes and social security contributions to GDP lie in the decrease of the non wage share of the economy as a result of declining revenues from gas and the imputation of declining profits which follows from our assumption that profit rates equal 3%. Furthermore, pension contribution rates are projected to fall because these are currently temporarily high in order to restore capitalisation rates of pension funds.

The share in GDP of wages and income tax and social security contributions rises by 3.5%-points in the period 2006-2040. Part of the increase is attributable to pensions (including public pensions). Ageing therefore does not account for the entire increase of the share of wage and income tax in GDP. This increase results, in part, from an increase in the share of the wage sum in GDP, which is 2.5%-points higher in the baseline projection in 2040 than in 2006. What are the reasons for this? First, consider the low real interest rate – as compared to the recent past – applied in the baseline projection. That low real interest rate entails low real costs of capital, as a result of which firms are able to attain normal profitability with a relatively low share of profits in GDP. Real wages can thus increase somewhat relative to labour productivity, which allows the share of the wage sum in GDP to increase in the baseline projection. Second, this share rises, owing to the drop in natural gas revenues. The gradual dwindling of natural gas revenues will cause average labour productivity to decline in coming years. That is yet another factor contributing to the growing share of the wage sum in GDP.

Ageing also entails a comparatively large increase in indirect taxes. This is mainly due to the strong growth of consumption by the population aged 65 and older. Indeed, the share of indirect tax revenues in GDP rises by 2.4%-points in the period 2006-2040, and this increase can be attributed virtually in full to the increase in indirect taxation on consumption by retirees.

[23] In the projection, other public expenditure rises just as fast as GDP at base prices. Accordingly, the share of this expenditure in GDP at market prices declines. That is because GDP growth at market prices will substantially outpace GDP growth at base prices over the next few decades, as revenues from indirect taxation will increase comparatively strongly under the influence of ageing.

Revenues from the corporate income tax increase somewhat less rapidly than GDP in the baseline projection because the share of profits in GDP declines. That decline is the counterpart of the increase of the share of the wage sum in GDP that was mentioned earlier. The reduction in revenues from the corporate income tax is – given its size – of subordinate importance for public finances. The same cannot be said for the gradual fall in natural gas revenues. Natural gas revenues still amount to 1.6% of GDP in 2006, but will gradually decline in the coming decades. Natural gas revenues represent only 0.1% of GDP in 2040.

The impact of the pension system on the base for tax and social security contributions

The table below reflects the influence of pensions on the base for wage and income tax and social security contributions in the baseline projection. The contribution of public pension benefits to that base is equal to 4.7% of GDP in 2006, after which it rises gradually to 8.8% of GDP in 2040. The contribution of supplementary pensions to that base increases from 4.3% of GDP in 2006 to 8.7% of GDP in 2040. The percentage paid to the government in the form of tax- and social security contributions is higher on the supplementary pensions than it is on public pension benefits. The contribution of the supplementary pensions to revenues from tax- and social security contributions is thus substantially larger in both 2006 and 2040 than the contribution from public pensions.

The supplementary pensions also influence the base for tax and social security contributions because taxpayers can deduct these contributions from taxable income. The adverse impact from this on the tax- and social security contribution base in 2040 differs little from the corresponding effect in 2006. Moreover, taxpayers are not liable to pay investment-yield tax on the pension capital available to them. The adverse effect of this on the tax base can be set at 4% (the imputed standard return for the purpose of the investment-yield tax) of pension funds' invested capital. The erosion of the tax base determined in this way amounts to 5.6% of GDP in 2006. This adverse effect on the tax base increases substantially over time, as the capital invested by the pension funds grows faster than GDP. In 2040, the erosion of the tax base amounts to 9.1% of GDP. The effects of the deductibility of pension contributions and not being liable for investment-yield tax on revenues from tax and social security contributions depend in part on the tax rates concerned. Lost tax revenues on the exempt imputed standard capital gains of the pension funds amount to 30% (the tax rate of the investment-yield tax). The effect of the deductibility of pension premiums on revenues from tax- and social security contributions is determined by the average tax rate for deductions.

The effect of the pension system on income taxes and social security contributions, without budgetary measures, in the baseline projection, 2006-2100

	2006	2011	2020	2040	2060	2100
	% of GDP					
Contribution of public pension benefits to tax base	4.7	5.3	6.6	8.8	7.8	8.2
Contribution of supplementary pensions to tax base	4.3	4.6	6.0	8.7	8.1	8.7
Erosion of base through premium deductibility	5.9	6.5	6.9	5.8	6.1	5.9
Erosion of base through exemption from investment yield tax[a]	5.6	6.4	7.8	9.1	9.4	9.9

[a] The erosion of the tax base has been set at 4% of pension funds' capital invested.

In the baseline projection, public sector income increases by 3.9% of GDP on balance in the period 2006-2040. Total public expenditure excluding interest payments, however, rises by 7.2% of GDP in this period. Public sector income therefore increases less strongly than public sector expenditure (excluding interest payments). In other words, the primary EMU balance deteriorates in the period considered. This deterioration causes the government debt ratio to rise again from 2019. That also puts an end to the decline in interest payments. That year sees the start of a process in which the public deficit will rise persistently as a result of continually rising interest payments. This means that the government debt ratio will also rise continually despite the fact that the real interest rate on government debt is lower than economic growth in the baseline projection. The debt ratio rises nonetheless, because the primary EMU deficit (in % of GDP) comparatively quickly exceeds the difference between economic growth and the real interest rate. Stabilisation of the government debt ratio is expected in the baseline projection only far beyond the horizon of the calculations discussed here and then only at an extremely high level. The situation, however untenable, is nonetheless presented here to show what the consequences are if the government were to do nothing to contain the ever-threatening derailment of public finances. The projection assumes that the government always succeeds in fully covering the strongly rising government deficit on the capital market at the prevailing international interest rate.

Figure 5.3 presents the development of both government debt and government total wealth. The strong increase in government debt after around 2019 is naturally linked to a corresponding decrease in government wealth. Note that the net debt of the government in 2006 is considerably smaller than the EMU debt of 54% of GDP. Total government wealth, which also includes the value of other assets (natural gas revenues, Dutch central bank revenues, infrastructure and buildings), is clearly positive. The net debt is only 28%, as the government also possesses financial assets equal to 26% of GDP. In summary, one can thus distinguish the following:

financial wealth (− 28%) = financial assets (26%) − gross public debt (54%)

total wealth (60%) = financial wealth (− 28%) + other assets (88%)

Figure 5.2 EMU balance and primary EMU balance without budgetary measures in the baseline projection (% of GDP)

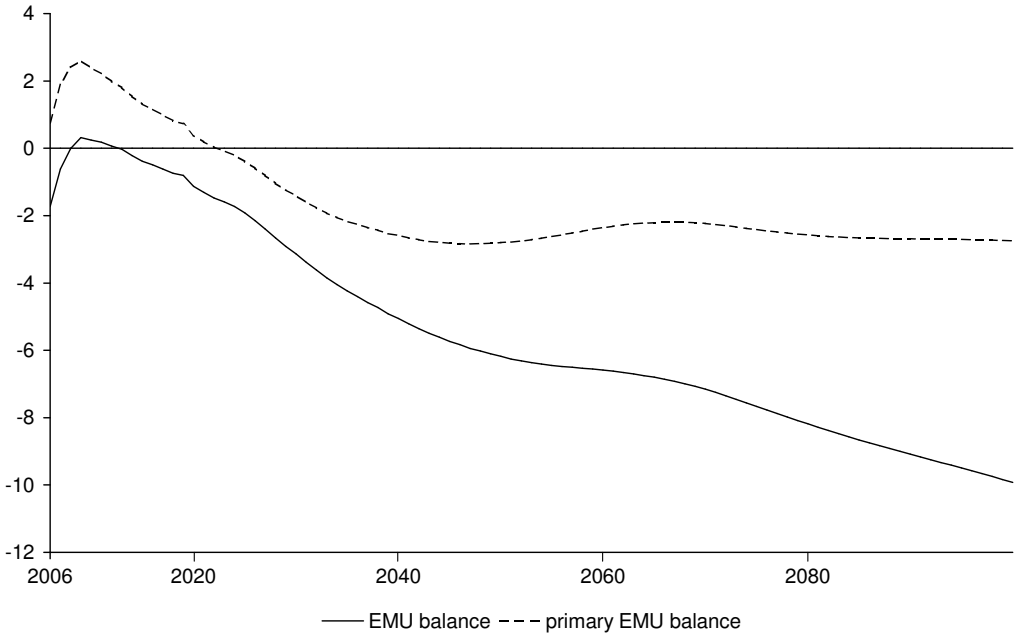
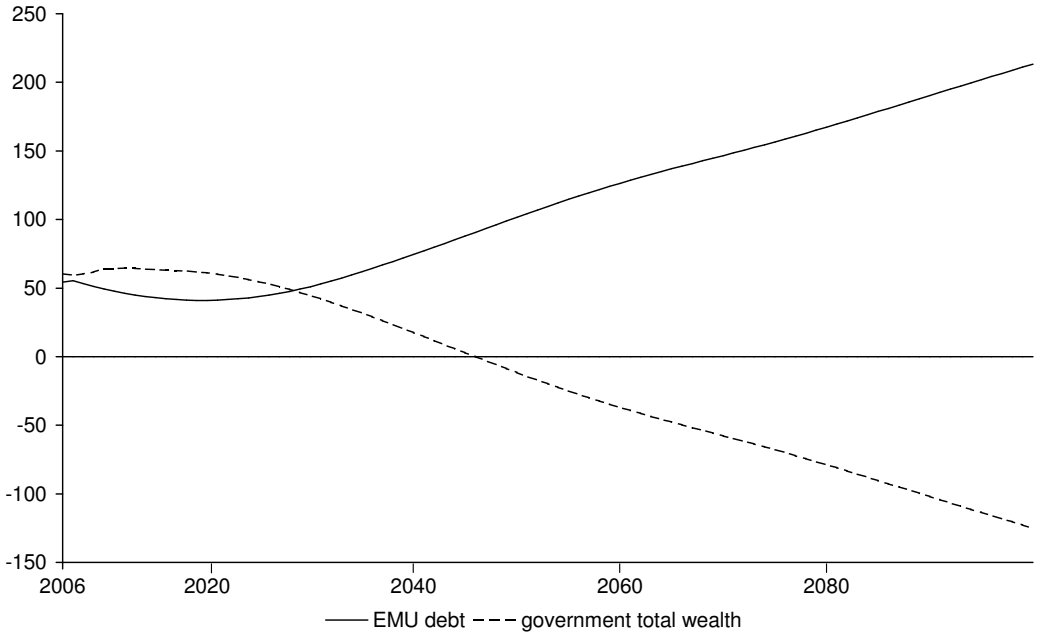


Figure 5.3 EMU debt and government total wealth without budgetary measures in the baseline projection (% of GDP)



The sustainability gap

Public finances are sustainable if they comply with the government's intertemporal budget restriction. Failure to comply implies harm to future generations because if the realisation of sustainable public finances is deferred, more budgetary measures will be required in the future (in % of GDP) than at the present moment. Deferring the implementation of measures accordingly exacts a price. Sustainable public finances are possible only if there is a prospect of a sufficient reduction in interest payments, since lower interest payments potentially provide budgetary scope for realising the relatively strongly increasing demographically sensitive public expenditure and for absorbing the depletion of natural gas revenues. In other words, there has to be a prospect of a sufficiently rapid decrease in government debt. At present, that prospect is not in the cards if no budgetary measures are taken. In view of the current base situation, sustainable public finances require budgetary measures. The extent of the required budgetary measures (in % of GDP) is known as the *sustainability gap* (see chapter 3 of this study).

A reduction of material government consumption

To realise sustainable public finances, the government can choose from various budgetary measures or combinations of budgetary measures. This section focuses on a projection achieving sustainable public finances as from 2006 through a reduction of material government consumption in that year. This budgetary measure was chosen merely for technical reasons; it does not entail behavioural effects, whereas various other budgetary measures do. For instance, increasing the burden on income from work entails lower labour market participation, since people respond to increases in that burden by working less. Also cutting back on material government consumption (unlike cutting back on government investment) does not affect labour productivity, nor does it (unlike a reduction in employment in the public sector) affect the labour supply available to businesses.

The choice for a projection in which the sustainability gap is closed through a limitation of material government consumption does not mean that this approach would be the most preferred, or the most realistic. The latter, in fact, is definitely not the case, since the reduction of material government consumption required in the projection is exceptionally high as a percentage of that consumption. The baseline for sustainable policies merely serves as a useful benchmark that can be used to analyse the consequences of various other measures to attain sustainable public finances. Chapter 7 discusses, by reference to policy variants, various alternative measures through which sustainable public finances can be realised.

Sustainable public finances on the basis of the baseline projection

The focus is primarily on the baseline projection for the period 2006-2100, which is based on a discount rate of 3% and labour-augmenting technical progress of 1.7% per year. Achieving sustainable public finances on the basis of these assumptions requires a permanent reduction in material government consumption by 2.6% of GDP as from 2006.

Table 5.2 Public finances on the basis of sustainable policies in the baseline projection

	2006	2011	2020	2040	2060	2100
	% of GDP					
Expenditure						
Social security	12.0	12.4	13.5	15.5	14.5	14.9
Public pensions	4.7	5.3	6.6	8.8	7.8	8.2
Disability benefits	2.0	2.1	1.9	1.6	1.6	1.6
Unemployment benefits	1.2	1.0	1.0	1.0	1.0	1.0
Other benefits	4.1	4.0	4.0	4.1	4.1	4.1
Health care	8.8	9.3	10.3	13.1	12.5	12.6
Education	5.4	5.5	5.4	5.8	5.7	5.8
Other expenditure excluding interest payments	16.5	15.9	15.8	15.6	15.7	15.7
Primary expenditure	42.7	43.1	45.2	50.0	48.4	49.0
Interest payments	2.5	1.5	0.1	– 0.7	– 0.4	– 0.4
Total	45.2	44.6	45.3	49.3	48.0	48.6
Revenues						
Income tax and social security contributions	21.8	23.1	23.7	25.3	24.9	25.2
of which on pension income	1.8	1.9	2.5	3.6	3.4	3.6
Indirect and other taxation	14.9	15.6	15.9	17.3	16.7	16,8
of which on consumption by population aged 65 and older	1.9	2.2	2.9	4.2	3.6	3.7
Corporate income tax	2.6	2.6	2.5	2.4	2.3	2.3
Natural gas revenues	1.6	1.2	0.8	0.1	0.0	0.0
Other income	5.2	5.3	5.2	4.9	4.7	4.4
Total	46.1	47.9	48.1	50.0	48.6	48.8
EMU balance	1.0	3.3	2.9	0.6	0.7	0.2
Primary EMU balance	3.4	4.8	3.0	– 0.0	0.2	– 0.2
EMU debt[a]	51.7	31.6	0.6	– 19.4	– 12.9	– 10.2
Government total wealth[a]	63.0	80.3	101.4	111.4	102.4	98.5

[a] Value at the end of the year

The differences between the projection on the basis of sustainable policies and the projection without budgetary measures relate – with the exception of the development of material government consumption – only to a limited number of variables. The policy intervention in 2006 produces wholly different dynamics of public expenditure excluding interest payments, interest payments and government debt. The sustainable projection centres on a budget surplus such that reducing debt decreases interest payments to an extent that creates sufficient budgetary scope for the comparatively strongly increasing demographically sensitive public expenditure and, moreover, provides compensation for the depletion of natural gas revenues. Government debt is negative in the projection from around 2020. The government will then no longer use the budget surplus to repay government debt but to buy the debt instruments of foreign governments. The corresponding government investments form almost 20% of GDP in 2040, after which time these investments will decline. Government wealth obviously develops far more favourably in this projection than in the projection without budgetary measures.

Figure 5.4 Budget balance and primary balance on the basis of sustainable policies in the baseline projection (% of GDP)

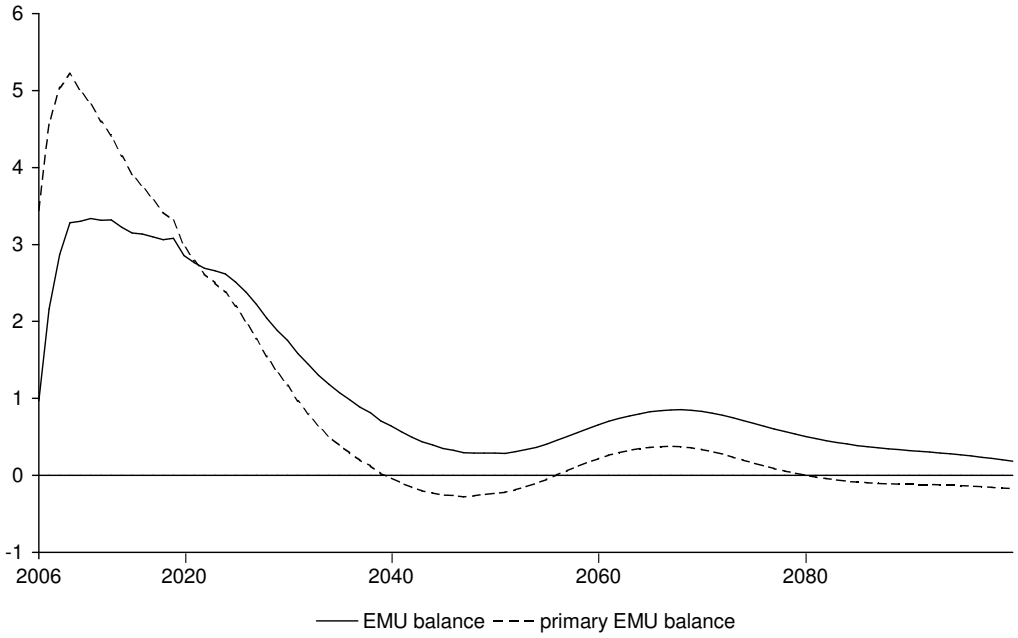
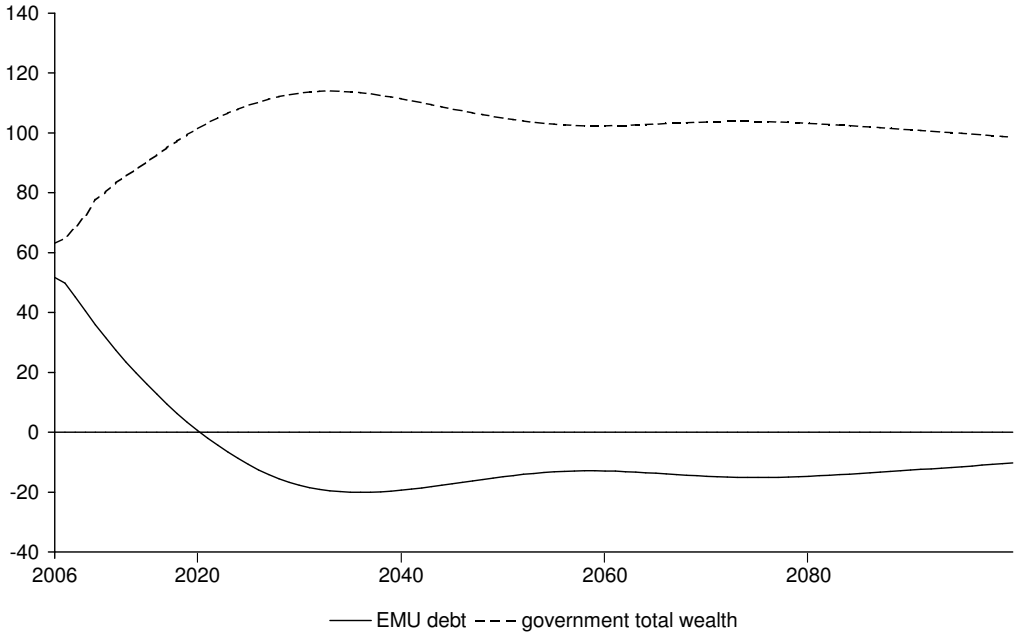


Figure 5.5 Gross debt and government total wealth on the basis of sustainable policies in the baseline projection (% of GDP)



Explaining the size of the sustainable primary balance in 2011

This section provides insight into the main determinants of the sustainable cyclically adjusted primary balance in 2011. Item 1 in Table 5.3 shows that its size in 2011 is 4.8% of GDP. The primary balance is decomposed into its main determining factors in items 2 through 7. The decomposition follows the methodology that is explained in chapter 3, and distinguishes between the impact of the initial debt position (item 2) and budgetary developments after 2011 (items 3 through 7). The latter involves the deterioration of future primary balances that is due primarily to the effect of ageing and the decline of government revenues from natural gas.

The initial debt position turns out to raise the sustainable primary balance by 0.4% of GDP.[24] The burden it forms is substantially smaller than the burden involved in the budgetary developments after 2011.[25] The main reason for this lies in the net effect of ageing, which increases the sustainable primary balance by a sizeable 2.9% of GDP (see item 3). This figure is the net result of rising government expenditure on public pensions and health care, which raises the sustainability gap by 2.5% and 2.9% of GDP, respectively, and increasing tax revenues from pensions, which have an alleviating effect of 2.5% of GDP.

Another burdening factor for public finances is formed by the depletion of revenues from natural gas (item 4). The estimated gradual decline of revenues from 1.3% of GDP in 2011 to zero in 2050 adds 1.1% of GDP to the requirement for the 2011 primary balance. An additional 0.7% of GDP (item 5) is explained by the fact that revenues from financial assets after 2011 will decrease relative to GDP. This results from our assumption that these assets will not grow in line with GDP, but rather will remain constant in real terms.[26] This burdens future budgets and forms an additional reason for a higher primary balance in 2011. Conversely, however, the budgetary situation is relieved by 0.5% as a result of the currently projected decrease of expenditure on disability programs, which is effected by a number of recent measures to curb the inflow into these arrangements (see item 6). These measures are discussed in section 4.5. Other factors turn out to contribute 0.2% of GDP. These comprise a projected future decline of revenues from the corporation tax and from taxes on private savings.

Item 8 presents the structural primary balance for 2011, should policies remain unchanged. This is 2.2% of GDP. Subtracting this figure from its sustainable equivalent (which is 4.8% of GDP; see item 1) leads to the requirement for budgetary change if a sustainable policy is to be

[24] As is explained in chapter 3 this effect is calculated by multiplying the initial debt ratio by the average future differential between the discount rate and the growth rate of the economy.

[25] This effect is explained in chapter 3. It is calculated by multiplying the present value of the impact of declining primary balances by the differential between the discount rate and the average growth rate in the economy.

[26] The assumption on the future development of government holdings of financial assets has no effect on the sustainability of government finances. If it is, alternatively, assumed that financial assets do grow in line with GDP, then government finances are not affected by decreasing revenues from this source (relative to GDP). Assets, in that case, are burdened by their increased need to be purchased, and by the affect of that need on government debt and interest payments. In present-value terms, these two alternatives are fully equivalent and therefore lead to the same outcome for the sustainability gap. Note, however, that the assumption is relevant for the size of the primary balance because this concept, asymmetrically, does include revenues from financial assets but not interest payments. In the near (medium-term) future, however, the two paths show only small differences.

achieved as from 2011. This figure (which equals 2.6% of GDP; see item 9) is referred to in this study as the *sustainability gap*.

Table 5.3 Decomposition of the sustainable primary balance in 2011

	% GDP
1. Sustainable cyclically adjusted primary balance in 2011	4.8
Due to:	
2. Servicing initial debt	0.4
3. Net effect of ageing	2.9
Increase in public pensions	2.5
Increase of taxes on pensions (–)	– 2.5
Increase in health care	2.9
4. Depletion of revenues from natural gas	1.1
5. Decreasing revenues from financial assets	0.7
6. Decrease of expenditure on disability (–)	– 0.5
7. Other factors (on balance)	0.2
8. Actual structural primary balance in 2011 under unchanged policy	2.2
9. Sustainability gap (= 1. – 8.)	2.6

5.4 Economic development

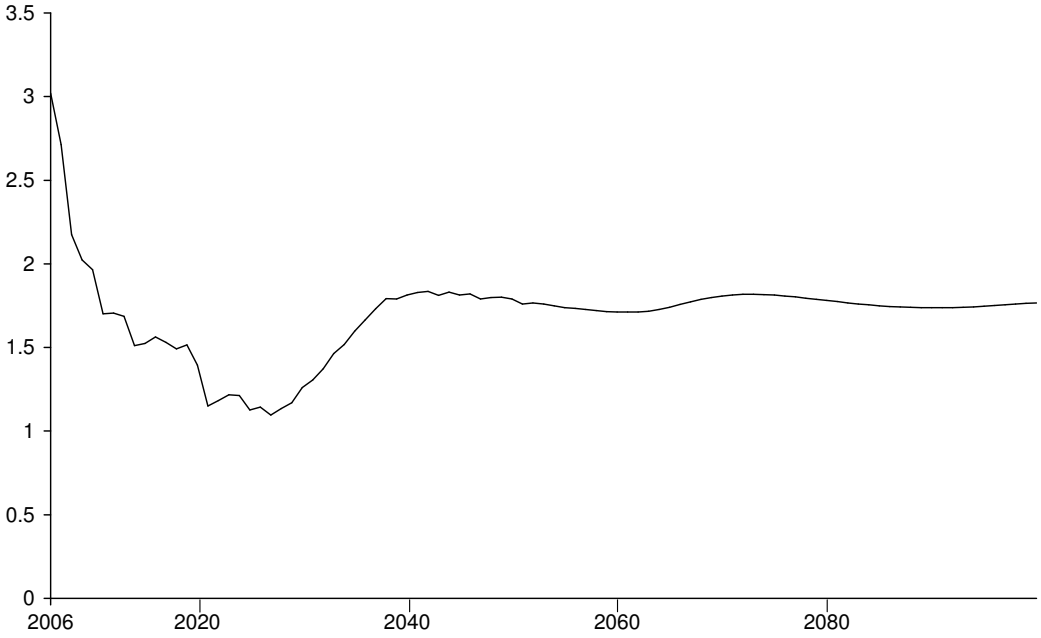
The focus above was the development of public finances on the basis of unchanged policies, on the one hand, and sustainable policies, on the other. The present section considers the economic development to be expected on the basis of sustainable policies.

Economic growth in the baseline projection

The negative output gap in the base year of our analysis allows for economic growth in the period 2006-2010 over and beyond potential growth. Projected economic growth therefore weakens more sharply in 2011, reflecting the fact that growth will no longer outstrip potential growth as from that year (see figure 5.6).

The increase in labour supply declines sharply in the baseline projection, and is slightly negative from as early as 2008. The labour supply growth rate declines further in subsequent years, and bottoms out at – 0.5% around 2020, when GDP growth will hardly exceed 1% per year. In subsequent decades, economic growth recovers in the baseline projection, as the labour supply gradually declines less rapidly. The decline in labour supply will end around 2040, after which labour supply will increase slightly and economic growth will amount to some 1.8%.

Figure 5.6 Growth rate of GDP (%) in the baseline projection, 2006-2100



Economic development in the baseline projection

Table 5.4 shows the development of a number of macroeconomic variables in the period 2006-2100. Notably, the share of consumption in GDP increases strongly in this period. This share peaks around 2040, after which it decreases somewhat. This reflects the age structure of the population. Current saving levels are high and national wealth is built up through a surplus in the current account. Gradually, savings will decrease and consumption increase relative to production when the share of elderly in terms of the working population starts to grow. The rapid increase in pensions that accompanies ageing results in an increase in the share of private consumption in GDP. That share peaks around 2040, when the private consumption rate will have risen by 7.8%-points compared to 2006. Also, the share of government consumption in GDP increases in the projection. The increase occurs primarily after 2020 as a result of the comparatively strong growth in demand for health care. In 2040, the share of government consumption in GDP – especially as a result of rising expenditure on health care – is higher by 4.1%-points in the baseline projection than in 2006.[27] Finally, corporate investment also outpaces GDP in the projection in the period 2006-2040. The increase in corporate investments occurs entirely in the years 2020-2040. Up to 2020, there is an adverse effect on corporate investment from the slowdown in the growth of labour supply available for businesses. At a given capital intensity of the production process, a lower investment rate is required (in line with diminished employment growth).

[27] The share of employment in health care in total employment will rise sharply in the coming decades. According to the CPB study '*Vier vergezichten op Nederland*,' published in 2004, that share rises from almost 11% in 2001 to some 18% in 2040.

Overall, national spending increases more strongly than GDP. As a result, the surplus on the balance of trade deteriorates. Nonetheless, the Netherlands will realise very considerable surpluses in international trade in the coming decades. On the basis of sustainable policy, the trade balance surplus is expected to be 9.4% of GDP in 2006. That surplus is substantially greater than that of the baseline projection without budgetary measures, because the decrease in material government consumption implies a decline in national consumption. The international trade balance surplus gradually decreases in the projection and swings into a deficit as from around 2030. This eventually results in an international trade balance deficit of 4.9% of GDP in 2040, which gradually diminishes in subsequent years.

The question arises whether these trade deficits can be financed without problems. The answer to that question is affirmative. In the projection, the Netherlands will realise current account surpluses; net foreign assets will therefore continually increase relative to GDP until around 2040**.** The accompanying improvement in the balance of primary revenue from abroad allows a deterioration of the trade balance to be absorbed without substantially diminishing the balance on the current account. The rising balance of primary income from abroad represents a welcome extension of consumption possibilities in the Netherlands once ageing has curtailed the production potential of the national economy. Due to this increasing balance, GNP growth outpaces that of GDP.

Table 5.4 Economic development on the basis of sustainable policies

	2006	2011	2020	2040	2060	2100
	% GDP					
GDP components						
Wage income	50.1	52.6	52.8	52.6	53.0	52.9
Net non-wage income	23.2	19.4	19.0	18.2	18.3	18.3
Depreciation	14.8	15.4	15.3	15.2	15.2	15.2
Indirect taxes less subsidies	11.6	12.4	12.6	13.8	13.4	13.4
Gross domestic product	100	100	100	100	100	100
Components of national spending						
Private consumption	46.8	48.8	50.9	54.6	52.8	53.1
Government consumption	23.6	23.9	24.8	27.8	27.1	27.3
Corporate investment	17.5	19.4	17.2	20.0	19.5	19.7
Government investment	2.6	2.6	2.6	2.6	2.6	2.6
National spending	90.6	94.7	95.5	104.9	102.0	102.6
Balance of trade surplus	9.4	5.3	4.5	– 4.9	– 2.0	– 2.6
Balance of primary income from abroad	0.4	0.9	3.2	4.5	3.9	4.6
Balance of secondary income from abroad	– 1.6	– 1.5	– 1.5	– 1.5	– 1.5	– 1.5
Balance of current foreign transactions	8.2	4.7	6.2	– 1.9	0.4	0.5
Net foreign assets[a,b]	0.0	23.3	76.1	103.1	86.3	104.9
Gross national product[c]	100.4	100.9	104.5	104.5	103.9	104.6

[a] Increase compared to 2006.
[b] Value at the end of the year.
[c] of GDP plus balance of primary revenues from abroad.

The Netherlands has already realised substantial current account surpluses. Those surpluses, however, are not reflected in movements in net foreign assets. CPB has in this context previously referred to a 'black hole'.[28] That 'black hole' may in part be the result of erroneous statistics. In other words, actual net foreign assets could be – much – greater than shown in the statistics. The disappointing development of net foreign assets can, however, also be due in part to the unlucky hand of Dutch citizens and businesses in selecting portfolio investments abroad and foreign direct investments. The baseline projection in this study assumes that foreign portfolio investments and foreign direct investments produce an average return of 3%. Dutch savings surpluses, then, do not disappear into a 'black hole'.

5.5 Pensions

Partial indexation in the baseline projection limits the increase in pension benefits paid. In the coming decades these pensions (as can be seen in Table 5.5) also rise faster than GDP, owing to ageing. Pension fund benefit payments, which currently account for just short of 11% of the total wage sum, increase to 21% of the wage sum in 2040 in the projection, after which this percentage for the ratio between pensions paid and the wage sum declines slightly.

Average participants will have accrued pension entitlements in 2006 with a present value of over 300% of their wage. This includes pension rights to surviving dependents as well as pre-pensions. The limitation of indexation will restrain the accrual of pension rights in the coming decades. Nonetheless, the present value of accrued rights will rise faster per participant than average pay. This is due to the higher average age of participants resulting from the influence of ageing. Older employees usually have higher accrued pension rights than their younger colleagues. Another important factor is that employees have over the past decades gradually accrued better pensions. As employees due to retire in the coming years have (on average) comparatively low pensions rights, the accrued rights per employee will also increase in the course of time.

The premium burden for the supplementary pensions initially rises in the baseline projection, increasing by 1.5%-points by 2020 compared to 2006. Limiting indexation will, over the coming decades, depress actuarially fair pension premiums. With the passage of time, funds will increasingly be able to relax the limitation of indexation. This will gradually increase actuarially fair pension premiums. As a result, the premium burden for pensions will increase in the period 2006-2020 although funds will decrease the catching-up premium slightly. Catching-up premiums will no longer be required from around 2025, and pension premiums will be equal to actuarially fair pension premiums.

The average coverage ratio for pension funds in 2006 is some 115% of accrued nominal pension entitlements. This coverage is not sufficient to permit full indexation. As stated above, pension funds therefore limit the indexation of the accrued nominal rights and pensions. After

[28] See for instance Kusters (1998).

2006, the funds' coverage ratio will gradually recover. In 2040, the funds realise a coverage ratio of almost 140%, which improves somewhat further in subsequent years.

It is assumed that pension funds aim for a coverage ratio of 100% of accrued real pension rights. In the baseline projection this requires a coverage ratio of 145% of nominal obligations. This coverage ratio will be attained only gradually.

To conclude, it should be noted that the supervisory authority requires a pension fund that has a conditional indexation of pensions and an investment mix where 50% of capital is invested in equities and the remainder in bonds to realise a coverage ratio of some 128% within 15 years. Table 5.5 shows that the GAMMA pension fund will comply with this requirement in the baseline projection.

Table 5.5 Pensions in the baseline with sustainable policies

	2006	2011	2020	2040	2060	2100
Pension fund benefits (in % of the wage sum)	10.7	11.1	14.2	21.0	19.4	20.7
Present value of nominal pension rights accrued (in % of the wage sum)	307.2	311.1	346.9	395.3	399.2	412.9
Indexation (in% of the wage or price increase)	33.8	63.8	94.4	100.0	100.0	100.0
Premium burden of supplementary pensions (in % of the wage sum)	14.8	15.5	16.3	13.9	14.6	14.1
Pension funds' coverage ratio (in % of the present value of nominal rights accrued)	114.2	123.9	133.7	138.4	140.9	143.4

5.6 Generational accounting

Components of welfare

The lifetime welfare of a member of a particular generation is comprised of three components. The first is the present value of the income that the members of the generation earn during their lifetime (*i.e.* their human wealth). The second- and third components of lifetime welfare are equal to the present value of the net benefits from the government and pensions funds, respectively. GAMMA can chart lifetime welfare and its components only for the future generations (*i.e.* those born in 2006 and later); they cannot be determined for generations already alive at present, owing to a lack of data for the past. For those generations, GAMMA can only be used to calculate welfare over their remaining lives.

Lifetime welfare of generations

Table 5.6 shows that total lifetime welfare for someone born in 2006 is almost 850 000 euro in the baseline projection. This represents the present value of the three components of lifetime welfare on the date of birth. By far the greatest part (92.8%) of lifetime welfare is derived from income earned during that person's lifetime. The remainder (7.2%) is the balance of net benefits from the government (7.3% of lifetime welfare) and small negative net benefits from pension funds (– 0.2%).

The same cannot be said for people reaching the age of twenty in 2006. The members of the generation born in 1986 can, on balance, expect negative benefits from the pension funds. That is the case because they will have to continue for some time to pay catching-up premiums, which do not accrue pension rights, for the pensions. The present value of those catching-up premiums in 2006 amounts to an average of 7 500 euro for a member of the generation of 1986. That generation will in the next few years also have to contribute to the PAYG-financed early retirement benefits enjoyed by senior citizens under transitional schemes. The present value of premiums due for those early retirement benefits on 1 January 2006 amounts to an average of 1 000 euro for a member of the generation of 1986.

Generations born after 2006 can expect higher lifetime welfare owing to the growth in labour productivity. That welfare is greater the later they are born after 2006. Table 5.6 illustrates this for people born in 2020, 2040, 2060 and 2100, respectively. Thus, the present value for the three components of lifetime welfare for people born in 2020 is (on their date of birth, in 2006 prices) over 200 000 euro higher than for people born in 2006. Each of the three components of lifetime welfare accounts for approximately the same share in lifetime welfare for people born after 2006 as for people born in 2006. The assumption that the government will realise sustainable public finances in 2006 plays a part in this. Should the government defer the measures required to realise sustainable public finances, the net benefits from the government will be higher for people who are born before the government takes such measures. The same benefits will in that case thus be lower for people born after the government has realised sustainable public finances.

It should be noted that, in measuring lifetime welfare, no value has been attributed to the leisure time people enjoy during their lifetimes. If leisure time had been valued and measured, then lifetime welfare for all generations would obviously have been higher. Owing to the increase in life expectancy, the increase in welfare arising from this would be greater for the members of generations born later.

Table 5.6 shows that the future generations can expect net benefits from the government. The present value of the government expenditure attributable to them – over their entire lifetime – is greater, in other words, than the present value of the tax and social security contributions they pay over their entire lifetime. Net benefits from the government represent a smaller portion of lifetime welfare for members of later-born generations. This is connected with falling per capita benefits from the GDP-related expenditure items, as a result of the declining share of workers in the total population, and slightly rising pension contribution rates.

The net benefits that future generations will receive from the government are essentially an inheritance that is handed down from their ancestors. For each generation, that inheritance consists of the wealth of the government on the date of birth plus net remittances to the government (during the remainder of their lifetime) from people already alive on that generation's date of birth. Assuming that the real return on government financial wealth exceeds economic growth, every generation can receive positive net benefits from the government while still leaving behind for the next generations an 'inheritance' that has grown

with GDP. If measures to realise sustainable public finances are deferred, the net benefits from the government decline for people born after the government has taken measures. It is conceivable, however, that those people would in that case still receive net benefits from the government. This issue is discussed further in chapter 7 by reference to variants that assume that the government delays for some years the measures to realise sustainable public finances.

Table 5.6 Generational accounting on the basis of sustainable policies

	Generations born in:				
	2006	2020	2040	2060	2100
Lifetime income (% of lifetime welfare)	92.8	93.2	93.3	93.3	93.4
Net benefits from the government (% of lifetime welfare)	7.3	6.9	6.6	6.5	6.3
Net benefits from pension funds (% of lifetime welfare)	– 0.2	– 0.1	0.0	0.2	0.3
Lifetime welfare[a] (1000 euro)	843.8	1062.4	1488.5	2087.7	4105.9

[a] In 2006 prices

5.7 Comparison with the previous CPB study

This section explores why our assessment is now so much worse than in our primary study (Van Ewijk *et al.* (2000)). It makes two comparisons: first for the change in required primary surplus, second for the change in the sustainability gap.

Main causes for the increase in the sustainable primary balance

Table 5.8 shows why the sustainable (cyclically adjusted) primary balance for 2011 in the baseline of this study is 1.9% of GDP higher than it was in the previous study for that year. This increase, which is the difference between the sustainable balance for 2011 of 4.8% in this study and its equivalent of 2.9% in the 2000 study, is presented as item 1. Items 2 through 9 present the decomposition of this increase. In the decomposition we distinguish between the impact of the projected initial (2011) debt position (presented in item 2) and the impact of budgetary developments that are now expected to influence the budgets in the years after 2011 in a way that differs from what was expected in 2000 (see items 3 through 9).[29] The latter influence includes the effect of the changes in the budgetary developments themselves as well as that of the lower differential between the discount rate and the growth rate,[30] which leads to a higher weight of future government balances.

The impact of the initial debt position (see item 2) turns out to be slightly negative. A higher initial debt position is outweighed by the far lower differential between the discount rate and the growth rate of the economy. The latter factor reduces the sustainable primary balance (see chapter 3). Changes in pension fund arrangements slightly raise the sustainable balance by 0.3%

[29] Chapter 3 explains why we carry out the decomposition in this way.

[30] This study employs a differential between the discount rate and the average growth rate of 1.3% (3% for the discount rate minus 1.7% for the growth rate). In the previous study this figure was 2.25% (4% minus 2.25%).

of GDP (see item 3). This small effect is the balance of larger developments that almost offset each other. The fact that tax-deductible pension premiums now develop more favourably for public finances causes an alleviating impact of 1.0%.[31] This is more than offset, however, by the lower rise of taxed pension benefits that follows from the changes in pension fund arrangements and depresses future tax revenues, thereby raising the required balance by 1.3% of GDP.

Of the other factors, the major contributor to the increase in the sustainable balance may be the future costs of health care, which contributes 0.9% of GDP. A part of this effect, 0.5% of GDP, is purely the result of the fact that a part of health care that was previously classified in the private sector is now classified in the public sector (see section 4.6). This extension of the coverage of the public sector also increases the public cost of ageing and thus the sustainable primary balance.[32] The remaining 0.4% of GDP follows from the lower discount rate, which increases the weight of the future cost increase.

Another contributing factor (raising the sustainable primary balance by 0.4% of GDP) lies in the changed composition of government revenues in 2011. More than in the 2000-assessment revenues have a temporary nature, as the revenues from natural gas resources are now higher (item 5). This implies that the budget balance for 2011 now provides a more flattering picture of the structural situation of government finances than in the previous assessment. Other contributors are the lower revenues from financial assets, which are caused by the lower interest-rate assumption employed in this study (item 6) and the lower projections for the growth of taxes on private savings (item 7). This is caused by a refinement of the methodology used for these projections and a lower interest rate. A further contributing factor (item 8) is the lower than previously expected rise in female labour participation. This factor adds 0.4%-points. A major alleviating factor, on the other hand, arises from the reform of the disability schemes (item 9). In the current projection, expenditure on these schemes is expected to decrease substantially (see Table 5.1), whereas the 2000 exercise assumed an increase. This favourable development, lowering the requirement for public saving and thus also reducing the size of the sustainable primary balance, adds to the favourable effects of the reform in the years before 2011. The budgetary effects of the reduced inflow after 2011, in combination with its favourable effect in labour participation, reduce the sustainability balance for this year by 1.0%-points of GDP. Other factors contribute 0.3% of GDP.

[31] Van Ewijk *et al.* (2000) featured gradually increasing pension premiums by around 2% of wages after 2011 (from 6.8% to 8.9% in 2080). The current exercise, in contrast, shows a decline of pension premiums from 15.5% of wages to 14.3%. The fact that they involve higher levels of pension premiums is not relevant for the budgetary developments that take place after 2011. However, the rise to higher levels has a substantial budgetary impact in the years up to 2011, and will be discussed presently.

[32] The extension of coverage also has the consequence that the implementation of a sustainable policy changes the size of the transfers from current generations to future generations.

Table 5.7 Decomposition of an increase in the sustainable primary balance for 2011	
	% GDP
1. Increase in sustainable primary balance	1.9
As a result of:	
2. Change in servicing initial debt	– 0.1
3. Change in pension fund arrangements	0.3
a. lower rise in (deductible) pension premiums	– 1.0
b. lower rise of taxes on pensions	1.3
4. Higher increase of health care/Transfer of private health care to public sector	0.9
5. Higher future decline of government revenues (due to natural gas)	0.4
6. Lower revenues from financial assets	0.3
7. Lower revenues from taxes on private saving	0.4
8. Lower increase in female labour participation	0.4
9. Reform of disability schemes (including beneficial effects on labour participation)	– 1.0
10. Other (on balance)	0.3

Major causes for the deterioration in sustainability

The analysis of the increased sustainable primary balance for 2011, as presented in Table 5.7, does not capture all of the changes in budgetary developments since the previous study. It only takes account of the changes that are relevant for the sustainable primary balance for 2011 (*i.e.* the change in the debt projection for 2011 and in the projections of developments in the years after 2011). Developments that have taken place and are expected to take place in the years before 2011, and that affect the challenge of achieving a sustainable balance in that year, are not discussed. In order to do this, we identify the main causes for the increase in the sustainability gap since AitN.

The deteriorated situation of public finances since publication of our previous study, as measured by the increase of the sustainability gap by 1.9%-points (from 0.7% of GDP to 2.6% in the baseline of this study), can largely be attributed to a number of underlying factors. These are presented in Table 5.8. The main underlying contributor to the increase in the sustainability gap seems to be formed by the lower assumption regarding pension fund returns on assets (from 5.8% in the previous study to 3.0% in this study) and the lower discount rate applied on government debt and assets (from 4.0% to 3.0%). Combined, this accounts for an increase of the gap that amounts to 3.3% of GDP (see item 2). In turn, this deterioration is mainly a result of the fact that the lower returns compelled pension funds to reform their arrangements, leading to higher (tax deductible) pension premiums and lower (taxed) future pensions than was expected in 2000.[33] A further 0.4%-points of the deterioration is explained by the lower discount rate, which renders the near-future primary surpluses to carry less weight relative to the distant-future primary deficits. This is discussed in chapter 3. The lower costs of servicing initial government net debt contribute a slightly alleviating effect.

[33] Note that the fact that current capitalisation rates of pension funds are lower than in 2000 add to the requirement for reforming pension fund arrangements. However, the influence of this factor is small relative to that of the assumed reduction of pension fund returns.

A second contributor lies in the higher reliance of government finances on revenues from natural gas, which is only a temporary source (see above). This explains 0.6%-points (see item 3). A further reason for the increased unsustainability of public finances is purely the result of the fact that a part of health care that was previously classified in the private sector is now classified in the public sector. This extension of the coverage of the public sector also increases the public cost of ageing and thus the sustainability gap.[34] The downward adjustment in the future development of female labour participation (see section 4.4) adds 1.2%-points to the increase of the sustainability gap.

The main alleviating factor is formed by the reform of disability schemes (see section 4.6). Combining both past and expected future inflows into these schemes (both inflows are far lower than projected in 2000), as well as the beneficial effects of the reduced inflow on labour participation, this factor reduces the sustainability gap by 3.0% of GDP. Other factors account for an alleviating impact of 0.7%-point.

Table 5.8 Main contributors to deterioration in sustainability (% GDP)

1. Increase in sustainability gap	1.9
Due to:	
2. Lower pension fund return/discount rate	3.3
a. more austere pension fund arrangements	3.3
b. lower discount rate	0.4
c. lower cost of servicing initial debt	– 0.3
3. Increase in temporary revenues (gas)	0.6
4. Transfer of private health care to public sector	0.5
5. Lower increase in female labour participation	1.2
6. Reform of disability schemes (including beneficial effects on labour participation)	– 3.0
7. Other factors	– 0.7

The increase of the sustainability gap makes it clear that the reforms and other discretionary measures have not kept pace with the setbacks of recent years. Note that the increased sustainability gap measures only the increased size of the *remaining* budgetary challenge. It does not capture the full budgetary burden of the deteriorated developments since 2000. Part of the full burden has already been covered by the reform of disability schemes and other factors.

[34] The extension in coverage also has the consequence that the implementation of a sustainable policy may change the size of transfers from current generations to future generations.

Appendix: Comparison with the AWG study

This study and the sustainability assessment of the AWG of the Economic Policy Committee (EPC) of the European Commission (to be published later this year) largely follow the same approach. However, the two studies differ in model characteristics, analytical approach and underlying assumptions with which the assessments are carried out.
As regards the model, the difference concerns the fact that this study uses an overlapping generations, applied general equilibrium (OLG-AGE) model, GAMMA, and thus accounts for behavioural feedbacks of economic agents such as the effects of taxation on labour participation and private saving. Our study thus carries out a more comprehensive analysis of the future development of tax bases. Moreover, GAMMA consistently models all sectors of the economy. This ensures compliance with the intertemporal budget constraint across all sectors of the economy. The model used by the AWG does not include behaviour and contains a full account only of the government sector.

Further noticeable differences involve the projection of government revenues. In the AWG methodology, revenues are kept constant relative to GDP with probably the single exception of the allowance for increasing direct taxes on pension incomes. Our methodology includes a number of additional features, such as the increase of *indirect* taxes and the decline of the revenues from natural resources as expected in the coming decades. Moreover, our calculation explicitly relates revenues from financial assets to the size of these assets. This implies that rising revenues from this source entail the need for additional financial asset formation. The AWG study includes this need only if it involves the assets of public pension funds.

As regards the analytical approach, there are similarities as well as differences. The major difference lies in the fact that this study focuses not only on sustainability but also on the intergenerational distribution of welfare. It explicitly presents the consequences of policies for separate cohorts.

As regards the underlying assumptions, there are differences in the demographic development. This study shows slower growth of the elderly dependency ratio due to a more moderate increase of life expectancies. In this study, which uses the demographic projections of Statistics Netherlands, life expectancy at birth increases by 2.9 years for males and by 1.4 years for females in the period 2005-2050. In the projections used by the AWG, these figures are 4.8 and 2.3, respectively. The projected development in labour market participation rates is also different. In particular, the AWG study assumes somewhat higher growth in labour market participation, thereby counteracting the effect of higher life expectancy growth. This study assumes a lower further rise than the AWG, due to a difference in the methodology of extrapolation.

Importantly, as regards the discount rate, the two studies use the same approach and numerical assumptions, *i.e.* one uniform discount rate that applies to all actors in the economy and a discount rate of 3% in the whole projection period. The two studies also share a common rate of productivity growth of 1.7% a year.

6 Sensitivity analysis

The degree to which public finances are to be qualified as unsustainable depends on various assumptions about the development of the economy and that of public finances. This chapter highlights the significance of the assumptions for the discount rate and the rate of labour productivity growth. Additionally, the assumptions for life expectancy and growth in health care expenditure prove to be crucial, compared with the somewhat less significant assumptions for pension indexation, fertility and labour market participation of women and mature employees. Jointly, the variants demarcate an enormously wide potential range for the required primary surplus.

6.1 Introduction

The baseline projection of this study mandates a reduction of material government consumption of 2.6% of GDP as from 2006 if sustainable public finances are to be attained. This figure of the sustainability gap depends on various assumptions for the development of the economy and other factors affecting the development of public finances. The discount rate, the growth in labour productivity, labour market participation, life expectancy and growth in health care expenditure are particularly relevant. This section uses sensitivity variants to chart the effects of changing assumptions on the sustainability gap.

The chapter starts with an overview of the sensitivity analysis. It continues to discuss the implications of alternative values for the discount rate and the rate of productivity growth. Next, the effects of alternative assumptions on labour market participation, demography, health care expenditure and pension expenditure are explored.

6.2 Range for the sustainability gap

The variants conjointly demarcate an enormously wide potential range for the sustainability gap. The gap can extend – depending on the sensitivity variants – from 0.9% to 5.1% of GDP. A number of comments are due. First, this range is wide due to the marked sensitivity of the sustainability gap to a number of significant variables. Second, the range is not symmetrical. For some variables, we actually assign greater weight to upside variances than we do to their downside counterparts. This is due to the fact that the real interest rate, the increase in life expectancy and the growth in health care expenditure might well have been set too low in the baseline projection. As for the other variables in the baseline projection the assumptions can be considered more realistic, the chances of upside and downside variances occurring on them are more evenly matched.

The two figures delimiting the range from 0.9% to 5.1% of GDP correspond to the minimum and maximum sustainability gap in table 6.1. This makes sense, as the selected variant impulses in the sensitivity analysis are required to be reasonably likely to occur. They do not represent the theoretical minimum and maximum values, however. Indeed, more

substantial deviations cannot be excluded, although these are somewhat less likely to occur. In addition, simultaneous deviations could conceivably occur in several variables at once although again, the chances of this occurring may be somewhat smaller. For example, higher real international interest rates (and higher real international returns on shares) are very likely as global economic growth accelerates on the back of strong global growth in labour productivity. Stronger global economic growth will require higher capital investments.

The final notable feature of the range is that it is invariably above zero. This is connected with the point made above. A negative figure for the sustainability gap – which would imply that public finances were already sustainable at the present time – can by no means be excluded, but does have to be qualified as less likely on the basis of our analysis.

Table 6.1 Primary surplus 2011 and sustainability gap (in % of GDP)

	Primary surplus 2011	Sustainability gap
Baseline projection	4.8	2.6
Change in assumption versus baseline projection:		
1%-point increase in discount rate	4.4	0.9
0.5%-points stronger growth in labour productivity	5.7	3.6
2%-points higher labour market participation by women[a]	4.7	2.3
5%-points higher labour market participation by people aged 55-65[b]	4.8	2.3
10% higher fertility rates	4.9	2.8
3.4 years extra increase in life expectancy	6.2	5.1
0.5%-points higher growth in health care expenditure up to 2046	6.7	4.9
Full indexation of supplementary pensions	4.7	2.6

[a] This participation rises for ten years from 2006 by 0.2%-points per year.
[b] This participation rises for ten years from 2006 by 0.5%-points per year.

6.3 A higher discount rate and a stronger increase in labour productivity

Discount rate

A 1%-point increase in the discount rate reduces the extent of the measures required by 1.6% of GDP. Clearly, then, the sustainability gap is highly sensitive to discount-rate levels. A higher discount rate makes it easier to realise sustainable public finances mainly because the discounted value of future primary budget deficits declines as the discount rate rises.

The choice of the discount rate is crucial for the sustainability assessment. In the Dutch situation, sustainability of public finances tends to worsen as the discount rate declines. A lower discount rate gives more weight to the more distant future. Since actual primary surpluses are positive in the near future and negative in the distant future (see figure 3.1), a low discount rate tends to reduce their aggregate present value, thereby worsening the sustainability of public finances. The intuition for this interest-rate effect is that the current generations must build up through the government a buffer for the rise in age-related expenditures notably, public pensions and health care. A low return on this buffer is undesirable, and compels us to save more in this virtual 'fund'.

This might sound confusing for some readers who are used to thinking in terms of a higher burden of interest to be paid on government debt. It should be realised, however, that along the sustainable baseline path current generations build up positive financial wealth. This is necessary to cover future primary deficits without shifting the burden to future generations. The key intuition is thus that the impact of the discount rate depends on whether the government can be considered as a net creditor or a net debtor (on average) over time. Since in the Netherlands initial net debt is fairly small, and primary surpluses lead to a substantial positive financial wealth position in the near future, the Dutch government can (on average) be regarded as a net creditor.

Additionally, a higher real return on pension funds' investments allows pension contributions to be reduced. Public finances benefit from lower pension contributions, owing to the existing tax subsidy for pension savings. Furthermore, an increase in the interest rate reduces the wage rate, thereby reducing employee wages in the public sector and social security benefits. Against this, the government's initial debt position carries higher interest payments if interest rates are higher which in itself would hamstring the attainment of sustainable public finances. In the Dutch context, however, this effect is insufficiently pronounced to necessitate additional budgetary measures at higher discount rates.

The substantial impact of a change in the discount rate on the sustainability gap can be derived, in part, from the level of the discount rate in the baseline projection since a 1%-point increase in the discount rate from an original discount rate of 3% represents a discount-rate hike of no less than 33.3% in relative terms.

Growth in labour productivity

The second sensitivity variant in table 6.1 shows the effects of growth in labour productivity pegged 0.5%-points higher than in the baseline projection. This variant pushes up the extent of the measures required in 2006 by 1.0% of GDP. A stronger increase in labour productivity widens the sustainability gap, as the primary budget deficits to be expected due to ageing will, in terms of today's prices, be greater as economic growth accelerates in the future. In other words, the burden of ageing becomes more onerous against a backdrop of higher economic growth. An important reason is that higher growth in labour productivity entails a greater increase in not only government revenues but also government expenditure. That is because social security benefits, salaries for employees in the public sector and non-age related public expenditure are assumed to grow proportionately with wages. As a result, the primary budget deficits expected to arise from ageing will likewise be higher, at constant prices. That is why higher future economic growth requires greater primary budget surpluses in the near term if sustainable public finances are to be realised.

But that is not the whole story. Another important factor is that stronger growth in labour productivity also requires higher pension premiums, if pension funds adjust pensions and pension rights accrued in line with the wage increase. This has an adverse effect on the primary budget balance, as taxpayers are permitted to deduct pension premiums from taxable income.

While the government will also derive greater tax revenues over time from the supplementary pensions, the present value of those additional revenues is lower than the present value of tax revenues lost owing to the deductibility of pension premiums. In addition, the revenues from financial assets will drop in terms of GDP if labour productivity growth develops more favourably.

Two comments are in order on this productivity growth variant. First, stronger growth in productivity leads to greater prosperity in all cases, and is therefore desirable. Second, it needs to be noted that stronger growth in labour productivity makes it easier to achieve a reduction of the ratio of public expenditure to GDP by not having stronger growth in labour productivity accompanied by concomitantly higher public spending for one or several years. Doing so reduces the effect of accelerated growth in labour productivity on the sustainability gap. Even a reduction of the sustainability gap is quite conceivable in those circumstances, if public expenditure declines sufficiently in the future. That the growth of public expenditure can indeed lag behind economic growth over a number of years is illustrated by the development of public expenditure in the period 1982-2005. Whereas the share of net public expenditure in GDP was still at 49.4% in 1982, it had declined to 40.8% by 2005. Not letting the more rapid growth of labour productivity be matched during one or more years by proportionately higher growth in public expenditure can be attained, for instance, by capping growth of employment in the public sector. A reduced increase in employment in that sector is possible if labour productivity in the public sector develops more favourably. Lower growth of public expenditure can also be realised by virtue of the fact that the greater welfare allows more responsibility to be taken on by citizens themselves for instance, in terms of health care. A reduction of the share of public expenditure in GDP can also be achieved by having salaries for employees in the public sector and/or benefits lag behind wage increases in the market sector and/or having the increase in material public expenditure lag behind economic growth.

Over a longer horizon, the impact of labour productivity growth depends on what happens to government expenditure. If the time path of expenditures is given, then higher labour productivity growth obviously contributes to sustainability, as it leads to higher revenues (which grow with the tax base) relative to expenditures. A higher growth of the tax base by 0.5%-point on a permanent basis at a given time path of expenditures can easily reduce the sustainability gap by 5% of GDP. The question, however, is whether this is a relevant exercise. First, it would imply that all expenditures of the government would lag behind in growth relative to income in the private sector. Thus, spending on not only education and culture, but also pensions and social insurance, will fall relative to private sector income. In the present framework this is rather to be regarded as a policy to diminish expenditures and social security. Second, the exercise would violate the Musgrave criterion for intergenerational distribution, as future generations would see their net benefit shrink relative to the contributions they pay through taxes. So, even if one considers such a scenario as possible, it is of little help as a measure of intergenerational equity. Instead of bearing an explicit debt, future generations then have to deal with lower benefits from government expenditures.

Similarly, exercises that show that there is no sustainability problem if government expenditures are kept constant in absolute terms are also of little help (*e.g.* Hauner (2005)). Indeed, if expenditures do not grow at all, the sustainability gap decreases by no less than some 10% of GDP. Obviously, the time path of the primary surplus then becomes upward- instead of downward sloping so that the surplus can be negative in the first years. Again, this does nothing toward solving the problem of future generations, who will suffer from these lower expenditures. In a long-term context it is natural to assume that government expenditures grow in line with private sector output. In that case, the rate of labour productivity growth proves to have a negative impact on sustainability. This is essentially the mirror image of the positive impact of the discount rate.

Table 6.1 shows that a 1%-point increase in the discount rate will reduce the required structural primary balance in 2011 only to a limited extent. The latter balance declines from 4.8% of GDP in the baseline projection to 4.4% of GDP in the uncertainty variant which is based on a discount rate of 4% instead of 3%. Why is the required structural primary balance in 2011 only 0.4% of GDP lower, while the sustainability gap is 1.7% of GDP lower? This can be explained by the improvement in the actual primary balance in 2011 by 1.3% of GDP which takes place in this uncertainty variant. While – assuming no policies to achieve sustainable public finances – the actual primary balance equals 2.2% of GDP in 2011 in the baseline projection, this balance amounts to 3.5% of GDP in 2011 in this variant.

This improvement of the primary balance in 2011 under unchanged policies stems for a large part from lower wages in the private sector. An increase in the real rate of interest implies a higher cost of capital. This results in lower wages in the private sector. In turn, this reduces both wages of employees in the public sector and social security benefits. The improvement in the actual primary balance is partly the result of an increase in government revenues. This increase occurs, since the higher real rate of interest encourages households to save more, which has a beneficial impact on the revenues of the investment yield tax.[35]

6.4 Higher labour market participation

Labour market participation in our country is – in terms of headcount – comparatively high in an international perspective. The position occupied by the Netherlands in this respect has improved considerably in the past twenty years, due to the fact that growth in employment reached US levels in the period 1985-2000. The strong growth in jobs in that period was made possible by a significant increase in the supply of labour. This is a period in which the Netherlands made up a great deal of ground in terms of women's labour market participation,

[35] It should be noted that according to GAMMA the actual primary balance improves quite quickly in this uncertainty variant. A rise in the real rate of interest will improve the actual primary balance also according to CPB's macroeconomic model SAFFIER, but according to this model it will take more time for this improvement to materialise, since the underlying processes will take more time than according to the applied general equilibrium model GAMMA.

and in which a reduced tax burden on income from work (together with various measures in the field of social security) boosted labour market participation.

The Netherlands scores significantly less well, however, when it comes to labour market participation in terms of the number of hours worked. In an international perspective, the number of hours worked per capita of the population in our country is low. In fact, in no other OECD country is the average number of hours worked per employee as low as in the Netherlands. Employees in the Netherlands average a mere 1340 hours worked per year, against an average of 1615 hours in the EU and 1815 hours in the US. Average hours worked are clearly comparatively low in the Netherlands. This is because comparatively many people work part-time, and the number of hours worked by people working full-time is relatively low. The jump in labour market participation by women was accompanied by a strong increase in the number of part-time jobs. Many women prefer part-time jobs, and an increasing number of men have swelled the ranks of part-timers.

In the coming years, the growth in labour supply is expected to flatten out rapidly. This is due to the combination of ageing and increasing labour market participation of women and older persons (55 to 65 years old). The future development of labour market participation is highly uncertain, however. Labour market participation could rise more strongly than is assumed in the baseline projection, it also has the potential to disappoint. The effects of a favourable trend are discussed here by reference to two variants. In the first, women's labour market participation in the period 2006-2015 outpaces growth in the baseline projection by 0.2%-points annually. In the second variant, the rise in labour market participation by the group of 55-64 year-olds accelerates by an additional 0.5%-points per year. These figures reflect that because the participation rate of people aged 55-64 is relatively low, there is relatively much room for an increase. Furthermore, the size of the impulses is chosen such that the labour participation rate of women and elderly become more similar to those in the Global Economy scenario (Roodenburg and Van Vuuren (2004)). They are not fully similar, as this would require additional policy measures which are absent in our sensitivity analysis.

A strong increase in labour market participation will benefit public finances, since economic growth speeds up as growth in labour supply accelerates. Accordingly, the basis for financing government expenditure will be improved by stronger growth of labour supply. On the basis of a favourable trend in labour market participation, ageing therefore reduces government expenditure in terms of GDP. In both the variant with a stronger increase in women's labour market participation and the variant with a stronger increase in labour market participation of the elderly, the measures required in 2006 to attain sustainable public finances are lower by 0.3% of GDP.

6.5 Uncertainty on demographic trends

Demographic trends are one of the factors in the future development of public finances. An unexpectedly strong rise in life expectancy is of course a blessing for those who thus have longer to live (in good health, one hopes), but for public finances an extended life expectancy is at a given set of collective arrangements perhaps not a curse, but certainly not a blessing. Not only life expectancy is uncertain; so is fertility. The baseline projection assumes that the average number of children per female will remain stable at 1.7. Higher birth rates initially affect public finances adversely because children do not contribute to the funding of government, but rather entail additional expenditure. Conversely, there is the obvious potential benefit that a greater number of children per female can, over time, mitigate the impact of ageing, as the potential labour force will grow in due course as a result of rising birth rates.

Life expectancy

Assumptions on the development of life expectancy have recently been reviewed in some depth (Westerhout and Pellikaan (2005)). The study concluded that a much steeper rise in life expectancy than assumed in the baseline projection is not at all that unlikely. To allow for this, we present a sensitivity variant in which life expectancy from 2006 – inspired by the living-longer scenario of the aforementioned study – is 3.4 years longer than that assumed in the baseline projection. In this variant, the sustainability gap in 2006 is 2.4% of GDP greater than in the baseline projection. Two factors contribute to a need in that case for more budgetary measures to realise sustainable public finances. In the first place, greater budget surpluses are required over the coming years to be able to fund the future strong increase in public pension and health care expenditures if life expectancy is raised. A second major factor is that a steeper-than-expected rise in life expectancy will force pension funds to increase pension premiums to be able to fund future pensions. Owing to the tax subsidy for savings through pension funds, this represents an expense for the government.

Fertility

The consequences of greater fertility have likewise been quantified, by reference to a variant in which fertility figures from 2006 exceed those in the baseline projection by 10%. The sustainability gap in this variant is higher by 0.2% of GDP in 2006 than in the baseline projection. This can be ascribed to the fact that, on balance, individuals derive net benefits (measured over the entire lifetime) from the government. That is to say, viewed over the entire lifetime of individuals, the discounted value of tax and premiums remitted to the government undercuts the discounted value of the public expenditure from which these individuals benefit; there is, accordingly, a net charge for the government.

6.6 Higher growth of health care expenditure

Another source of uncertainty to be discussed here is the development of health care expenditure. According to many authors, the income elasticity of health care expenditure is greater than one (for a summary, see Westerhout (2006)). Additionally, technological progress in the field of medicine can prompt an increase in health care expenditure, owing to the potential of new technologies to boost demand (Weisbrod (1991)). One reason is that new technologies often serve to extend life. Another is that they can pioneer treatment of previously incurable diseases. A third reason why growth in health care expenditure might exceed that of GDP is known as the Baumol effect: if growth in labour productivity in the health care industry falls behind that in other sectors of the economy (while its wage growth keeps up with them), the result will be a continual relative price increase in the health care sector (Baumol (1967)).

The baseline projection in this study combines a unitary income elasticity of health care demand with an ageing effect. Higher health care expenditure on account of higher income elasticity, medical-technological progress and the Baumol effect are not taken into account.

It is certainly plausible that health care expenditure will develop as projected in the baseline scenario: until 2040, the growth rate of health care expenditure in terms of GDP is similar to the corresponding figures in the Regional Communities and Strong Europe scenarios from CPB's 2004 Scenario study (Bos *et al.* (2004)). Perhaps a better motivation for our baseline scenario is to say that this scenario implicitly states that health care policies will adjust in such a way as to keep the health care expenditure-to-GDP ratio from rising (apart from the ageing effect). This assumption is in line with the general methodology in this study that all public expenditure items grow proportionately with wages or GDP. It again underlines the fact that the baseline scenario is not so much a projection, as a benchmark.
Hence, growth in health care expenditure may thus be much higher than was assumed in the baseline projection. The above discussion also illustrates the fact that it is sometimes difficult to make a clear distinction between sensitivity variants and policy variants. This distinction is related strongly to the concept of policy neutrality, the definition of which is ambiguous. As long as the policy variants are discussed on a global level only, however, the labelling of variants as sensitivity variants or policy variants is not really an issue.

A variant has been calculated in which the growth in health care expenditure in the period 2006-2046 is 0.5%-points per year higher than in the baseline projection. This variant is more in line with the Transatlantic Market and Global Economy scenarios (Bos *et al.* (2004)). Needless to say, more budgetary measures will be required in that case in 2006 in order to realise sustainable public finances. This is due to the fact that more rapid growth in demographically sensitive government expenditure will require additional future debt repayments to create sufficient budgetary scope by way of lower interest payments. The sustainability gap in this variant in 2006 exceeds that in the baseline projection by as much as 2.3% of GDP.

6.7 Full indexation of supplementary pensions

The baseline projection sees pension funds curtailing pension indexation until around 2025. This limited indexation adversely affects retirees' purchasing power and the accrual of pension rights by employees. It is possible that the social partners will decide to limit the curtailment of indexation in the coming decades, in contrast to the assumption made in the baseline projection. The effects of such a decision can be illustrated using a variant in which the social partners always opt for full indexation of pensions and pension rights as from 2006. Clearly, the pension funds will increase pension contributions in the event of full indexation, as actuarially fair contributions will be higher if accrued rights are indexed in full. In this variant the pension contributions increase less rapidly in the coming decades than actuarially fair contributions because the funds to some extent contain increases in the form of catching-up contributions. That kind of moderation does, however, imply that catching-up contributions will continue to be required even beyond 2025, in which year the baseline projection allows them to lapse.

The higher pension contributions obviously harm public finances in the variant concerned. This will be partly offset by increased revenues from both direct and indirect taxes. As a result, the net adverse effect of full indexation of pensions and pension rights on the sustainability gap in 2006 is limited to 0.1% of GDP. There is, however, no return to a net contribution, as the increase in total pension costs entailed by full indexation concomitantly increases the implicit subsidy applying to collective pension savings.

7 Policy analysis

Various alternative policies can be pursued to achieve sustainable public finances. This chapter compares some of these alternatives with the benchmark of an immediate and permanent cut in material public consumption. It focuses on differences in economic and intergenerational distributional effects. Raising taxes to achieve sustainability implies that both employment and output are lower than in the benchmark. This effect is most visible in the case of an increase in the labour income tax. The effect that occurs when the consumption tax is increased is similar, but less pronounced. All policies analysed imply redistribution across generations. The delay variant is most outspoken. The income transfers from future generations to currently living generations that result when policy adjustment is postponed to 2040 are obviously enormous. The redistribution effects that correspond to an increase of consumption or labour income taxes are comparatively fairly small, but still much larger than the effects that occur in some other cases (when the income tax subsidy to retirees is abolished, when rather than tax smoothing, tax plus premium smoothing is applied, and when the statutory retirement age is increased). On balance, intergenerational redistribution may occur as much from changes in lifetime incomes as from changes in net benefits from the government.

7.1 Introduction

The previous chapters used only one of the many possible instruments of government policy to render sustainable public finances, *i.e*. material government consumption, and in all cases assumed that the policy was implemented immediately. This chapter explores a number of alternative ways of achieving sustainability. Concrete policies are not considered here; that would exceed the scope of this study.[36] Rather, we present more global measures that sharply demonstrate the range of possible effects from policy reforms. In particular, this chapter analyses measures that (in contrast to government consumption) exert behavioural feedback effects on labour supply and private saving; measures that are targeted specifically at the elderly rather than all age groups equally; and measures that are implemented with a delay rather than immediately. We focus on economic, budgetary and intergenerational effects: employment and output, the key indicator of public finances in this study (*viz.* the sustainable primary government balance) and the lifetime welfare effects across cohorts.

This chapter first shows how the policy adjustments that are necessary to render public finances sustainable affect the welfare of average members of each cohort (generation). Policy options to achieve sustainability are then discussed in detail by comparing their economic, budgetary and intergenerational effects. This provides us with a clear understanding of the pros and cons of the various options, and explains the differences in outcome and the mechanisms that lead to these differences in outcome.

[36] See De Mooij *et al.* (2006) for a comprehensive analysis of policy measures that aim at increasing labour market participation.

7.2 How does achieving sustainability affect the welfare of cohorts?

To understand the effects of policies, we can examine their consequences on the welfare of separate cohorts. This section facilitates this process by showing how the lifetime welfare of an average member of each cohort is affected by various ways in which the government can achieve sustainability. The policy options are compared to a situation in which policies are not adjusted (and are thus unsustainable).

As in chapter 5 (where levels of lifetime welfare are calculated), the measurement of lifetime welfare spans the full (remaining) lifetime. Lifetime welfare is defined as the sum of present values (at the year of birth) of three components: primary income, net benefits from the public sector (the balance of benefits and burdens) and net benefits from pension funds. Comparability of the net benefits of unborn generations is obtained by adjusting their net benefits by a factor that corresponds to the difference in lifetime income. The first component, the changes in primary income, can in a way be interpreted as the efficiency gain or loss due to the policy change (although any changes in leisure time are not included).

In addition to our benchmark policies of adjusting material public consumption, we select four policy options for achieving sustainability:

1. Raising indirect taxes in 2006. This variant introduces behavioural feedbacks, mainly by a reduction in labour supply. Another difference is that its annual incidence across age groups (its 'age profile') is not flat, as in the benchmark variant, but follows the pattern of private spending through life.
2. Reducing government consumption in 2040 rather than in 2006. This variant is chosen to represent the effects of a delay of adjustment.
3. Abolishing the tax privileges of pensioners. This variant targets the costs of adjustment at the elderly. It also has effects on labour supply and private saving. To the extent that this policy does not close the entire financing gap, government consumption is curtailed in 2006 to close the remaining part of the gap.
4. Raising the retirement age by two years. This variant also targets the costs of adjustment at the elderly. In 2015, the age of retirement is raised by one year to 66, followed by a further rise to 67 in 2025. As in the previous variant, the remaining part of the financing gap is closed by curtailing government consumption.

Figure 7.1 shows how the lifetime welfare of cohorts is affected in each of these five policy options. Ageing and the declining revenues from gas are shown to represent a major overall cost in all variants. In all variants, cohorts see their lifetime welfare decrease or remain constant. In addition, the costs of the adjustment generally rise the younger the cohort involved is. Apart from the delay variant, the costs of adjustment increase up to 30 to 40 thousand euros in present-value terms, and stabilise at that level for the yet-unborn generations (when corrected for their higher lifetime income). These maximum levels correspond to 3.3% to 4.5% of

lifetime welfare. In the delay variant, the elderly obviously escape the costs of adjustment. This variant, however, increases the costs for the unborn cohorts to a (income-corrected) level of 55 thousand euros (which corresponds to 6.5% of lifetime welfare).

Figures 7.2 and 7.3 provide a decomposition of figure 7.1 by presenting the effects of the variants on lifetime incomes and net benefits from the government, respectively. Net benefits from pension funds are not presented separately because these effects turn out to be negligible. The figures show that the bulk of the costs of the adjustment lie in the lower net benefits from the government. The effects of adjustment costs on lifetime incomes are either fully absent or small relative to those of net benefits from the government. Note, however, that these effects are only relatively unimportant if they are compared to an (unrealistic) no-policy-change scenario in which the changes in net benefits from government are very large. As will be seen in the following section, changes in lifetime incomes do play an important role in a comparison of the policy options and the differences in net benefits from the government become much smaller.

Figure 7.4 shows how government debt develops in these five variants and in the case in which policies are not made sustainable. It shows that government debts explode if no policy adjustment takes place at some point in time. In the variants that implement sustainable policies in 2006, government debts are significantly reduced and in most cases even eventually turned into an asset position. Only in case of an adjustment delay until 2040, government debt is stabilised at a very high level. Even then, sustainability is achieved, as the public debt ratio stabilises. Delaying the adjustment benefits current cohorts, but leads to increasing debt levels that eventually burden the yet-unborn cohorts.

Figure 7.1 Lifetime welfare effects of achieving sustainability on cohorts (1 000 euro)

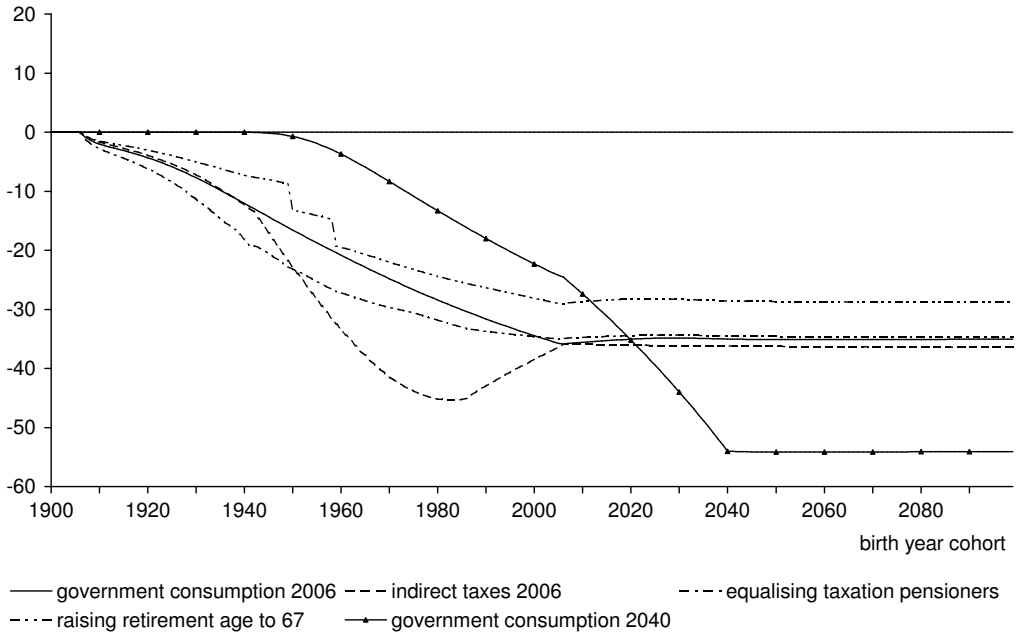


Figure 7.2 Lifetime income effects of achieving sustainability on cohorts (1 000 euro)

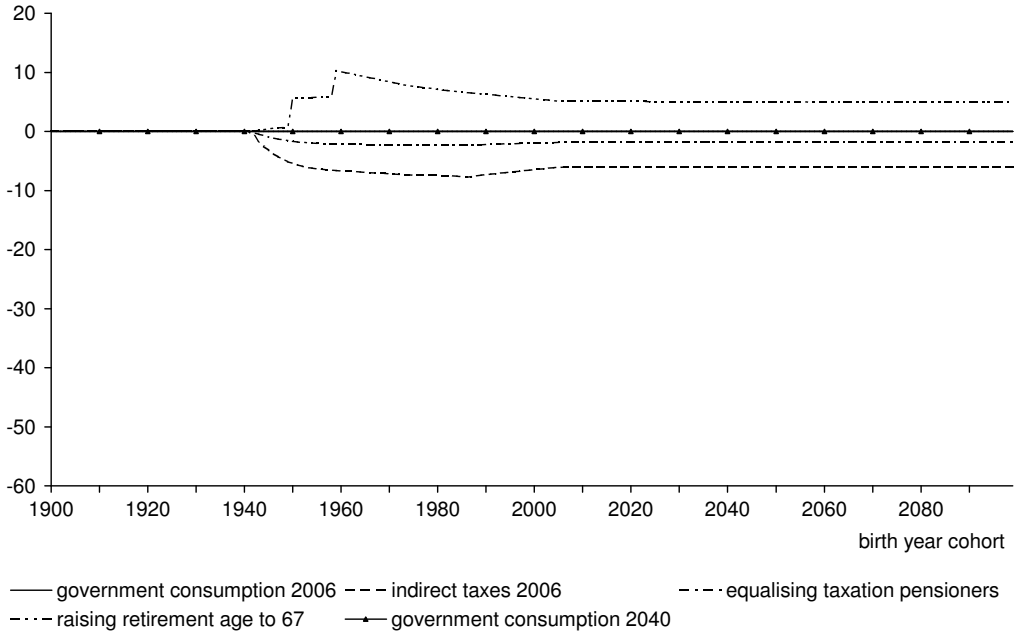


Figure 7.3 Net government benefit effects of achieving sustainability on cohorts (1 000 euro)

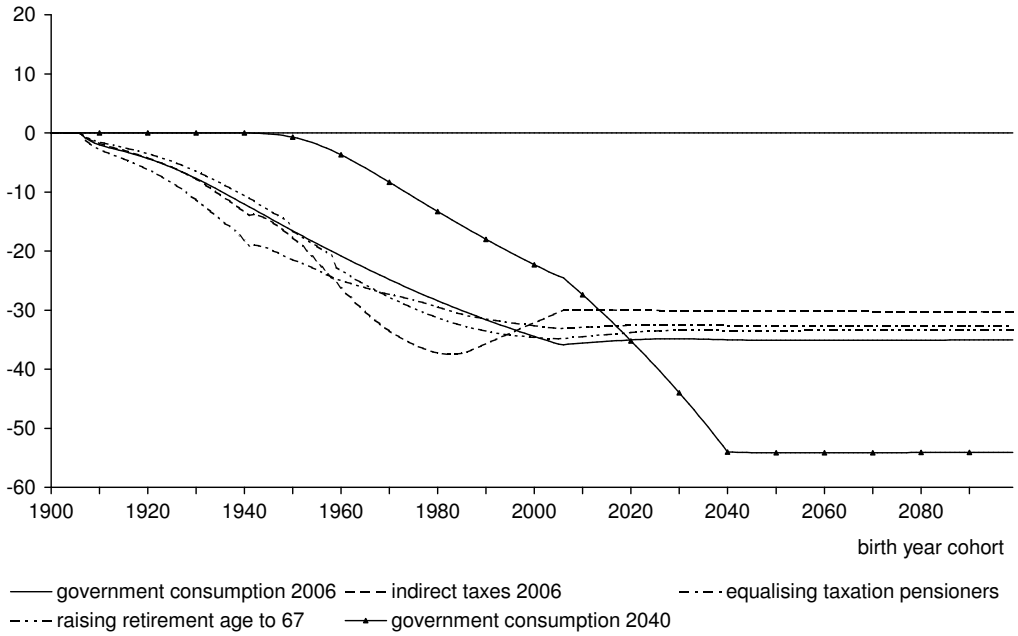
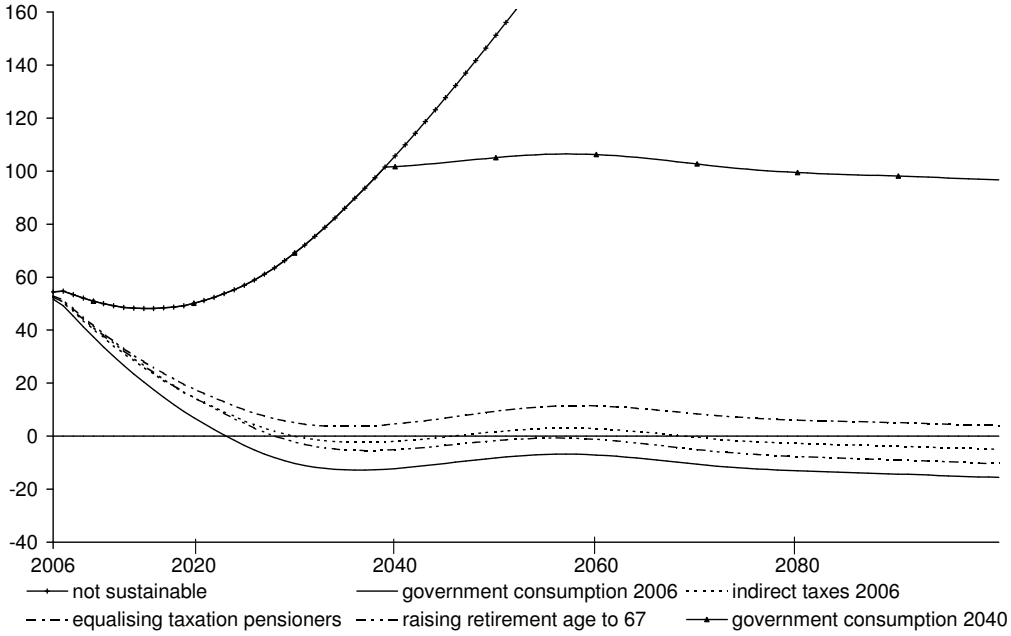


Figure 7.4 Government debt (% of GDP) under unchanged policies and in five variants



7.3 Raising taxes as an instrument to realise sustainable public finances

The study now turns to an analysis of the economic, budgetary and intergenerational effects of the policy options outlined above for achieving sustainability. The approach is to compare the policies with the benchmark variant. In addition to analysing the variants mentioned above, we also examine two other variants: one that renders government finances sustainable by raising taxes on labour income and one that smoothes taxes plus pension contributions (rather than taxes only).

Raising indirect taxes

The benchmark variant assumes that sustainable public finances will be realised through a reduction in material government consumption. As stated above, the method of cutting back on government consumption is one of many ways in which sustainable finances can be achieved. Achieving sustainable public finances by increasing indirect taxation will require an increase in indirect taxation of 2.0% of GDP.

Table 7.1 shows the effects of such an increase in indirect taxation in 2006. This variant obviates the need for a curtailment of material government consumption by 2.6% of GDP from 2006. The primary EMU balance is 0.5% of GDP lower in 2011. In this case, attaining sustainable public finances in the near term requires a less demanding target for the primary EMU balance in 2011, because revenues from an increase in indirect taxation will grow in the future under the influence of ageing. The impact of ageing thus 'lifts' the share of consumption in GDP in the next few decades. The primary EMU balance will therefore improve to a greater

extent, over time, in this variant than in the baseline projection in which sustainable public finances are realised by a reduction in material government consumption.

Unlike curtailment of public consumption, an increase in indirect taxation produces behavioural effects. The main reason is that a higher rate of indirect taxation of consumption results in less real income from labour, which in turn causes a decline in labour supply. This variant therefore produces an adverse effect on employment and output. This hampers the attainment of sustainable public finances. It means that a more substantial change in tax rates is required in order to achieve the increase in tax revenues needed for sustainability.

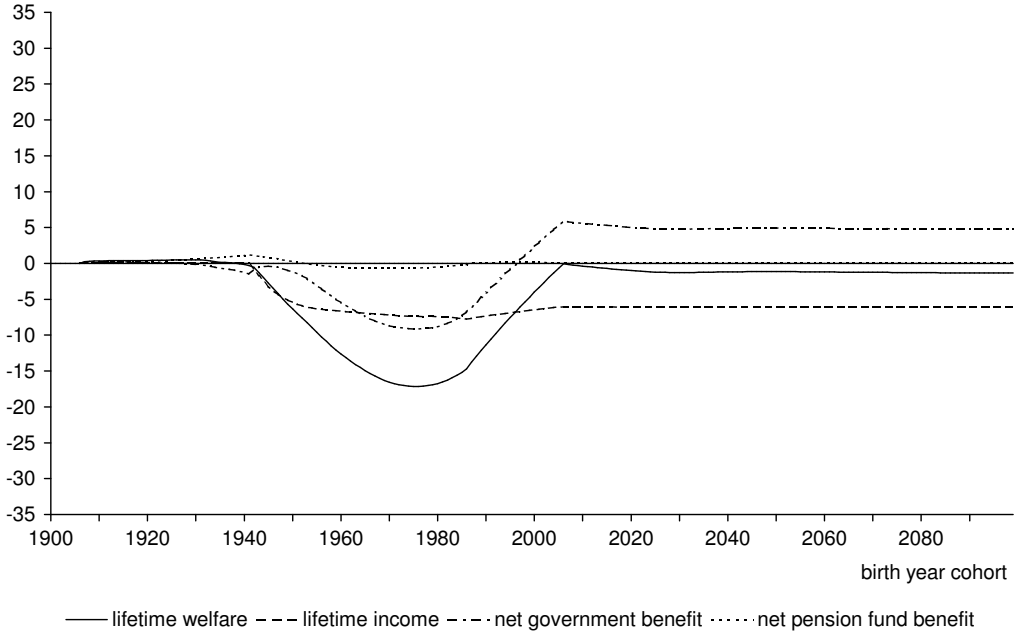
Table 7.1 Effects of realising sustainable public finances in 2006 by raising indirect taxes, compared to reducing government consumption

	2011	2020	2040	2060	2100
	% GDP				
Government consumption	2.6	2.6	2.6	2.6	2.6
Income taxes	– 0.4	– 0.4	– 0.4	– 0.4	– 0.4
Indirect and other taxes	2.0	2.1	2.3	2.3	2.3
Primary EMU balance	– 0.5	– 0.3	0.1	0.1	0.1
EMU balance	– 0.7	– 0.6	– 0.3	– 0.4	– 0.4
Government debt	3.6	7.6	10.2	9.9	10.6
	%				
Employment (in full time equivalents)	– 0.8	– 0.8	– 0.8	– 0.8	– 0.8
GDP at base prices	– 0.8	– 0.8	– 0.8	– 0.8	– 0.8

Figure 7.5 shows how this alternative affects cohorts. The cohorts included in the figure are classified according to their birth year, ranging from birth year 1906 (the oldest of the currently living in GAMMA) to birth year 2100. The figure presents the effects on not only lifetime welfare, but also its three components. Figure 7.5 shows that the policy change reduces lifetime primary income for each cohort with a birth year later than 1942. This results from the detrimental effects on employment and production that were mentioned above. The distributional effects by the public sector show significant changes. Older cohorts are affected negatively because their contribution to consumption tax revenues is higher than their share in the benefits of material public consumption. Overall, lifetime welfare declines also for all cohorts younger than 65. The costs, in the form of higher tax payments and lower labour income, clearly outweigh the benefits from higher public consumption.

Note that in this comparison of sustainable policy options, the changes in net benefits from the public sector and pension funds are purely the result of distributional effects, as the sum of net benefits from these sectors of the economy add up to zero. Therefore, unlike in the above presentation of intergenerational effects, changes in benefits cancel out across cohorts. The zero-sum property obviously does not imply that a change in policy by the government or by pension funds cannot have efficiency effects; it only means that these efficiency effects are reflected in changes in primary incomes, and not in the net benefits from these sectors.

Figure 7.5 Effects on cohorts of raising indirect taxes compared to the effects of reducing government consumption (1 000 euro)



Raising taxes on labour income

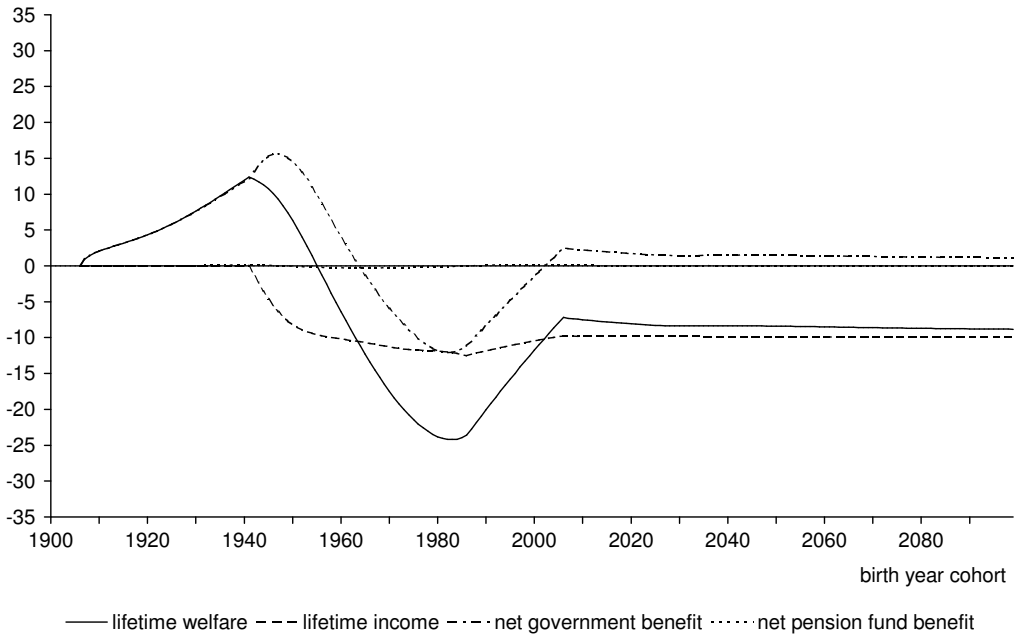
Sustainable public finances can obviously also be realised by increasing taxes on labour income. Table 7.2 shows the effects if public finances are made sustainable in 2006 using this instrument instead of a reduction of material government consumption. Again, therefore, curtailment of this material government consumption by 2.6% of GDP from 2006 onwards can be omitted. Instead, taxes on labour income have to be raised by 4.1% of GDP to achieve fiscal sustainability. The increase is so high because the decrease in spending power of households it brings about leads to a partially offsetting reduction in the revenues from indirect taxes. The sustainable primary balance in 2011 is still 0.3% of GDP higher than in the baseline case, however. This can be explained by the above-mentioned interaction between the tax on labour income and indirect taxes. As this variant raises the former at the expense of the latter (which is on average targeted at a higher age group), tax revenue collection is shifted to earlier stages of the life cycle. This corresponds to a higher requirement for the primary surplus in the near future, and smaller requirements in the distant future.

As was the case with an increase in indirect taxation, increases in income tax rates produce behavioural effects, since they depress net income from work. This causes labour supply and employment to decline. In this variant, the decrease in labour supply is more pronounced than in the previous variant because the labour income tax is fully targeted at the workforce, whereas the indirect tax is partially borne by pensioners who cannot avoid taxation by reducing labour supply.

Table 7.2 Effects of realising sustainable government finances in 2006 by raising taxes on labour income, compared to the effects of reducing government consumption

	2011	2020	2040	2060	2100
	% GDP				
Government consumption	2.6	2.6	2.6	2.6	2.6
Income taxes	4.1	4.2	4.4	4.3	4.4
Indirect and other taxes	– 1.2	– 0.8	– 0.9	– 0.9	– 0.9
Primary EMU balance	0.3	0.1	0.0	– 0.1	0.0
EMU balance	0.2	0.1	0.1	0.1	0.1
Government debt	0.2	– 1.2	– 2.3	– 1.9	– 1.9
	%				
Employment (in full-time equivalents)	– 1.3	– 1.2	– 1.3	– 1.3	– 1.3
GDP at base prices	– 1.3	– 1.3	– 1.3	– 1.3	– 1.3

Figure 7.6 Effects on cohorts of raising taxes on labour income, compared to the effects of reducing government consumption (1 000 euro)



The effects on cohorts (see figure 7.6) are to some extent similar to those in the previous variant (in which sustainability was achieved by raising indirect taxes): primary lifetime incomes are affected negatively (as a result of the effects on employment) and the young and future generations see their net benefits from the government increase. The effects on lifetime incomes are now larger, however, because of the larger employment effects. The redistribution via the public sector shows the difference with the previous variant that the cohorts older than birth year 1965 are now beneficiaries from the policy change because this group's remaining lifetime participation on the labour market (and thus the increased tax burden involved) is limited in this variant, whereas the group shares in the benefits from higher government consumption. The net benefits for the cohorts between birth years 1965 and 2000 are negative, due to the specific

targeting of this tax at the working ages that especially hits these groups (in a lifetime calculation). For the very young and unborn cohorts, the net benefits of the policy change are slightly positive. This reflects the net effect of the difference in age targeting between both measures. Lifetime welfare in this variant increases only for the age cohorts with a birth year before 1955. The other cohorts experience lifetime welfare losses mainly as a result of the dominant detrimental effects of the lower primary incomes.

7.4 Delaying budgetary adjustment

The continual assumption in this study has been that the government aims to realise sustainable public finances from 2006. It is also conceivable, however, that the government will decide to make public finances sustainable at a – much – later date. In other words, it could postpone the measures required for this aim. This section therefore explores a variant in which realising sustainable public finances is postponed to 2040, and the sustainability gap is assumed to be closed in that year by a reduction of material government consumption. If the government postpones measures to 2040, then realising sustainable public finances from that year onwards will require a reduction of material government consumption by 4.0% of GDP. The sustainability gap in 2040 will therefore have increased by 1.4% of GDP, as compared to 2006.

This increase in size may not seem very large and, at first sight, delay may therefore appear an attractive option as it enables 2.6% of GDP, almost double that figure, higher expenditure levels for a period of 34 years. It must be noted, however, that the 1.4% lower room for expenditure after the period of 34 years is permanent. An alternative way to present the 'exchange rate' involved in the delay would be to attribute its cost to a period that equals the length of the delay. This can be done by calculating how much more the budgetary adjustment in 2040 must be if policy in that year is geared in such a way that the lost ground due to the delay, in terms of the higher debt, is fully recovered in a period of 34 years, *i.e.* in the period 2040-2074. After 2074 government finances then equals the benchmark case of immediate adjustment.

It turns out that the required adjustment in 2040 in this variant amounts to a sizable 7.4% of GDP, rendering a 4.8% of GDP (7.4 - 2.6) higher primary surplus than in the sustainable benchmark. The additional benefit of 2.6% over the first 34 years must thus be followed by an additional burden of 4.8% in the 34 years after 2040 in order to return to the time path of the sustainable benchmark.

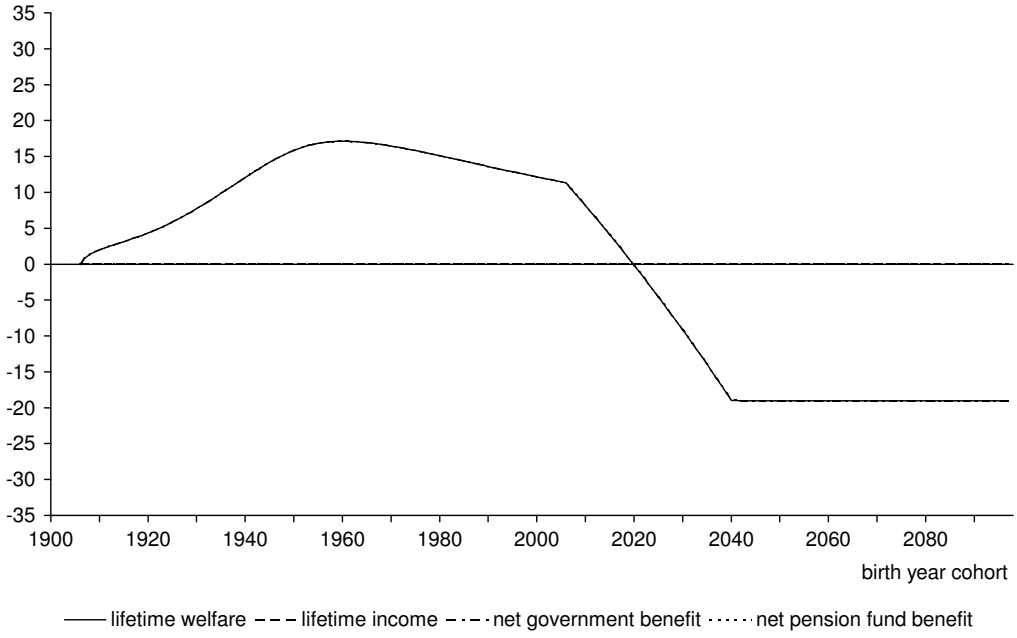
The effects of a delay on separate cohorts (see figure 7.7) follow the expected pattern. Lifetime incomes do not change, since changes in government consumption do not affect employment. A substantial distributional effect occurs, however, via the government. The elderly obviously benefit from the delay of adjustment. However, also groups that are faced with the increased size of the measure over a significant part of their lives benefit from the delay, as the short-term benefit turns out to outweigh the long-term burden involved in the higher requirement for budgetary adjustment. Even the unborn cohorts up to birth year 2020

seem to benefit from the delay. Later born cohorts will have to pick up the bill. The costs of the delay for the cohorts born after 2040 amount to a sizable 19 000 euros (income corrected) or 2.3% of their lifetime welfare.

Table 7.3 Effects of delaying the realisation of sustainable government finances by reducing government consumption from 2006 to 2040

	2011	2020	2040	2060	2100
	% GDP				
Government consumption	2.6	2.6	– 1.4	– 1.4	– 1.4
Income taxes	0.0	0.0	0.0	0.0	0.0
Indirect and other taxes	0.0	0.0	0.0	0.0	0.0
Primary EMU balance	– 2.6	– 2.6	1.4	1.4	1.4
EMU balance	– 3.2	– 4.5	– 4.2	– 4.1	– 4.1
Government debt	16.3	43.4	113.9	113.3	112.2
	%				
Employment (in full-time equivalents)	0.0	0.0	0.0	0.0	0.0
GDP at base prices	0.0	0.0	0.0	0.0	0.0

Figure 7.7 Effects on cohorts of delaying the reduction of government consumption to 2040 (1 000 euro)



7.5 Applying tax + premium smoothing

Of course, the government can also postpone raising taxes on labour income. The effects of postponing an increase in these taxes are discussed by a variant in which the wedge is stabilised as from 2006. The baseline projection discussed in chapter 5 features constant tax rates on labour income from 2006. The wedge on labour, however, is not constant over time in the

baseline projection. For example, the catching-up premiums that employees are required to pay to their pension funds in the coming years form part of the wedge (as these premiums are not accompanied by an accrual of pension rights but are intended solely to bolster the funds' capital). The early retirement premiums that employees are required to pay in the coming years under transition schemes facilitating early retirement for older employees likewise form part of the wedge. The reason is that payment of these premiums does not produce any accrual of rights to a future pre-pension. Given that both catching-up premiums and early retirement premiums are expected to diminish in the coming decades in the baseline projection, the wedge on work likewise diminishes over time. This means that a gradual increase in the tax burden on income from work is possible if, rather than the labour income tax, the wedge is stabilised as from 2006. In this case, a smaller increase in the tax on labour income is called for in 2006.

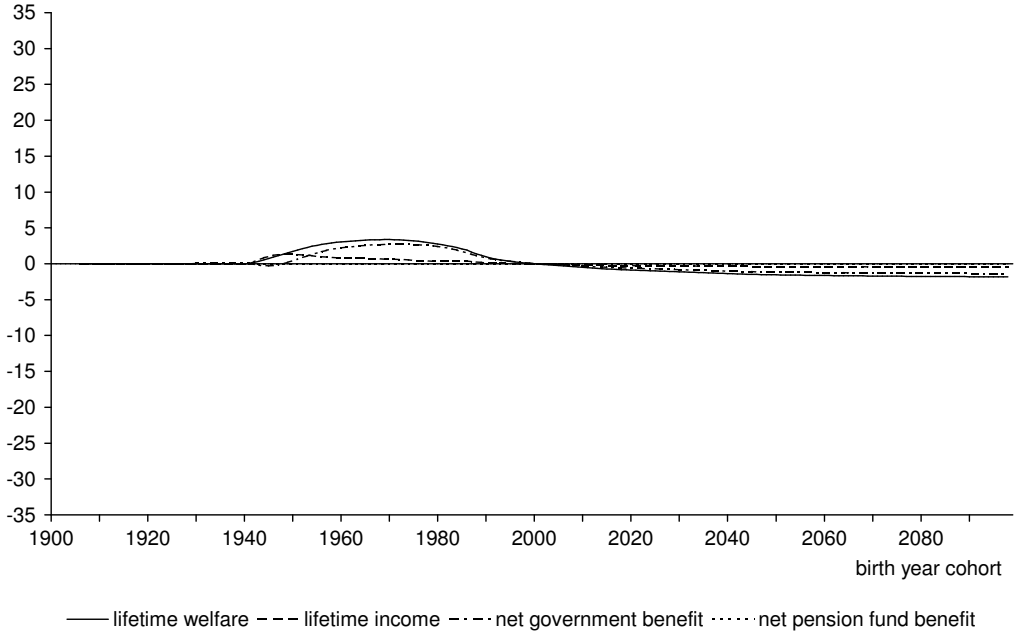
Table 7.4 shows the effects of this policy variant. In contrast to the other policy options, its effects are compared to those of rendering finances sustainable by an immediate rise of taxes on labour income. It is obvious that the delay reduces the size of the required primary surplus in 2011. In later years, this policy variant shows a higher primary surplus. Employment and output gain in the first decade, followed by a very small loss in later years.

Table 7.4 Effects of stabilising the sum of taxes and pension contributions

	2011	2020	2040	2060	2100
	% GDP				
Government consumption	0.0	0.0	0.0	0.0	0.0
Income taxes	– 0.9	– 0.2	0.1	0.1	0.2
Indirect and other taxes	0.0	0.0	0.0	0.0	0.0
Primary EMU balance	– 0.4	0.0	0.1	0.1	0.1
EMU balance	– 0.3	– 0.2	– 0.2	– 0.3	– 0.3
Government debt	3.9	4.5	5.5	6.3	7.0
	%				
Employment (in full-time equivalents)	0.2	0.0	0.0	0.0	0.0
GDP at base prices	0.2	0.0	0.0	0.0	0.0

Figure 7.8 presents the cohort effects. The delay of a rise in the tax on labour income benefits the elderly in three ways: by reducing the distortionary impact of the tax for these groups, by raising primary incomes, and by reducing the burden of taxation itself. The opposite effects can be seen for the younger cohorts, however. The effects in this variant turn out to be very small relative to those of the previous variants.

Figure 7.8 Effects on cohorts of applying tax + premium smoothing, compared to smoothing of taxes on labour income (1 000 euro)



7.6 Raising the taxation of pensioners

This section describes the effects of abolishing the exemption for contributing to the public pension scheme that currently applies to retirees. This policy measure does not result in a change in net public pension benefits paid to people who only have a public pension, because under the currently applied net-net linkage procedure, the amount of the net benefit payments they will continue to receive is derived from the level of the net minimum wage. Assuming the latter remains constant, net public pension benefit payments will not be affected by this policy. However, net pensions for those who have a supplementary pension alongside their public pension will be adversely affected by the equalisation of the taxation of pensioners. This measure thus amounts to an increase in the tax burden for people with a supplementary pension.

Table 7.5 shows the effects of equalising the taxation of pensioners from 2006. These effects were calculated by reference to the benchmark in which sustainability is achieved by a reduction of material government consumption. The boost in government revenue resulting from the abolishment of the exemption facilitates a smaller reduction in material government consumption in 2006: 1.8% of GDP instead of 2.6%. Because government revenue is set to rise even more strongly over time in this variant under the influence of ageing than is the case in the near term, a smaller improvement in the primary EMU balance is required in 2006 than in the baseline projection. In 2011, the sustainable primary surplus can be 0.7%-points of GDP lower than in the benchmark scenario.

Raising the taxation of pensioners in this way implies a larger wedge in GAMMA between employers' labour costs and employees' net wages. Labour supply therefore diminishes in this variant, and so, accordingly, do employment and production. The wedge increase occurs

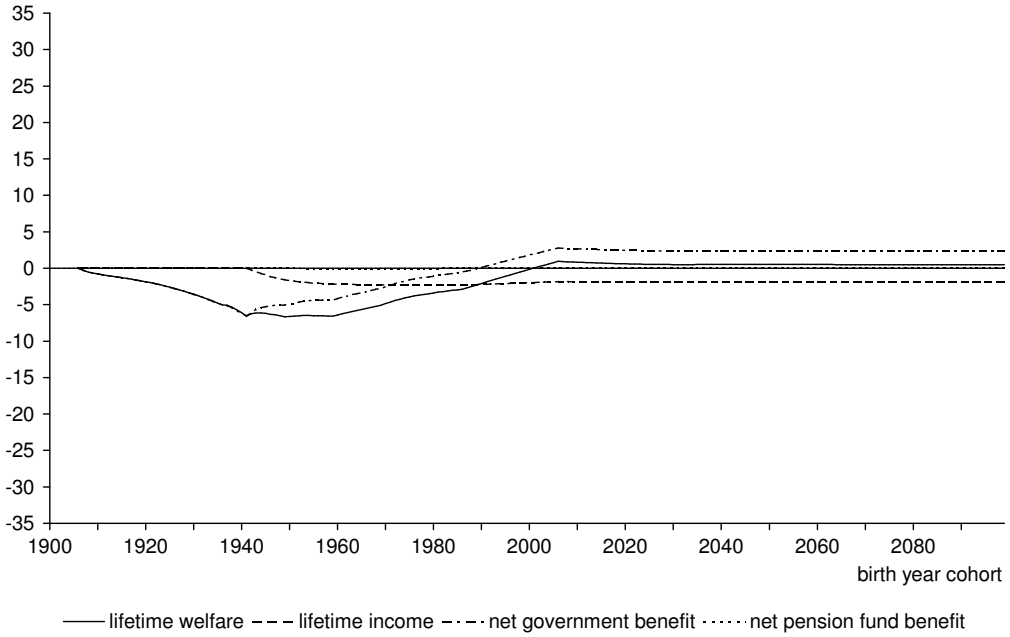
because the same pension contributions as before buy lower after-tax pensions in the future. Total net remuneration for work (*i.e.* including the present value of the future net pension) therefore decreases.

The cohort effects in Figure 7.9 are mostly negative. Cohorts younger than 65 are adversely affected due to the negative effects on employment and output. The current elderly are worse-off due to lower net benefits from the government. Higher government consumption translates into a benefit for the very young and future generations, which is relatively small.

Table 7.5 Effects of equalising the taxation of pensioners 2006, relative to a path with sustainable government finances as from 2006 by reducing government consumption

	2011	2020	2040	2060	2100
	% GDP				
Government consumption	0.8	0.8	0.8	0.8	0.8
Income taxes	1.3	1.6	2.3	2.2	2.3
Indirect and other taxes	– 0.4	– 0.3	– 0.2	– 0.2	– 0.2
Primary EMU balance	– 0.7	– 0.4	0.1	0.1	0.2
EMU balance	– 0.9	– 0.9	– 0.7	– 0.8	– 0.7
Government debt	5.0	10.8	16.8	18.5	19.5
	%				
Employment (in full time equivalents)	– 0.2	– 0.3	– 0.2	– 0.3	– 0.3
GDP at base prices	– 0.1	– 0.2	– 0.2	– 0.3	– 0.3

Figure 7.9 Effects on cohorts of equalising the taxation of pensioners (1 000 euro)



7.7 Raising the statutory retirement age

It was stated in chapter 2 that increased – and still increasing – life expectancy has already prompted a number of countries to take measures, including an increase in retirement age. One variant is therefore introduced to chart the effects of an increase in the statutory retirement age. This variant assumes that the age at which peoples' entitlement to a public pension and supplementary pension commences is raised in two steps, by a total of two years, to the age of 67. These calculations assume a one-year step-up of the retirement age in both 2015 and 2025.[37] We assume that, to the extent sustainability is not realised by this policy reform, the remaining gap will be covered by a reduction of government consumption in 2006.

The computations assume that the rate of labour participation after the increase in retirement age for the group aged 65 years (and 66 years, respectively) is the same as that for the group aged 64. On that assumption, the effects of the higher retirement age on effective labour supply in the baseline projection are limited, since the rate of participation for the 64-year-old group is rather low in this projection. The baseline projection assumes a participation rate for this group of 10% and 11%, respectively, for 2014 and 2024. While this represents a slight increase in participation (as compared to the present level of 8%), it is low compared to the labour market participation of the average cohort.

The increase in the retirement age means that the reduction in material government consumption can be more limited. Table 7.6 shows that it is 2.0%-points, which is 0.6%-points smaller than in the baseline projection. Fewer measures are now required for realising sustainable public finances since the higher retirement age results in a smaller increase in spending on public pensions in the coming decades, coupled with higher government revenues as employment and output are boosted.

The increase in employment in this variant is smaller than the increase in the labour supply of the group aged 65 and over, since the higher retirement age results in a greater wedge. The increase of the retirement age makes pensions less generous and indirectly reduces the subsidy implicit in second-pillar pension schemes. This reduces labour supply for all age groups. This effect is very small, though. This can be derived from the negligible impact on employment in 2011, before the rise in retirement age takes effect.

Figure 7.10 shows that primary incomes increase for all cohorts younger than 65. This is mainly a result of the lengthened stay in the workforce of those who are currently active at the age of 64. The distributional effects through pension funds are at first sight somewhat counterintuitive. It turns out that the rise of retirement age *benefits* the elderly (see the cohort older than birth year 1942). This is explained by the fact that these cohorts escape the

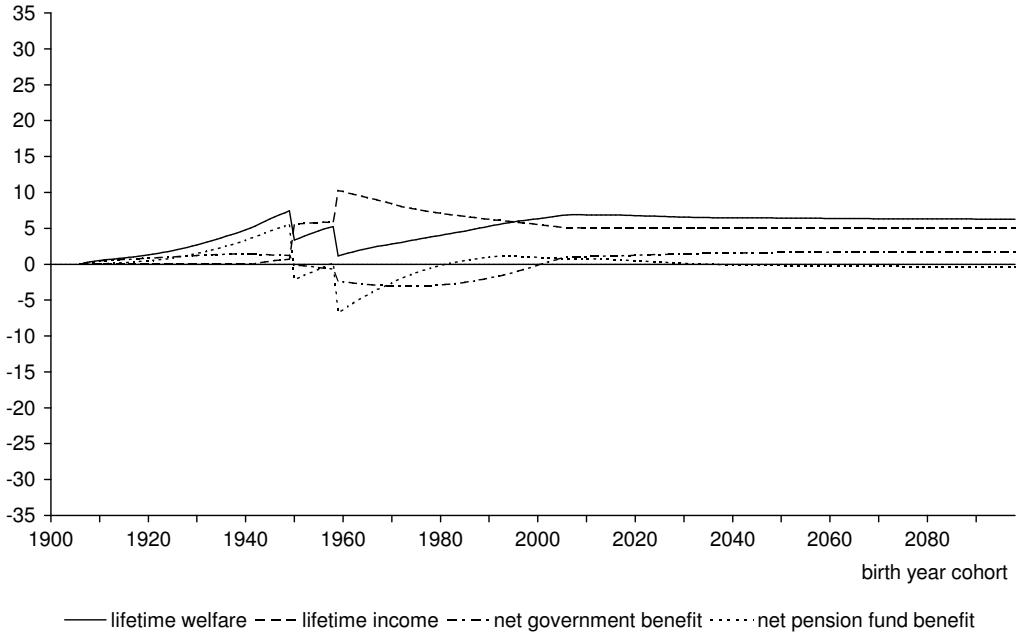
[37] If a greater number of steps are assumed for bringing the retirement age up from 65 to 67, as is the case in the United States and Germany, the effects to be expected are roughly comparable.

consequences of the rise in the retirement age. Moreover, the elderly even benefit from the rise because it reduces pension-fund liabilities, thereby improving the funding ratios of pension funds. This reduces the need to limit the indexation of pensions. The full burden is borne by the age groups that do face the direct consequences of the higher retirement age, but have a part of their careers behind them in which the contributions they made to pension funds were in accordance with the lower retirement age. The distributional effects through the government sector are relatively small. The elderly benefit because they are not faced with the higher retirement age, whereas they do benefit from the smaller reduction in government consumption and higher pensions. The middle-aged and younger groups carry the burden of this policy change. These groups are fully confronted with the higher retirement age. The net benefits (which are very small) for the newborns and unborn cohorts reflect the net effect of the difference in age targeting between the increase of retirement age (the elderly) and the offsetting government consumption (all age groups equally). The lifetime welfare effects are positive for all groups. Generally, this results from the prevalence of the increases in primary lifetime incomes. This effect has to be qualified, though, as it does not take the decreased consumption of leisure into account.

Table 7.6 Effects of raising the retirement age in 2015 and 2025 to the age of subsequently 66 and 67 years if sustainable government finances are realised from 2006 through a reduction of government consumption

	2011	2020	2040	2060	2100
	% GDP				
Government consumption	0.6	0.6	0.6	0.6	0.6
Income taxes	0.2	0.4	0.3	0.2	0.2
Indirect and other taxes	– 0.2	– 0.1	– 0.2	– 0.2	– 0.2
Primary EMU balance	– 0.7	– 0.1	0.1	0.1	0.1
EMU balance	– 0.9	– 0.5	– 0.2	– 0.3	– 0.3
Government debt	4.4	7.6	7.1	5.9	5.9
	%				
Employment (in full-time equivalents)	0.0	0.4	0.7	0.7	0.7
GDP at base prices	0.0	0.5	0.8	0.9	0.9

Figure 7.10 Effects on cohorts of raising the retirement age by two years (1 000 euro)



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